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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 ბაზებშიდან.

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. რენტგენოგრამების 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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THE INCIDENCE OF SPORTS INJURIES AMONG SCHOOL-AGED CHILDREN AND ADOLESCENTS

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Abstract.

It is estimated that approximately one in ten school-aged children experience sports-related injuries annually. These injuries are most common at 12 years of age. Boys are more likely to get injured and more likely to get seriously injured than girls. The probability of injury is greater in contact or high-impact sports, with American soccer accounting for the largest number of injuries, followed by wrestling, basketball, soccer, and baseball. In certain sports, such as horseback riding, women are four times more likely to sustain injuries.

The presented literature review details the incidence of various sports-related injuries in adolescents. Sports-related injuries observed in children under the age of 10 are nonspecific and include contusions, mild sprains, and fractures of the extremities, most commonly Salter-Harris fractures (growth plate fractures) or plastic fractures. In young athletes, sports-related injuries of the ligaments or muscles, as well as spinal or head injuries, are rare. This is particularly true during puberty, where growth plate fractures and musculoskeletal injuries occur more frequently.

Key words. Excessive load, high-intensity training, epiphyseal injuries, apophysis, spondylolysis, spondylolisthesis, school-aged children.

Introduction.

Physical activity in children and adolescents promotes healthy growth and generally staves off the onset of persistent chronic disease later in life [1]. Meanwhile, school physical education has an exceptional part to play in promoting the acquisition and development of functional motor skills and physical competence in kids [2,3]. These factors are associated with physical literacy, which is defined as motivation, confidence, physical competency, knowledge, and understanding of the value and responsibility of engaging in lifelong physical activity. Physical literacy extends beyond the development of motor skills in early childhood to encompass a wide range of physical activities and is relevant across the lifespan. Inadequate motor skills during childhood may result in both a reluctance to engage in physical activity and injuries during adolescence and adulthood [4,5].

Limited range of motion and uncoordinated muscle activation hinder proper form during sports exercises, leading to an abnormal distribution of stress on the musculoskeletal structures. Playing sports carries a risk of injury and can adversely affect growing bones, tendons, ligaments, and muscles, which can lead to chronic problems if not treated in time [6].

Children are particularly vulnerable to sports injuries due to their immature reflexes, underdeveloped coordination, and inability to recognize and assess risks. Sports injuries pose a challenge for children and adolescents, causing a disturbance to their sports activities, physical discomfort, and school

absenteeism. Approximately 25% of injuries sustained by youngsters are classified as severe, requiring hospitalization [7].

Materials and Methods.

• Information Sources

A literature review was conducted by searching for relevant articles in Russian and English electronic databases, including eLIBRARY, Google Scholar, PubMed, and the references cited in these articles.

• Literature search strategy

Search terms for the analysis included: «school-aged children AND sports-related injuries», «physical activity AND adolescents», «sports injuries AND pre-adolescents», «preschoolers' physical activity level AND injuries», «classifications of sports injuries AND children/adolescents/school-aged children», «incidence of sports-related injuries AND school-aged children/adolescents», «musculoskeletal system growth AND sports injuries in school-aged children», «bone injuries AND school years», «young athletes/adolescents AND sports-related injuries», «young athletes/adolescents AND injuries of the ligaments», «young athletes/adolescents AND muscles», «young athletes/adolescents AND spinal injuries», «young athletes/adolescents AND head injuries», «young athletes/adolescents AND contusions», «young athletes/adolescents AND mild sprains», «young athletes/adolescents AND fractures of the extremities», «young athletes/adolescents AND Salter-Harris fractures».

• Eligibility Criteria

The analysis included only articles meeting the following criteria:

- Publication date no earlier than 1992.
- Covers classifications of sports injuries in adolescents.
- Describes the correlation between musculoskeletal system growth and sports injuries in school-aged children.
- Discusses the most common injuries in school-aged children due to various biological and social factors.
- A discussion of various sports injuries in adolescents is also included.

The analysis was conducted independently by two operators and comprised several stages. Firstly, the title and abstract of the article were reviewed. Determination of the relevance of the data to the topic of the present review. Secondly, operators read the full text to extract the necessary information (Figure 1).

Results.

A total of 113 publications were reviewed, of which 13 were retrieved from the PubMed database, 25 were retrieved from eLIBRARY and 75 were retrieved from Google Scholar. After applying the inclusion criteria, the final number of included studies was 43. These included articles examined various topics such as sports injury classifications in schoolchildren, sports

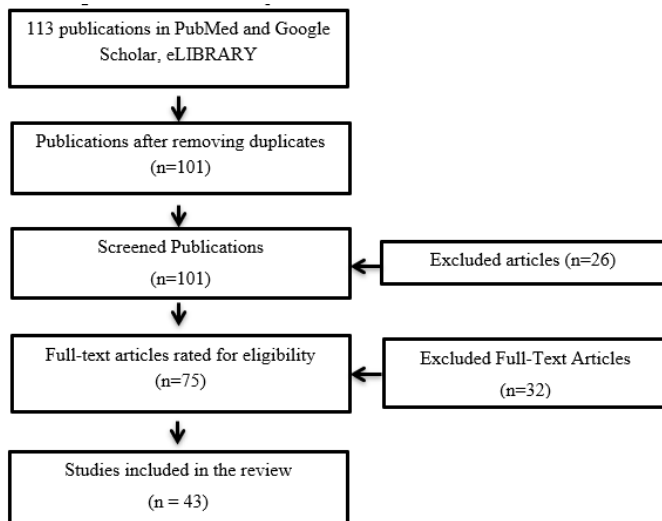


Figure 1. Article selection process.

injury incidence, adolescent musculoskeletal growth, and the effects of various factors on adolescent musculoskeletal growth.

Discussion.

1. Factors responsible for pediatric injuries.

The timing and onset of children and adolescents' growth exhibit considerable variability within the same chronological age cohorts. The musculoskeletal system undergoes proportional changes over time, leading to age-specific injury patterns in youth sports due to variations in leverage, individual flexibility, and strength. Typically, sport teams group juniors based on their chronological age. This presents a risk not only of overuse and injury but also of limiting athletic development [8]. School-age children are at a greater risk of sustaining sports injuries because, as they reach 6-7 years old, they are introduced to a new activity – attending organized physical education classes in general education institutions.

The range of sports injuries during childhood varies across sports and countries. According to certain statistical reports, the number of injuries is 28 per 100 children annually between the ages of 9 and 12 [9]. The WHO reports that sports injuries account for 5-8% of all injuries [10].

Sports injuries among school-aged children and adolescents occur primarily during three activities: physical education classes at school, organized sports through sports clubs, and spontaneous physical activity. Most sports-related injuries require medical attention and may result in missed school days, although most of them are minor. The frequency and characteristics of these injuries vary by age [11-13].

Children's sports have experienced significant changes in recent decades, with a focus on earlier specialization and more intensive training [14]. A study conducted in Malaysia indicated that the majority of professional badminton players began specialized training or received supervised training at an average age of 9.0 years. The Japan Badminton Association reports that children typically begin participating in badminton between the ages of 7 and 12. The sports with the earliest age of specialization are gymnastics at 8.9 ± 1.7 years, dance at 10.8 ± 3.0 years, and soccer at 10.9 ± 2.4 years [15].

The rise in novice athletes is also related to the mounting apprehension surrounding injury risks, which can impact player performance, limit future potential, or even result in the termination of a player's athletic career. Young athletes who differ physiologically and physically from adults are believed to have a greater risk of sports injuries due to their immature musculoskeletal system and cognitive functions [16,17].

2. Sports injury frequency distribution

Sports-related injuries account for 41% of all musculoskeletal injuries in children and adolescents, making them the most common cause of injury [18]. In the United States, 79% of children aged 5 to 15 participate in organized sports, with 11% undergoing intensive training phases. In the United States, organized sports involve a participation rate of up to 50% for boys and 25% for girls between the ages of 8 and 16 years. It is worth noting that compared to regular athletes, professional athletes exhibit lower injury rates [6].

It was discovered that maximum occurrence of injuries is divided into three categories: 43.8% to the upper extremities, 34.5% to the lower extremities and 16% to the head. The most prevalent sports injuries emerge in individuals between the ages of 10 and 15 [19,20]. The majority of injuries (up to 60%) are attributed to stretches, contusions, and lacerations [6,21]. The summary of sport-related injuries among school-aged children, based on literature review, is presented in Table 1.

Children are more susceptible to upper extremity injuries between ages 5 and 12, whereas those between 13 and 17 are more prone to chest, hip, pelvis, and spine injuries. Intense physical activity tends to cause injuries among older children at a rate of 54.4%, in contrast to younger children whose rate is 49.2%. Soft tissue injury is present in 37.9% of older children, whereas bone injuries are present in 26.1% of older children. Anterior cruciate ligament injuries, meniscus tears, and spondylolysis have higher incidence among individuals aged from 13 to 17 years. Whereas younger children are more commonly diagnosed with fractures, including bone fractures, apophysitis, and delaminating osteochondritis. A significant majority of patients between five and twelve years old receiving treatment for spinal cord injuries are female (75.8%). In 40% of the cases, surgical intervention is necessary [22].

However, previous investigations indicate higher occurrences of musculoskeletal injuries in male patients (62%) when compared to females. The three most frequently occurring types of injuries are stretches, contusions, and fractures with respective ratios of 34%, 30%, and 25%, respectively. Furthermore, girls were found to be more susceptible to sprains (44% vs. 36%)

Table 1. The prevalence of sport-related injuries among school-aged children.

Body area location	Injury prevalence percentage
Lower limbs	30-35%
Upper limbs	40-58%
Column and head	10-16%
Injury type	Injury prevalence percentage
Strains	30-35%
Sprains	25-30%
Fractures	15-23%

and contusions (37% vs. 33%) than boys, while the incidence of fractures was limited to 22% in girls compared to 31% in boys. Head, forearm, and wrist injuries are most commonly observed in cycling, while hand injuries are frequently seen in soccer and basketball, and knee injuries typically occur in soccer. Ankle and foot injuries are most prevalent in basketball [18].

According to British researchers, soccer and rugby are responsible for the majority of injuries (61%). Severe injuries requiring surgery are most frequently found in children who participate in horse-riding (42% of injuries requiring surgery), gymnastics (27%), ice-skating (25%) and rugby (22%). Popular sports with a relatively low incidence of injury include swimming, athletics, cricket, hockey, tennis, and badminton [19].

Researchers have shown that in school sports, the majority of injuries to children and adolescents occur during outdoor activities, more often in football. Gymnastics, on the other hand, results in lower injury rates. Basketball and volleyball rank third in terms of injury frequency among physical education classes. 30% of all sports injuries in children and adolescents are fractures, with the majority of these being upper limb bone fractures. The proportion of sports injuries in the overall injury rate ranges from 3.5% to 10% [23].

Childhood sports injuries rank fourth among all injuries. The lowest rate of injuries in 2013 was 6.7% and the highest in 2014 was 7.6%, according to researchers' data [24].

The most common sites of injury in young athletes are knee injury (8%), foot injury (5%), arm injury (4%), hand injury (3%), and head injury (2%) [11].

The majority of young athletes are injured due to overtraining - 62.5%, and in 37.5% the cause is traumatic injury. Studies conducted by other authors describe the gender-related topographic dependency of sports-related injuries. Female athletes have a higher incidence of lower limb and spine injuries: 65.8% and 11.3%, respectively, while male athletes have a higher incidence of the same traumas: 53.7% and 8.2%, respectively. Male athletes are found to have a higher percentage of upper extremity injuries (29.8%) compared to female patients (15.1%). Boys and young men are more likely to participate in team and contact sports. The percentage of female athletes with patellofemoral knee pain is approximately 3 times higher than the number of boys with a corresponding trauma and presented to be 14.3%. Male athletes are twice as likely than girls to be diagnosed with osteochondritis delamination (8.6% vs. 4.3%, respectively) and fractures (19.5% vs. 8.2%, respectively). Anterior cruciate ligament injuries are almost independent of the sex of the athlete, occurring in 10.0% and 8.9%, respectively [25,38].

3. Apophyseal injuries

Sports activities during childhood and adolescence lead to increased stress on the apophysis, especially in the case of chronic repetitive stress injuries during high-intensity training. Apophyseal injuries are highly represented in this age group, accounting for approximately 16% of all injuries. The age of predisposition to apophysis injury ranges from 12 to 16 years. Boys are 9 times more likely to be affected than girls. Increased muscle mass in boys, a different hormonal situation during

puberty, and different gender-specific sports activities have been discussed as reasons for these gender differences [26].

Apophyseal pelvic injuries are common in dancers, gymnasts, runners, and football players. The typical age range for these injuries varies depending on the location of the specific apophysis but is most common between the ages of 9 and 15 years [27].

4. Unilateral muscle loading and repetitive loading stress.

Unilateral muscle loading in training and repetition of sport-specific exercise stereotypes are key factors leading to musculoskeletal injuries that manifest as ossification abnormalities with partial avulsion, fracture, or condensation of the apophysis. In addition, isolated trauma with punctual stresses and abrupt muscle loading, as well as chronic repetitive loading, can bring this fragile structure to the brink of avulsion injury. The classic mechanism of avulsion injury involves the muscles of two joints: one joint force the muscle group forward into its final position, and the jerky extensor movement of the other joint results in apophyseal injury. A clear example of this is the "step over obstacle". This involves flexion of the hip with an accentuated extensor movement at the knee joint [26].

Chronic repetitive loading stress often overloads the growing musculoskeletal system. In adults, this mechanism of injury usually results in muscle rupture. In children and adolescents mentioned above mechanism resulted in damage to the tendon apophysis. A central aspect associated with intense athletic activity in children and adolescents is muscle imbalance due to sport-specific muscular adaptation phenomena. Typical examples of this damage are pronounced contractions of the lumbar, sciatic, and rectus femoris muscles in soccer, handball, and tennis players [26].

Depending on the sport-specific physical activity pattern, chronic repetitive loading apophyseal damage occurs in typical localizations. For example, in football or basketball players who perform a loading pattern with forced knee extension and hip flexion, apophyseal defects are commonly observed at the insertion of the patellar tendon into the tibial tubercle, as in Schlatter disease, and at the direct insertion of the femoral bone into the anterior inferior iliac spines. Thus, certain types of apophyseal injuries are classically sport specific. Cohort studies using muscle function tests from 12 to 16 years of age have identified unique sport-specific muscle imbalances [26,27].

5. Types of sports injuries in schoolchildren.

Falls and sports are the leading causes of trauma-related injuries to the genitourinary tract in girls. Lacerations are the most common injuries and often require surgical intervention [28].

Sports- and recreation-related eye injuries remain common in children. On average, 26.9 sports- and recreation-related eye injuries occur per 100,000 children. Children aged from 10 to 14 and from 15 to 17 years have the highest incidence of eye injuries. Three-quarters of injuries occur in boys. The most common types of injuries are corneal injury (27.1%), conjunctivitis (10.0%), and foreign body in the eye (8.5%). The most common sports and recreational activities leading to eye injuries are basketball (15.9%), baseball and softball (15.2%), and toy guns (10.6%) [29].

Ankle injuries are the most common sports injuries in school-aged children participating in sports that involve rapid jumping, jumping in multiple directions in response to an opponent, and returning to a central position in preparation for the next movement (badminton, tennis). The most common ankle injury is a ligament sprain, which puts athletes at risk for long-term consequences, including re-injury and instability of the joint. In addition, an ankle injury is a predisposing factor for injuries to other joints in both the lower and upper extremities. This is because the ankle is the last segment of the kinetic chain. This term is used to describe how the body performs movement and transfers energy: each movement is a chain of interconnected events in which a deficiency in one component of the chain can affect another [16].

Up to 20% of all emergency trauma visits in children are due to ankle injuries. According to various authors, ankle fractures account for 5 to 8% of limb fractures and 15 to 40% of tibial fractures. This is due to the increasing number of sports injuries [30].

Osgood-Schlatter disease (OSD) is one of the most common causes of anterior knee pain in children and adolescents, resulting from traction apophysitis of the tibial tuberosity. The peak incidence occurs between 8-13 years of age in girls and 10-15 years of age in boys. At this time, there does not appear to be a difference in the sex distribution. This may be due to the greater participation of girls in intense athletic competition. Risk factors for OSD include body weight, muscle strain, knee extensor weakness, hamstring flexibility, and rectus femoris shortening [31,32]. Changes like OSD in the knee joint have also been described in the elbow joints of professional gymnasts aged from 11 to 15 years [33].

Sinding-Larsen-Johansson disease (SLJD) is distinct from Osgood-Schlatter disease. Both diseases affect the extensor mechanism of the knee in children and adolescents. However, SLJD describes a pain syndrome of the proximal patellar tendon associated with tendinosis overloading of the insertion site at the distal pole of the patella. This condition can be pragmatically and clinically referred to as "jumper's knee". Tendinosis is present at the patella with intratendinous tendon changes manifested by necrosis or partial tears. This often results in dense calcific changes at the distal pole of the patella. A tenderness of the distal patella is typical [34].

Sever's disease is a painful overloading of the apophysis of the calcaneus (heel bone), often seen in sports involving the use of the feet, such as basketball or soccer, as well as running and jumping [35]. Classically, athletes present with pain in the plantar and dorsal heel pressure area below the Achilles tendon insertion.

Sports-related concussion is an important injury in almost all sports and at all levels in children and adolescents. Understanding the signs and symptoms of concussion is important for timely diagnosis and exclusion of more serious intracranial injury. Concussion symptoms can negatively affect a child's academic performance, social life, family relationships, and future athletic endeavors. Concussion can affect the emotional well-being of the injured athlete [36].

Subaxial injuries (49%) and fractures (56%) are common in children with sports- and recreation-related cervical spine

injuries. These children are more likely to have a spinal cord injury than children with cervical spine injuries due to other mechanisms (25% vs. 6%, respectively). Children with sports- and recreation-related injuries had an increased likelihood of cervical spine injury if they had focal neurological signs, complaints of neck pain, and prolonged exposure to axial loading. Soccer (22%), diving (20%), and bicycle accidents (11%) were the leading activities associated with cervical spine injury [37].

Some sources describe traumatic rotatory subluxation of the atlas in boys engaged in Greco-Roman wrestling, which occurs due to insufficient duration and intensity of warm-up before the main part of training; sharp turn of the head during wrestling; unfortunate fall as a result of an opponent's throw. The number of the atlas rotational subluxations decreases with the age of boys and their experience in sports training. Rotational subluxations of the atlas are most frequently observed after the end of the summer holidays, when training resumes in September of the school year [38].

Spinal injuries are relatively common in professional athletes, especially in children and adolescents. The popularity of sports activities has increased the prevalence of spinal injuries in sports in general. High-intensity athletic competition places constant stress on the spine [39].

Much attention has been paid to the relationship between various training factors and sports injuries. The number of sleeping hours per night and academic performance were found to be the best independent predictors of injury. Athletes who slept an average of less than 8 hours per night were 1.7 times more likely to be injured than athletes who slept ≥ 8 hours. For each additional year in school, athletes were 1.4 times more likely to be injured. Thus, sleep deprivation and increased academic performance appear to be associated with injury in adolescent athletes [40-43].

Conclusion.

In summary, a variety of injuries are common in many sports in the adolescent age group, with characteristics that vary by gender, age, mechanism, location, type of injury, and sport. Most injuries are minor sprains, strains, and contusions, some of which are severe enough to require hospitalization. Injuries can lead to dysfunction and reduced participation in sports by children, contributing to the epidemic of childhood obesity and missed general education classes in school [43]. Growth and maturation are potential risk factors for sports injuries. Children of the same chronological age can differ significantly in biological maturation status, and individual differences in maturation status affect growth and performance during childhood and adolescence.

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РЕЗЮМЕ
ЧАСТОТА ВСТРЕЧАЕМОСТИ СПОРТИВНОЙ ТРАВМЫ У ДЕТЕЙ И ПОДРОСТКОВ ШКОЛЬНОГО ВОЗРАСТА

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По оценкам специалистов, примерно каждый десятый ребенок школьного возраста ежегодно получает травмы, связанные со спортом. Наиболее часто такие травмы встречаются в возрасте 12 лет. Мальчики получают травмы гораздо чаще и с большей вероятностью, чем девочки. Риск получения травмы выше в контактных или высокоинтенсивных видах спорта, причем максимальное количество травм приходится на американский футбол, за которым следуют борьба, баскетбол, футбол и бейсбол. В некоторых видах спорта, например в верховой езде, вероятность получения травм у девочек в четыре раза выше.

В представленном обзоре литературы подробно рассмотрена частота различных видов спортивного травматизма у подростков. Спортивные травмы, наблюдаемые у детей до 10 лет, неспецифичны и включают ушибы, легкие растяжения и переломы конечностей, чаще всего переломы Солтера-Харриса (переломы пластины роста) или пластические переломы. У юных спортсменов спортивные травмы связок и мышц, а также травмы позвоночника и головы встречаются редко. Особенно это касается периода полового созревания, когда переломы

пластины роста и травмы опорно-двигательного аппарата встречаются чаще.

Ключевые слова: чрезмерная нагрузка, высокоинтенсивные тренировки, эпифизарные повреждения, апофиз, спондилолиз, спондилолистез, школьники.

რეზიუმე
 სასკოლო ასაკის ბავშვებსა და მოზარდებში სპორტული დაზიანების გამოვლენის სიხშირე

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ექსპერტების აზრით, ყოველწლიურად ათიდან ერთი სკოლის ასაკის ბავშვი იღებს სპორტთან დაკავშირებულ დაზიანებებს. ყველაზე ხშირად ასეთი დაზიანებები ხდება 12 წლის ასაკში. ბიჭები უფრო ხშირად და უფრო ხშირად არიან დაზარებულები, ვიდრე გოგონები. ტრავმის რისკი უფრო მაღალია კონტაქტში ან მაღალი ინტენსივობის სპორტში, ტრავმების მაქსიმალური რაოდენობა ხდება ამერიკულ ფეხბურთში, რასაც მოჰყვება ჭიდაობა, კალათბურთი, ფეხბურთი და ბეისბოლი. ზოგიერთ სპორტში, მაგალითად ცხენოსნობაში, გოგონები ოთხჯერ უფრო ხშირად არიან დაზარებულები.

წარმოდგენილი ლიტერატურის მიმოხილვაში დეტალურად არის განხილული მოზარდებში სხვადასხვა სახის სპორტული ტრავმების სიხშირე. 10 წლამდე ასაკის ბავშვებში დაფიქსირებული სპორტული დაზიანებები არასპეციფიკურია და მოიცავს სისხლჩაქცევებს, მცირე დაჭიმულობას და კიდურების მოტეხილობებს, ყველაზე ხშირად სალტერ-ჰარისის მოტეხილობებს (ზრდის ფირფიტის მოტეხილობები) ან პლასტიკურ მოტეხილობებს. ახალგაზრდა სპორტსმენებში იშვიათია ლიგატებისა და კუნთების სპორტული დაზიანებები, ასევე ზურგის და თავის დაზიანებები. ეს განსაკუთრებით ეხება სქესობრივი მომწიფების პერიოდში, როდესაც ზრდის ფირფიტის მოტეხილობები და კუნთოვანი სისტემის დაზიანებები უფრო ხშირია.

საკვანძო სიტყვები: გადაჭარბებული ვარჯიში, მაღალი ინტენსივობის ვარჯიში, ეპიფიზური დაზიანება, აპოფიზი, სპონდილოლიზი, სპონდილოლისთეზი, მოსწავლეები.