

3. По результатам изученного материала провести анализ, сделать выводы, подготовить и сделать доклад (можно в форме компьютерной презентации). Провести обсуждение методики с целью выявления ошибок.

Подготовка такого кейса дается студентам (группе студентов) в качестве домашнего задания, обсуждение кейса проводится на семинарском занятии в группе. Оценка за работу по кейсу выставляется не только авторам проекта, но и студентам активно участвующим в обсуждении.

Проведение семинарского занятия в подобном формате позволило студентам мобилизовать все полученные ранее знания в области развития силовых способностей, принципов рационального питания, а так же в области применения иных средств физической культуры. Полученный ими опыт проектирования методики построения тренировочной программы по конкретному заданию, позволит им освоить алгоритм решения подобного рода проблем и продемонстрирует возможности применения получаемых теоретических знаний для своего профессионального становления и роста.



### **Литература**

1. Пожитнева В.В. Кейс-технологии для развития одаренности//Химия в школе. – 2008. -№4.-С.13-17
2. Пырьева В. В. Кейсовая технология обучения и ее применение при изучении темы «Алгоритмы» // Информатика и образование. – 2009. -№ 11. – С.25-28.

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## **KNEE JOINTS FUNCTION STUDY AT THE CLASSES OF PHYSICAL CULTURE AND SPORTS**

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Среди студентов факультета физического воспитания имеется значительная частота травм коленных суставов. Предлагаются образовательная программа первичной профилактики травм коленных суставов.

Musculoskeletal system dysfunction is the problem at the forefront of many people in the world of different nationalities, gender, age and social status. The reason for this is array of factors that create a pathogenetic basis for the development and formation of inflammatory and degenerative-dystrophic disorders of musculoskeletal system. One of such disorders is the knee joints damage – gonarthrosis.

The occurrence of gonarthrosis is associated with the hereditary characteristics of the connective tissue forming the supporting apparatus, congenital defects, climatic, social and other factors, defined as the biological and social burden of previous life [1].

Injuries are part of any sports. Systematic excessive exercises lead to functional disorders and injuries of athlete's body. The most common injuries are bruises, sprains and tears of ligaments, injuries of the lower extremities, including knee joints, requiring surgery [2]. The consequences of such disorders of the musculoskeletal system often lead to degenerative-dystrophic changes in the knee joints, gonarthrosis and disability. Therefore, there is a need for targeted development of prevention measures of the knee joints damage, anticipating morphological disorders of this most important joint of the body that determines human mobility and quality of life [3].

***The objective of the study*** was to analyze knee joints injury frequency among students during physical education classes and sports in order to develop primary prevention issues of the identified pathology and to create a self-monitoring system over the function of the knee joints.

**Materials and methods.** 199 students were surveyed basing on continuous sampling method. 108 people had different sports specialization and sports skill level and 91 students were engaged in physical culture as part of educational program.

The average age of students was  $20.9 \pm 0.5$  years. There were 90 female students (47.6 %) and 99 male students (52.4 %) on both intramural and extramural form of study engaged in physical culture and sports. The age structure corresponded to the youth from 17 to 22 years old – 173 students (91.0 %) and the first mature age from 23 to 37 years (9.0 %). The majority of respondents were involved in sports (107; 56.6 % of the people), while 82 students did recreational physical culture (43.4 % of the people). The largest group of students specializing in sports belonged to game sports (football, handball, volleyball, basketball, hockey). Next followed martial arts (wrestling, boxing), weightlifting (barbell). The rest of the persons surveyed were involved in water sports (rowing, swimming, diving) and athletics (running, hammer throwing), modern pentathlon and other sports.

Along with questionnaire survey, there was physical examination of students who had injuries of the knee joints; statistical analysis was made of the material obtained as well as the analyses of specific literature sources.

**The results of the study.** The analysis of the functional state of the knee joints during physical training of students revealed 48 cases of knee joint injury (study group 1, 25.4 %) with frequent disfunction complaints. 32 students had no injuries of the knee joints, but they mentioned unspecified disfunction (study group 2, 16.9 %). Students of study group 3 (109; 57.7 %) had no complaints about the function of the knee joints.

Study groups 1 and 2 are of interest in terms of an objective assessment of the functional state of the knee joints and the prognosis of possible disorders during physical training. The present study of knee joints disfunction in the selected groups of students has a theoretical and methodological justification associated with the development of features of existing prevention programs, which should be based on medical and rehabilitation activities, medical coaching observation for a possible return to sports (group 1, secondary prevention, existing pathology of the knee joints). For students (group 2) who have a predisposition to disfunctions of the knee joints, health-saving tactics should be applied (primary prevention of disfunction of the knee joints with an appropriate sports orientation).

Study group 3, which was represented by students having no anamnestic indications of knee joints disfunction, is of considerable interest as well, yet they may represent both group 1 and group 2 in the aggregate.

The ratio of student-athletes and students who do regular physical training is 43: 5 in group 1, whereas it equals to 5:13 people in group 2, indicating an increase in the motivational focus on sports and the increase of knee joints injury probability. It should be noted that there were no differences in gender in the selected groups.

Knee joints injuries in groups fall into the following pattern: 16 people (8.6 %) had knee bruises alongside the meniscal damage or tear, 12 people had ligaments damage (6.3 %), 4 respondents experienced fractures with ligaments damage (2.1 %) and 17 students got knee joint microtraumas (9.0 %). Surgical measures were needed in 5 cases of all.

The post-injury period, lasting from several months and up to 8 years or more (14.6 % of respondents), indicates an intermittent variation of the pathological process that comes with periods of slow inflammation and degenerative-dystrophic changes. The respondents had complaints of pain, crunching and clicking sounds, stiffness, a sense of instability during movement. In 7 cases, there was a restriction of movement in the affected joint.

There is also a certain interrelation of the knee joints pathology with certain sports. In particular 41.7 % of the above mentioned cases were associated with martial arts and team sports. These results coincide with the studies described in the professional literature. In most cases, injuries took place during competitions and training sessions (40 cases, 21.2 %),

along with unspecified circumstances (8 cases, 4.2%). The fact, that a significant part of respondents with no knee injuries complained of pain, crunching and clicking sounds, as well as instability during movements of the knee joints (32 students), might indicate genetic and inborn connective tissue dysplasia, which causes poor congruence of the articular surfaces.

This implies the development of preventive methods of sports medicine specialists, as well as the development of activity key areas of physical education teachers and coaches who help students choose direction in sports. The focus should be placed on educational program, covering all aspects of possible injuries prevention and the development of articular degenerative changes. The subject matter of this educational program and its main principle is an individual approach in assessing the physiological consistency of the knee joints to prevent possible disfunction when doing sports. The educational program can be presented in a form of a training school called "Means of preventing knee joints disfunction".

In this regard a number of specific practical preventive sport activities have been marked out based on professional literature:

1. Studying and revealing personal capability of the musculoskeletal system (including the knee joints), its reaction to sports among children and youth.
2. Revealing connective tissue dysplasia of the locomotor apparatus for the purpose of reasonable sports selection.
3. Studying the mechanisms of traumatic injury pathogenesis of knee joints ligament apparatus related to the sport, competitions, body weight control.
4. Organizing sport activities and physical education classes eliminating mechanical overexertion falling on the cartilaginous surface of the knee joints.
5. Introducing methods of knee joints morphological structures strengthening (physical therapy, massage, self-massage, physiotherapy and other methods).

**Conclusion.** Analysis of the functional state of the knee joints during physical education classes and sports performed by students of the Faculty of Physical Education revealed disfunction in 43.3% cases. Respondents reported injuries, pain, crunching and clicking sounds, stiffness, instability, limitation of joint mobility, experiencing post-injury period up to 5 years or more.

It can be affirmed that most common injuries of knee joints are damage of ligamentous apparatus, meniscal tear, and overexertion of ligamentous apparatus during training and competitions. This comes from the absence of proper preventive work, which leads to the development of knee degenerative-dystrophic processes.

The main preventive activity can be represented in the form of a training school called "Means of preventing knee joints disfunction". The principal aim of training is to master methods that prevent the development of inflammatory and degenerative changes in the joints.



### **Bibliography**

1. Ревматология: национальное руководство / под ред. Е.Л.Насонова, В.А.Насоновой. – М.: ГЭОТАР-Медиа, 2008. – 720 с.
2. Аль-Бшени Фатхи Али. Основные принципы реабилитации заболеваний суставов средствами лечебной физической культуры / Аль-Бшени Фатхи Али [и др.] // Вестник Полоцкого государственного университета : Серия Е. Педагогические науки. – 2013. – №7. – С. 185 – 188.2. Миронова, З.С. Спортивная травматология / З.С.Миронова, Е.М. Морозова. – М.: ФиС, 1976. – 152 с.
3. Досин, Ю.М. Частота дисфункции коленных суставов при занятиях спортом и методика их исследования / Ю.М.Досин [и др.] // Международный теоретический журнал «Прикладная спортивная наука». – Минск, 2016. – РНЦП спорта. – № 3. – С. 77-84.