

**THE EVALUATION OF THE PHYSICAL  
FITNESS OF THE MEDICAL STUDENTS  
WITH JOINT HYPERMOBILITY**



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**Анотація**

В статті представлені результати дослідження фізичної підготовленості студенток медичної академії з різним ступенем гіпермобільності суглобів. Проведено порівняльний аналіз оцінювання фізичної підготовленості між групами студенток. Встановлено, що у студенток першої групи кращі оцінки були у тестуванні силових якостей, загальної та спеціальної витривалості, швидкості і спритності, а у студенток другої та третьої групи при тестуванні гнучкості. За результатами дослідження виявлені відмінності в оцінці результатів тестування фізичної підготовленості в залежності від ступеня ГМС: студентки першої групи виконали більшість тестів на 4 бали, другої групи – на 3 бали, а студентки третьої групи – на 3 та 2 бали.

**Ключові слова:** студентки, фізична підготовленість, гіпермобільність суглобів.

**Аннотация**

В статье представлены результаты исследования физической подготовленности студенток медицинской академии с разной степенью гипермобильности суставов. Проведен сравнительный анализ оценивания физической подготовленности между группами студенток. Установлено, что у студенток первой группы выше оценки были при тестировании силовых качеств, общей и специальной выносливости, быстроты и ловкости, а у представителей второй и третьей группы – при тестировании гибкости. За результатами исследования выявлены отличия в оценках тестирования физической подготовленности в зависимости от степени ГМС: студентки первой группы выполнили большинство тестов на 4 балла, второй группы на 3 балла, а студентки третьей группы на 3 и 2 балла.

**Ключевые слова:** студентки физическая подготовленность, гипермобильность суставов.

**Problem statement.** Physical fitness is an important part of the individual's health. This determinant correlates significantly with physical working capacity and functional condition, consequently, it is important to achieve the appropriate level of the physical development. [8]. Physical fitness is a result of the person's physical activity, an integral index, as far as multiple organs and systems are interacting during this activity. Using the special tests, it becomes possible to evaluate each system engaged in the exercise performance [9].

There are numerous data about the impact of different morphological and functional manifestations of the connective tissue dysplasia (CTD) on the young adults' level of health [2, 5].

According to Kalinichenko the main manifestation of the CTD is the joint hypermobility syndrome, which is represented by ligamental weakness and increase in the range of motion in single or multiple joints [7]. Taking into account the immediacy of the problem, it is necessary to improve JHM screening to prevent health condition complications and functional offenses among students during the physical training.

**Literature analysis.**

The assessment of the physical fitness is the main indicator used in



the system of control over the state of physical development and health of the Ukrainian population. Physical fitness to a certain extent reflects the physical activity of the student as an integral indicator of the functioning of body organs and systems [13].

Nowadays, labor and studying activities are connected with low-activity lifestyle and long-lasting stay in the same position, sitting or standing. Sedentary lifestyle and the big amount of the static load decrease the working capacity, lead to mistakes and inaccuracies, and deteriorate the general health [6].

Scientists [1, 3, 16] claim there is a connection between several genetic abnormalities and the manifestations of the CTD. The statistics show the increased number of young people with the asthenic build, posture disorders and increased the range of motion in the joints. Usanov et al. claim that the increased elasticity of the connective tissue became distinctive in modern population and may be the reason for the

increased number of injury during the physical load [3].

Joint hypermobility (JHM) is the main manifestation of the CTD, which affects musculoskeletal and cardiovascular systems, and decreases the capacity of the adaptation resources. Individuals with CTD frequently have muscle hypotonia and predisposition to abarticulations and ligament strains [1, 2, 16].

Scientists [12, 16] suggest that physically strong people show lower flexibility because of the increased muscle tonus when the more flexible individuals have low capabilities to show speed and power. The research by Glotov et al. also shows that teenagers with CTD manifestations show low exponent of power and static endurance [11]. Other scientists suggest that CTD affects not only the health level and motor activity, but also impairs the psychological status of the student [2]. According to Dyachenko, the analysis of the static endurance of the back and abdominal muscles

among children with JHM showed that 74,7 % of children showed the scores “below average” and “significant weakness” for back muscles results, when the abdominal muscles showed the score “significant weakness” in 77,24 % of the all observed [4]

Nekhanevich et al. [10] determined the influence of the JHM degree on the results of the motor qualities testing and defined that students with severe level of JHM have an evidentially lower endurance, speed, strength, speed-strength qualities, and level of physical fitness than that of students with mild and moderate the degree of JHM.

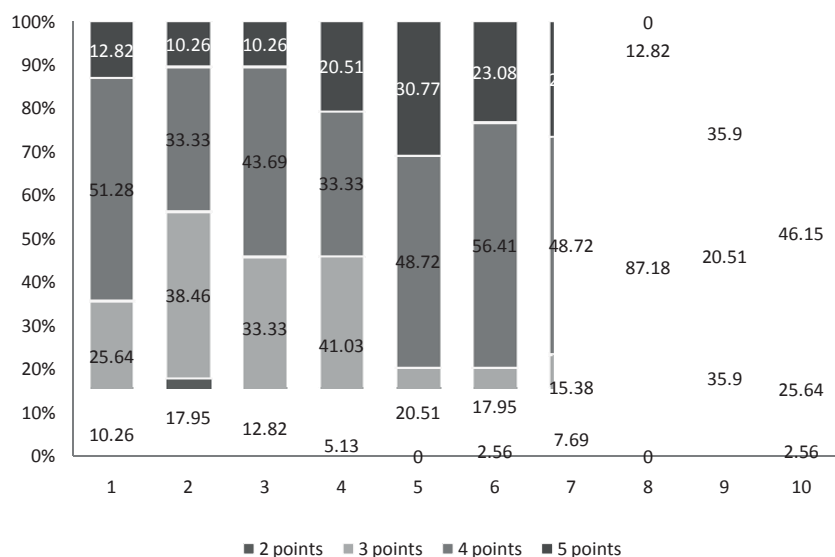
According to the data represented above, it is necessary to study the indexes of physical fitness in students with JHM and correct the physical education classes and taking into account the results of the testing.

The research, which constitutes the main content of this work, was carried out in accordance with the topic «Scientific and theoretical foundations of the physical education process improvement in various population groups» (State Registration Number 0116U003010).

**The purpose of the research** is to study and analyze the scores of physical fitness of female students of the medical academy with different levels of JHM.

**Methods of research:** analysis and generalization of scientific and methodical literature; pedagogical testing [8]; diagnostics of the presence and degree of JHM according to the method of Beiton with the use of a medical goniometer [14, 15]; The obtained results were statistically processed using the package of licensed applications STATISTICA (6.1, serial number AGAR909E-415822FA).

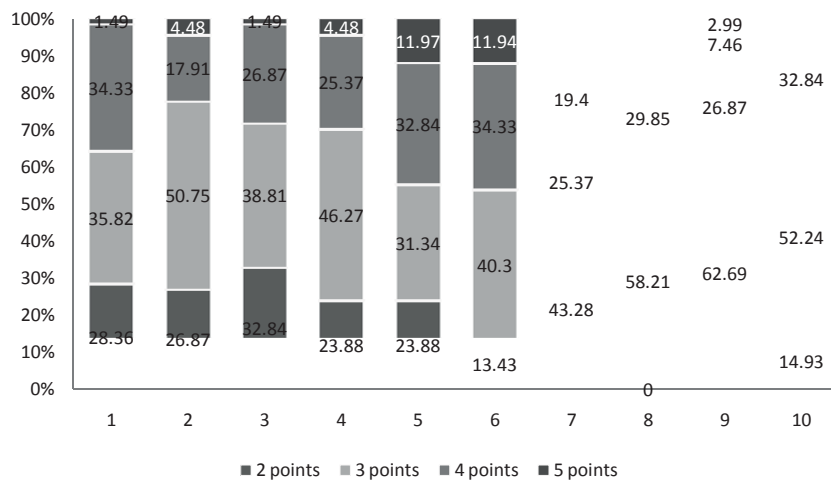
**Research organization.** 155 female students of the first year of study at SI “Dnipropetrovsk medical academy of the Ministry of Health of Ukraine” were observed. They were attending physical edu-



**Figure 1. Physical fitness scores of the female students with the 1<sup>st</sup> grade of JHM (%).**

\* Note: 1 – jump in length from place, cm; 2 - running 60 m, s; 3 - running 12min , m; 4 – press-ups, the number of times; 5 - lifting the body to the position sitting from the position lying for 1 minute, the number of times; 6 - lifting the body lying on the hips, the number of times; 7 - shuttle running 4 × 9 m, s. 8 - tilt of the trunk ahead standing on the gymnastic bench, cm; 9 - swimming 50 m, s; 10 - swimming 12 minutes, m.





**Figure 2. Physical fitness scores of the female students with the 2<sup>nd</sup> grade of JHM (%).**

cation classes at the university. The average age of the observed students was  $18,21 \pm 0,16$ .

**Results and Discussion.** It was defined that the average score according to the Baton grading scale was  $4,99 \pm 0,19$ , and is estimated as a moderate level of the JHM. According to the severity of the JHM female students were divided into 3 groups: the first one included 39 students (25,16 %) with mild JHM (scores 0-3), which is determined as the physiologic normal ratio; the second group included 67 students (43,23 %) with moderate JHM (scores 4-6); the third one included 49 students (31,61 %) with severe JHM (scores 7-9). The evaluation of physical fitness in each group is represented in the figures 1, 2, 3.

According to the received data (Fig. 1), score 2 and 5 have not prevailed during the testing of physical qualities in the 1st group of students. The most frequently met score “4 points” in performing such exercises as “jump in length from place” - 20 (51,28 %), “lifting the body from the position, lying on the thighs” - 22 (56,41 %), “lifting the trunk in a position sitting from the position lying in 1 minute” - 19 (48,72 %), “shuttle running  $4 \times 9$  m” - 19 (48,72 %), “12 minutes

running” - 17 (43,69 %), as well as “Swimming 50 m” - 14 (35,90 %) and “swimming 12 minutes” - 18 (46,15 %). A score of “3 points” was observed in most students when performing exercises “The tilt of the trunk forward standing” - 34 (87,18 %), “running 60 m” - 15 (38,46 %), “press-ups” - 16 (41,03 %).

Analyzing the obtained results of testing of physical fitness of the students of 2nd group (Fig. 2) almost in all exercises, the most common score was “3 points”: “jump in length from place” - 24 (35,82 %), “running 60 m” - 34 (50,75 %), “12 minutes” - 26 (38,81 %), “press-ups” - 31 (46,27 %), “lifting of the body from the position of lying on the thighs” - 27 (40,30 %), “tilt forward while standing on gymnastics bench” - 39 (58,21 %), and “swimming 12min” - 35 (52,24 %). As “2 points” score only two exercises were estimated: “shuttle run” - 29 (43,28 %) “swim 50 meters” - 42 (62,69 %). The “4 points” score most students received during the exercise “lifting the trunk in position sitting from the lying position” - 22 (32,84 %). The “5 point score” was achieved with the lower frequency in all tests.

The study of the physical training of students in group 3 showed (Fig.

3) that most of them would have been evaluated as “3 points” in the following exercises - “running 60 m” - 22 (44,90 %), “lifting the body to the position sitting from a position lying in 1 minute” - 27 (55,10 %), “swimming 12min” - 21 (42,86 %), and a score of “2 points” in the following exercises: “jump in length from place” - 21 (42,86 %), “running 12 minutes” - 32 (65,31 %), “press-ups” - 26 (53,06 %), “shuttle running  $4 \times 9$  m” - 26 (53,06 %), and “swimming 50 m” - 36 (73,47 %). In this group, there was a significant percentage of students who showed high flexibility in exercise “the body tilt forward standing on a gymnastic bench” and scored “4 points” - 18 (36,73 %), and “5 points” - 14 (28,57 %) students.

After comparing the physical fitness test data in three groups, we can say that the score of “5 points” was not widespread for all students. These data confirm the results received by the scientists [13] about the low state of physical fitness of students in higher educational establishments.

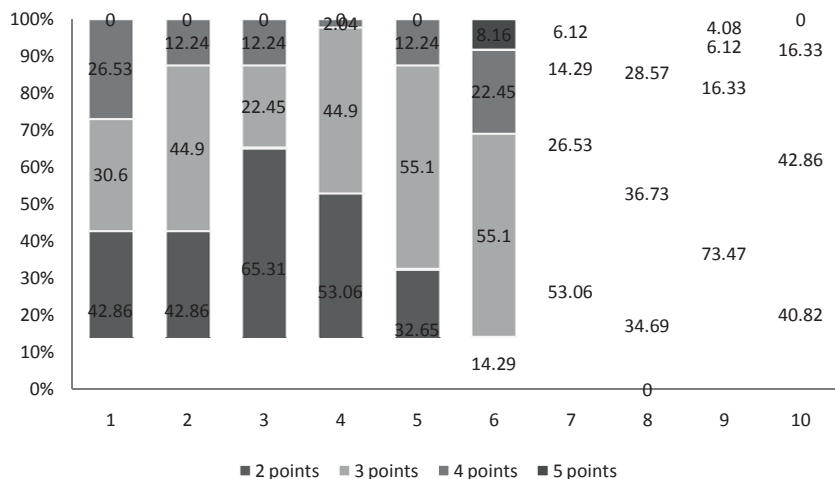
Female students from the 1<sup>st</sup> group had better scores in testing physical fitness than students from the 2<sup>nd</sup> and 3<sup>rd</sup> groups. It is evidenced by a larger number of “4 points” scores in most tests when students from the 2<sup>nd</sup> group received the big number of scores “3 points”, and the students from the 3<sup>rd</sup> group got scores “3” and “2 points”.

Students of the 3<sup>rd</sup> group were evaluated as “2 points” in a bigger amount of tests than students from the groups 1 and 2.

In all groups of students, low results were observed when performing swimming tests, especially in groups 2 and 3.

Students from the 2<sup>nd</sup> and the 3<sup>rd</sup> groups had high scores in flexibility testing and low in tests for strength, endurance, speed, and agility evaluation. These data confirm the results of previous research by scientists [1, 4, 11] about the reduced ability to perform strength





**Figure 3. Physical fitness scores of the female students with the 3<sup>rd</sup> grade of JHM ( %).**

exercises for the students, which correlated with the degree of JHM in direct ratio.

#### Conclusions

1. The data on the prevalence of JHM among students of medical universities were analyzed, and physical activity influence on the students' health with different degrees of JHM was determined.

2. The physical fitness scores of medical students with different degrees of JHM were evaluated. The results show that "5 point" score is not the most frequently got one in any of the groups, however, in the 1st group the percentage of "5point" scores was higher than in two others.

3. The results of the study indicate the unevenness of physical fitness, namely: the 1st group of students completed the majority of tests with "4 points" scores, students of the 2nd group – "3 points", and students of the 3rd group – "3" and "2 points".

4. The analysis of the results of the physical fitness tests showed that the students of the 1st group had better results in the testing of strength qualities, general and special endurance, speed and agility, and the students of the groups 2 and 3 showed better scores when testing the flexibility.

5. In swimming tests, in all three groups, low scores were received, especially in representatives from the groups 2 and 3, indicating to an inadequate level of physical qualities development.

**Prospects for further research:** to determine the correlation between the degree of joints hypermobility and medical academy students physical fitness.

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