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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии
საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

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GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman (Кириллица)**, для текста на грузинском языке следует использовать **AcadNusx**. Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - <http://www.spinesurgery.ru/files/publish.pdf> и http://www.nlm.nih.gov/bsd/uniform_requirements.html В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректур авторам не высылаются, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or computer-printed on a single side of standard typing paper, with the left margin of 3 centimeters width, and 1.5 spacing between the lines, typeface - **Times New Roman (Cyrillic)**, print size - 12 (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf

In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned
Requirements are not Assigned to be Reviewed.**

ავტორთა საქურაღებოლ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დაიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx**. შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრაფიების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შედეგის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფხიხლებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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AWARENESS OF LYME DISEASE AMONG VOCATIONAL SCHOOL STUDENTS AND CHILDREN (TERNOPIL REGION, WESTERN UKRAINE)

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Abstract.

Aim: The research goal is to assess the awareness of Lyme borreliosis among students and parents whose children were bitten by ticks (aged 3 to 18 years) and to inform about preventive measures that are carried out in case of contact with ticks in college students and bitten children in Ternopil region (Western region of Ukraine).

Material and methods: The research was conducted by surveying 95 18-year-old first-year students of a vocational technical, and 78 parents whose children were bitten by ticks (children aged 3 to 18 years). Children of this group were treated for EM. The participants filled out the questionnaire.

Results: Participants of both groups were bitten by ticks mainly in the rural areas. In most of the respondents, the tick was removed not later than 12 hours from the moment of the bite. 43% of students and 47% of children's parents did not remember the fact of a tick bite. About a third of students believed that the source of the disease is bacteria and viruses.

More than a third of children, 36,62%, showed very low awareness of Lyme borreliosis. When removing a tick 11,1% of students filled the tick with fat, and 42,0% twisted it with tweezers. Only 33,3% of children and their parents went to the trauma center for tick removal. In fact, only 28% of students went to the hospital.

Conclusions: Training the correct methods of removing ticks and prevention of tick bites (clothes, repellents) should become an important element of measures to protect students in regions with a high incidence of Lyme borreliosis including endemic zones in the Ternopil region.

Key words. Lyme-borreliosis, knowledge, prevention, students, children, Ternopil (Western Ukraine).

Introduction.

Lyme disease (also known as a systemic disease, Lyme borreliosis (LB), or chronic erythema migrans (EM) is a natural focal disease transmitted by *Borrelia burgdorferi*. The main natural reservoir of *Borrelia burgdorferi sensu lato* is Ixodes ticks. The disease manifests itself as migratory ring-shaped erythema, fever, and damage to the central and peripheral nervous system, heart, and large joints [1,2]. Cases of this disease have been registered in large areas of forests and the forest-steppe zone of Eurasia. Western Ukraine, including the Ternopil region, is an endemic area of Lyme borreliosis [3]. However, the highest incidence rates are recorded in the countries of Central Europe, Scandinavia, and the Baltic States [4].

Purpose.

The purpose of the study was to assess the awareness of Lyme borreliosis and tick attack prevention among vocational college students and parents of children with EM who were under

supervision.

Material and methods.

A survey of 95 young people up to 18 years of age ($17,4 \pm 1,0$ years) was conducted. Out of 95 surveyed college students, 53 (55,78%) students had tick attacks, which made up the first group of surveyed children. The second group included 78 children aged 3 to 18 years who were being treated for EM. The main research tool was a questionnaire consisting of 21 questions. Inquiries related to preventive measures while staying in places where ticks prevail, in the form of the use of repellents and body checks after returning from green spaces, as well as familiarization with the correct methods of tick control. In addition, the questionnaire contained questions about tick bites. The results of the study were subjected to statistical processing. Protocol of the expert commission No. 71 of October 25, 2022.

Statistical analysis was carried out using the STATISTICA Software v. 10 (StatSoft, Poland).

Results.

The results of the research, regarding the survey of school students and children who were on treatment, are presented in table 1.

Among the students of the school, tick bites most often occurred in the forest in 24 (45,28%) cases ($p < 0,001$), in the village - in 11 (20,77%) cases, in the park, and in the garden in 6 cases (11,32%), respectively. Children receiving treatment were most often bitten in rural areas 10 (12,82%), and with the same frequency in the forest, park, and garden 3 (3,85%), respectively. Almost a third of parents and children of the 2nd group did not know the place of the tick attack 55 (70,51%).

In most cases, 33 (62,28%) vocational school students had a single tick attack. Almost with the same frequency, there were more tick bites in these groups - 7 (13,20%) and 2 (2,56%), respectively ($p < 0,05$).

The third part of the children of the 2nd group, 24 (30,77%), also had one bite episode ($p < 0,001$). With a small frequency, children of this group were bitten by a tick 2 or more times 5 (6,41%) and 2 (2,56%), respectively. Most often, the children of the second group did not know whether there was a tick bite at all (60,26%). Half of the children in the second group had a tick bite in the head area 42 (53,85%). With the same frequency - lower limbs, trunk, and neck - 8 (10,26%), 8 (10,26%) and 9 (11,54%), respectively. The tick bit the abdomen and upper limbs most rarely - 5 (6,42%) and 6 (7,69%). 2 cases were especially interesting when 16 and 28 ticks were removed from the skin.

According to the data of the questionnaire regarding the localization of the place of attack, the most frequent place in the children of the 2nd group was the head 42 (53,84%). With

Table 1. The results of a survey of vocational school students and parents of children regarding awareness of Lyme borreliosis.

	1 - a group (Students of a vocational technical)		Parents whose children were bitten by ticks (aged 3 to 18 years)	
	53 students	%	78	%
A tick bite occurred in:				
Forest	24	45,28#	3	3,85
Village	11	20,77	10	12,82
Garden	6	11,32	3	3,85
Park	6	11,32	3	3,85
Other	5	9,43	4	5,12
Do not know	1	1,88#	55	70,51
Occurrence of a tick bite				
Once	33	62,28#	24	30,77
Twice	6	11,32	5	6,41
Many times	7	13,20*	2	2,56
I don't remember/was	7	13,20#	47	60,26
Location of a tick bite				
Upper limbs	13	24,54*	6	7,69
Lower limbs	16	30,18*	8	10,26
Neck	7	13,22	9	11,54
Body (Front)	8	15,09	4	5,12
Body (Back)	6	11,32	4	5,12
Head	2	3,77#	42	53,85
Abdomen	1	1,88	5	6,42
When the tick was removed				
Less than 12 hours	28	52,83	54	69,23
Up to 24 hours	5	9,47	3	3,85
Up to 48 hours	0	0	6	7,69
I do not remember	20	37,7 *	15	19,23
The method of tick removal				
Doctor/nurse	15	28,30	26	33,33
Another person	4	7,54 *	1	1,28
Fingers Treated with a disinfectant	6	11,32	7	8,98
Unscrewed	7	13,20	3	3,85
Scraped off	2	3,77	0	0
Treated with a disinfectant solution	8	15,09*	26	33,33
Filled with fat	11	20,78 #	1	1,28
The appearance of migrating erythema was noticed				
Up to 24 hours	4	7,54 *	17	21,80
From 24 to 48 hours	1	1,88	3	3,85
In 3 days	1	1,88	2	2,56
In 7 days	0	0	1	1,28
In 14 days	0	0	3	3,85
In 21 days	0	0	2	2,56
In 30 days	0	0	2	2,56
I do not remember	3	5,66 #	48	61,54
Clinical symptoms				
Reduced concentration of attention	0	0	0	0
fever	2	3,77	4	5,12
Headache	7	13,24	10	12,82
Pain in the joints	1	1,88	2	2,56
Inflammation of the joints	1	1,88	2	2,56
Muscle pain	4	7,54	5	6,41
Swollen lymph nodes near the bite site	1	1,88	3	3,85
None	37	69,81	62	79,48

What animals do you live with?				
Cat	23	43,40 #	4	5,12
Dog	20	37,73 #	6	7,70
There are no animals	10	18,87 #	68	87,18
Are you under the supervision of a cardiologist, neurologist, dermatologist, or other specialists for chronic diseases?				
yes	2	3,77	1	1,28
no	51	96,23	77	98,71
Reason for Lyme disease				
The number of respondents	n=95	%	n =78	%
Bacteria	32	33,68*	44	56,41
Viruses	28	29,48	19	24,36
I do not know	35	36,84*	15	19,23
How did you learn about Lyme Disease?				
Radio	2	2,10*	10	12,82
TV	17	17,90*	25	32,05
Internet	41	43,15	43	55,13
Other (questionnaire)	35	36,85#	0	0
Knowledge of the threat of Lyme Borreliosis to different body systems				
Nervous System	12	12,63#	56	71,79
Heart disease	6	6,31#	20	25,64
Joints	1	1,05#	34	43,58

Note. # - $p < 0,001$ for Pearson's χ^2 test when comparing groups 1 and 2.

* - $p < 0,05$

the same frequency, tick bites in this group of children were on the neck 9 (11,54%) and lower limbs 8 (10,26%). Most often, students were bitten in the upper 13 (24,52%) and lower limbs 16 (30,18%), ($p < 0,05$). The rare bites were localized in the head 2 (3,77%) ($p < 0,001$) and stomach 1 (1,88%).

Within 12 hours from the moment of the attack, the tick was removed in 54 (69,23%) patients of the 2nd group and in half of the student children of the 1st group, 28 (52,83%). More than a third of student children 20 (37,73%) and a fifth of 15 (19,23%) patients who underwent treatment do not remember tick removal (group 2).

15 (28,30%) school students and 26 (33,33%) children and their parents sought medical help for tick removal. 11 (20,78%) students filled ticks with fat. Among the children of the 2nd group, this method was observed in 1 (1,28%) case. 14 (17,95%) children of this group admitted that the tick fell off on its own.

Only 4 (7,54%) students noticed the appearance of EM up to a day after a tick bite, and only one patient (1,88%) noticed it for up to two and three days. A fifth of the children of the 2nd group, 17 (21,80%), remembered the appearance of EM up to 24 hours after the tick attack, which was a significant difference compared to the students of the 1st group, $p < 0,001$. Among these children, with the same frequency, 2 (2,56%) the latest appearance of EM was observed - 3 and 4 weeks after the tick attack. A large number of interviewees in this group, 48 (61,54%), did not remember the fact of having a rash on the skin after a tick bite. Among students, this indicator was small - 3 (5,66%), $p < 0,001$.

The most frequent complaints after a tick bite were headache in 7 (13,24%) students and 10 (12,82%) children, increased body temperature in 2 (3,77%) students and 4 (5,12%) children, muscle pain in 4 (7,54%) students and 5 (6,41%) examined

children. It should be noted that 37 (69,81%) of the surveyed students and 62 (79,48%) of the children's parents had no complaints. Treatment of erythema migrans was carried out in 3 (5,66%) students at a technical college, and in 78 children who were treated at the Ternopil Regional Hospital.

Most children of the 2nd group, 68 (87,18%), did not live together with animals (cats, dogs). Among college students, there were significantly fewer such patients - 10 (18,87%), $p < 0,001$. 36 (37,73%) college students live with a dog and 42 (43,40%) with a cat. However, only 3 college students considered that this is the source of infection. Parents of children in the 2nd group also indicated that they have pets - 4 cats (5,12%) and 6 dogs (7,70%).

Awareness of the causative agent of Lyme disease was analyzed in 95 college students (1st group) and 78 children in the 2nd group. With almost the same frequency, students of the 1st group answered that the cause of this disease is viruses - 28 (29,48%), bacteria - 32 (33,68%), ($p < 0,05$). Approximately the same number 35 (36,84%) did not name the cause of Lyme disease. Parents and older children from the 2nd group in their majority 44 (56,41%) believed that the causative agent is bacteria and viruses 19 (24,36%) did not know the cause only 15 (19,23%), which compared to the answers in the 1st group was a significant difference, ($p < 0,05$).

Students more often obtained information about Lyme disease from the Internet in 41 (43,15%) cases, from television in 17 (17,90%), and from other sources - in 35 (36,85%). More than half of the parents and children of the 2nd group 43 (55,13%) obtained information from the Internet and a third 25 (32,05%) - from television.

Among the sources of information about Lyme disease, 28,4% of the students of the school indicated the questionnaire ($p < 0,05$).

12 (12,63%) college students indicated the danger of damage to the nervous system after an illness ($p < 0,05$), heart disease - 6 (6,31%) ($p < 0,001$). Parents of children in the second group were more informed about damage to the nervous system 56 (71,79%), heart 20 (25,64%), and joints 34 (43,58%).

Discussion.

Lyme disease is an endemic disease that is becoming a pandemic, and the number of children suffering from Lyme borreliosis is increasing.

Diseases caused by *B. burgdorferi sensu stricto* are usually inflammatory in nature and more commonly cause single or multiple EM, arthritis, and carditis. It is believed that EM is the most common clinical manifestation of Lyme disease and may be a manifestation of a skin infection caused by *B. burgdorferi* [5].

In the United States, the most common presentation of late-onset Lyme disease (LD) is intermittent or chronic mono- or oligoarthritis, particularly affecting the knee [6]. Lyme arthritis (LA) can usually be prevented by early treatment of acute LB [7].

Most cases of Lyme carditis are clinically asymptomatic. If symptomatic, complaints of fatigue, dyspnea, palpitations, syncope, and chest pain may be typical [8]. In Europe, only 0,3–4,0% of all borreliosis cases manifest as myocarditis [9]. Lyme carditis occurs when *B. burgdorferi* enters the heart tissue directly.

Patients can be treated empirically, but antimicrobial therapy can reduce the immune response, leading to false negative serological test results. In clinical practice, patients are quite often referred to a rheumatologist because of arthralgia or even arthritis during Lyme disease, and cardiovascular symptoms do not need to be noticed first if they do not have a certain clinical manifestation [10-14].

The most frequent attacks of ticks in the forest and in rural areas can be explained by the location of ixodid ticks on grass vegetation and, obviously, the lack of chemical treatment of the environment. This is indirectly indicated by a small proportion of infection with ticks in the garden and in the park areas.

In most cases, one-time tick attacks were noted, as indicated by other studies [3]. The question of multiple bites remains open regarding the clarification of the causes of tick attacks, distant clinical consequences, in particular manifestations from the side of cardiovascular diseases [9].

Localization of bites in younger children is the head, and in older children - upper and lower limbs. The requirement of knowledge about possible methods of protection and special clothing when children go to green areas [3].

The time of removal of the tick in most cases was up to 12 hours from the moment of the bite. A small amount - up to 48 hours. According to the data from the American Academy of Pediatrics, when a tick is on a child's body for more than 72 hours, it is an indication of preventive antibiotic therapy. Post-exposure prophylaxis with a single dose of doxycycline may be used for significant exposure. Prevention is started within 72 hours after removing the tick [10].

In our study, a significant percentage of children do not remember the time the tick was on the body, which requires

a careful analysis of the need for antibacterial therapy and the development of criteria for its appointment. Most cases of Lyme disease occur as a result of being bitten by an infected tick while out walking, resting, or having fun. Therefore, children who live in forested areas or areas with an increased prevalence of borreliosis, infected with vector ticks, are at risk of getting Lyme disease [8,15].

B. burgdorferi is inoculated into the skin by a feeding Ixodes tick, usually after the tick has been feeding for more than 48 hours. The initial infection takes place at the tick bite location. After skin inoculation, *B. burgdorferi* moves through the extracellular matrix, binding to components such as epithelial cell-derived proteoglycans and interacting with decorin, glycosaminoglycans, and fibronectin. This leads to the expansion of rashes [17]. Borrelia quickly spreads from the skin to other organs. They reproduce, kill host cells, and exit through the cell membrane. Within days or weeks after infection, Borrelia are isolated from the blood, cerebrospinal fluid, myocardium, retina, muscles, bones, spleen, liver, meninges, and brain [16,17].

Conclusions.

1. The diagnosis of Lyme disease is difficult due to multiform clinical manifestations.
2. The need to clean the territory of ticks where children are engaged. Carry out deratization measures.
3. Teach children to use repellents before entering park areas.
4. Due to the low level of awareness among young people about Lyme disease and its consequences, there is a growing need to conduct a wider information campaign using information technology tools.

Conflict of interest statement.

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