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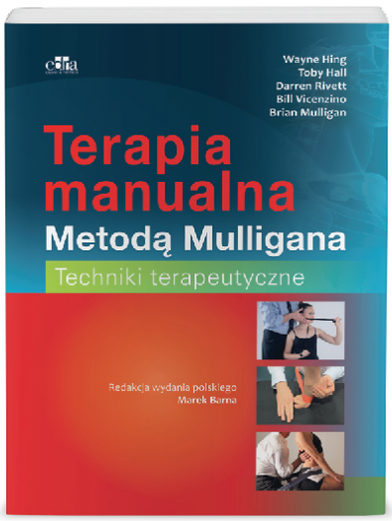

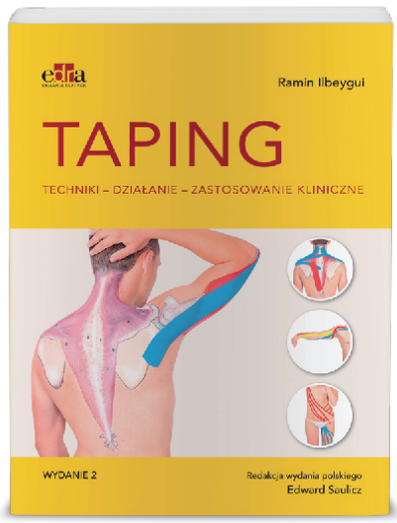

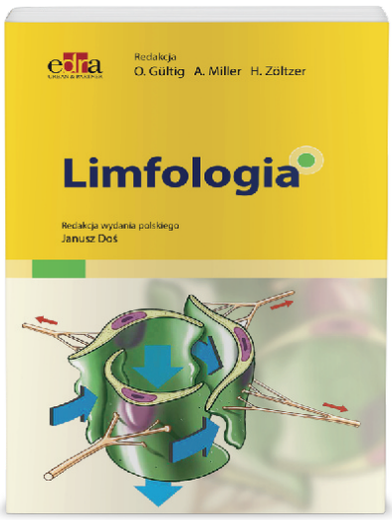

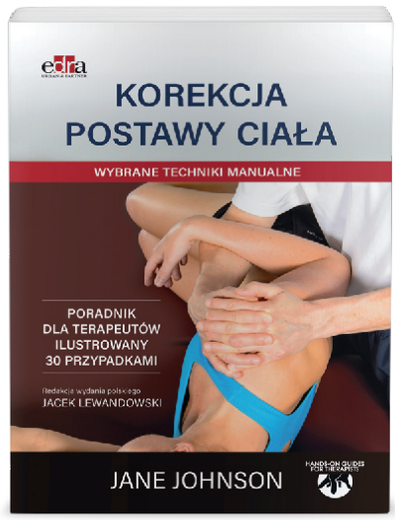

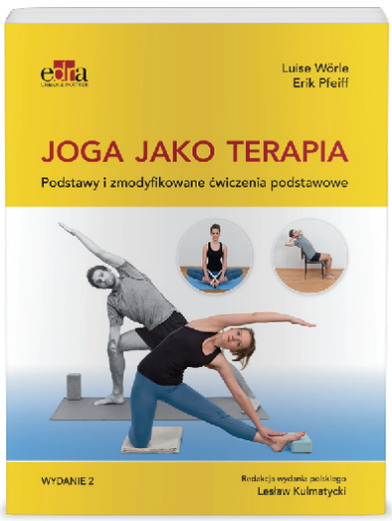

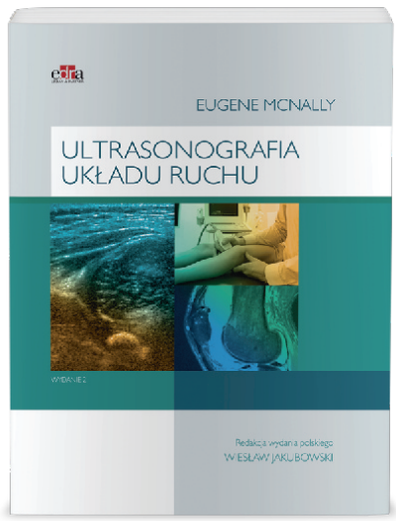

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Test FMS w ocenie ryzyka wystąpienia urazu w grupie unihokeistek

FMS test in assessing the risk of injury in a group of female floorball players

福乐球球员组受伤风险评估的 FMS 测试

Tomasz Ridan[1(A,D,E,F)], Adrianna Warzecha[1(A,B,F)], Katarzyna Ogrodzka-Ciechanowicz[2(A,F)], Beata Kita[3(A,F)], Krzysztof Czupryna[3(A,F)]

[1]Zakład Kinezyterapii, Katedra Fizjoterapii, Akademia Wychowania Fizycznego, Kraków /
Institute of Kinesiotherapy, Department of Physiotherapy, University of Physical Education, Cracow, Poland
[2]Zakład Rehabilitacji w Traumatologii, Katedra Rehabilitacji Klinicznej, Akademia Wychowania Fizycznego, Kraków /
Unit of Rehabilitation in Traumatology, Department of Clinical Rehabilitation, University of Physical Education, Cracow, Poland
[3]Katedra Fizjoterapii, Wydział Nauk Stosowanych, Akademia WSB, Dąbrowa Górnicza /
Department of Physiotherapy, Faculty of Applied Sciences, WSB University, Dąbrowa Górnicza, Poland

Streszczenie

Functional Movement Screening jest jednym z testów, które pozwalają oceniać istniejące ryzyko uszkodzeń. Celem pracy była ocena stanu funkcjonalnych możliwości ruchowych zawodniczek unihokeja za pomocą testu Functional Movement Screen (FMS) oraz ocena możliwości poprawy wyniku przy pomocy zestawu ćwiczeń korekcyjnych. Badaniami objęto grupę 50 sprawnych dziewczyn w wieku 16-24 lat, trenujących unihokej w kategorii juniorek starszych i seniorek (średnia wieku 18,2). Badane zostały poddane badaniu funkcjonalnej ocenie motorycznej za pomocą urządzenia FMS. Ocena testem FMS składała się z siedmiu funkcjonalnych testów ruchowych. Średni wynik uzyskany przez zawodniczki w teście FMS przed korekcją wyniósł 14,6 pkt (SD = 1,5), po korekcji 16,3 pkt (SD = 1,4). Zawodniczki unihokeja w oparciu o przeprowadzony test FMS, prezentują dobry poziom podstawowej sprawności ruchowej z klasyfikacją ryzyka urazu na poziomie 25-35%. Wprowadzenie korekcji wg testu Functional Movement Screening już po okresie 2 miesięcy poprawia sprawność funkcjonalną zawodniczek unihokeja.

Słowa kluczowe:
Functional Movement Screen, ocena funkcjonalna, ryzyko urazu, unihokeistki

Abstract

Functional Movement Screening is one of the tests which allow you to find the existing risk of injury. The aim of the work was to assess the state of functional movement possibilities of female floorball players with the use of the Functional Movement Screen (FMS) test and to assess the possibility of improving the result with the use of a set of corrective exercises. The research covered a group of 50 fit young women aged 16-24, training floorball in the category of senior juniors and seniors (mean age 18.2). To evaluate the movement patterns, Functional Movement Screen (FMS) was used. The assessment with the FMS test consisted of seven functional movement tests. The average score obtained by the athletes in the FMS test before the correction was 14.6 points (SD = 1.5), after the correction 16.3 points (SD = 1.4). Female floorball players, based on the FMS test, present a good level of basic mobility with the risk classification of 25-35%. Introducing correction according to the FMS test after just 2 months improves the functional efficiency of the female floorball players.

Key words:
Functional Movement Screen, functional evaluation, dance

摘要

功能性运动检测(FMS)功能性运动检测为评估现有损害风险的测试之一，研究目的在通过功能性运动检测（FMS）评估福乐球球员的功能性运动能力状态，并评估通过矫正练习来改善的可能性。参与研究者包含 50 名 16-24 岁间的健康女性，她们接受福乐球初级及高级类别的培训（平均年龄 18.2 岁），研究通过 FMS 设备对受试者进行功能性运动评估。FMS 测试评估由 7 项功能性运动测试组成，运动员在矫正前的 FMS 测试中取得的平均分数为 14.6 分（SD = 1.5），矫正后为 16.3 分（SD = 1.4）。福乐球球员基于 FMS 测试展现出良好的运动能力，其受伤风险等级为 25-35%。福乐球球员根据功能性运动检测进行矫正，其体适能在 2 个月后获得改善。

关键词：
功能性运动检测、功能性评估、受伤风险、福乐球球员

Introduction

Functional Movement Screening (FMS) is one of the tests which allow you to find the existing risk of injury. Scoring of seven movement tests is assessed and summed up. FMS is a highly reliable and repeatable test confirming an increased risk of injury with an achieved result of 14 points. The system has been designed to find significant movement limitations and left or right-side asymmetries [1].

In scientific research [2], it has been proven that factors such as: flexibility, trunk stability and muscular misbalance are the key to predicting the occurrence of injuries. FMS is a study allowing the introduction of an appropriate therapy, directed to observed dysfunctions.

Floorball is an asymmetrical discipline, which is associated with an increased risk of injuries. It is also a discipline having a comprehensive impact on the body through the included activities such as: running, sudden stopping, jumps or a large number of changes in the directions of movement. Floorball has a very fast pace and contact with an opponent, which, together with the increasing popularity of floorball, creates the conditions for increased incidence of injuries among players. The reason for this phenomenon is, in addition to the increase in competition between players, insufficient ability to adapt effort to the possibilities, and activity inadequately enriched with the stabilization and stretching training. In terms of motor abilities, floorball can be classified as an endurance-speed sport [3,4].

The most common injuries among athletes of floorball concern sprains and dislocations of joints, straining as well as breaking muscles or ligaments. The majority of injuries, about 70-85%, are acute injuries, while the minority has an overloading character [5]. The literature indicates a higher frequency of injuries in floorball in relation to the lower limbs (55%), including knee structures (34%). To a lesser extent, injuries refer to the ankle and joints of the upper body. Injuries associated with overexploitation result in an average 2-6 weeks' time loss out of the full participation in training. Damages can occur directly caused by a sudden injury, as well as by overload changes and micro injuries [6].

Snellman and Parkkari [7], testing Finnish players, emphasized the fact that most injuries concern the lower limb (62%). During the test, 100 out of 295 players got injured, which gives the result of 34% (37% of men and 28% of women); 83% of the injuries were of a traumatic character and 17% were connected with overload. The most common types of injuries were dislocations in men and sprains in women. The spine injury was accounted for 19%, and the upper limb – 10% of the injuries. As far as joints are concerned, injuries to the knee joint and ankle joint were the most common, respectively 22% and 20% of all the injuries, and less frequently – injuries to the head and neck (8%).

Pasanen et al. [8] made a prospective assessment of injuries in 374 licensed female floorball players in the first and second league in Finland during one season. In the season, 35% of players were injured; 70% of the injuries were traumatic and 30% were connected with overload. The most common type of injury was joint dislocation (27%), and the most common places of injuries were knee joints (27%) and ankles (22%).

Tranaeus et al. [5], testing 12 Swedish teams, also showed that during the season dislocations in the ankle and knee joints were

the most common, accounting for 30% and 11% of all the injuries, respectively. Pasanen and Bruun [9], conducting joint research for three years at twelve international tournaments, proved that the most common place of injury was an ankle (24%), followed by a head (18%) and a knee joint (18%). Half of the injuries (46%) concerned joints or ligaments.

Aim

The aim of the work was to assess the state of functional movement possibilities of female floorball players with the use of the Functional Movement Screen (FMS) test and to assess the possibility of improving the result with the use of a set of corrective exercises.

Material and methods of research

The research covered a group of 50 fit young women aged 16-24, training floorball in the category of senior juniors and seniors. Among the tested female floorball players, one player was a member of the Polish National Team of Seniors and participated in the World Championships in 2017, and three members belonged to the Polish National Team of Senior Juniors. Team training took place twice a week, matches were played every two weeks on average.

Table 1. Characteristics of the study group

Parameters	Mean	Minimum	Maximum	SD
Age [years]	18.2	13.0	25.0	3.2
Height [cm]	165.1	152.0	176.0	5.9
Weight [kg]	57.8	48.0	74.0	7.6
BMI	21.1	18.8	25.0	1.8

The research was carried out in the PUKS Trzebinia sport club. The criterion for the selection of athletes for testing: training practice for at least five years and regular attendance at training sessions. The players who underwent surgery and those who did not train regularly were excluded. The tested were subjected to a functional motor assessment with the use of the FMS tool in March 2018. The players performed seven screening tests. The second stage was the performance of a set of 12 exercises 3 times a week for 8 weeks following Leppänen et al. and the authors' own experience. The second FMS testing was conducted in May 2018 in order to verify the result.
The assessment with the FMS test consisted of seven functional movement tests, including: 1. Deep squat; 2. Hurdle step;

3. In-line lunge; 4. Shoulder mobility; 5. Active straight leg raise (ASLR); 6. Trunk stability push up; 7. Trunk rotational stability.

The subjects were assessed according to the rule: a healthy person – result > 17 points, the risk of overload injury at the level of 25-35% 15-17 points, the risk of overload injury at the level of 50% – < 14 points at the FMS test [10, 11]. Each test was assessed on a four-point scale from 0-3 points: where 0 points – during the test there is pain, 1 point – the tested person is unable to perform the test, 2 points – the subject performs movement with the existing compensation patterns, 3 points – means a correctly executed pattern without compensation.

During the test, the studied person could obtain a maximum of 21 points. The specialist 'FMS Test 92 KitTM' equipment, consisting of a base with the dimensions of 5 x 15 x 150 cm, a bar with a scale and a rubber, two crossbars with a scale, was used for the FMS evaluation [1, 2, 12].

A corrective exercise program used in the training program, developed based on the literature [2, 13, 14, 15, 16], included: 1. Stretching the Soleus muscle; 2. Stretching the Soleus Gastrocnemius muscle; 3. Deadlift on one lower limb with a stick; 4. Stretching combo the flexors of a hip; 5. Dynamic stretching of the back tape (sciatic-tibial muscles); 6. Mobilization of the thoracic spine with extension of the upper limbs; 7. Opening the chest in the support with the transfer of the lower limb; 8. Opening the chest lying on one's side; 9. Forearm support facing forward; 10. Eccentric pump; 11. Support facing forward with alternate touching the hand to the foot; 12. Deadlift with a rubber.

The obtained data was subjected to a statistical analysis based on the Statistica 2016 program. The student's t-test for dependent samples was used in the research. In all the tests carried out, a significance level of 0.05 was assumed.

Results

The average score obtained by the athletes in the FMS test before the correction was 14.6 points (SD = 1.5), after the correction 16.3 points (SD = 1.4). Before the exercises, the best result obtained was 17 points, and after the correction - 19 points, in the case of the lowest result before and after the correction, these values were respectively 12 points and 14 points. None of the tested floorball women players obtained the maximum number of points, both before and after the intervention (Table 2).

Table 2. Functional evaluation of the subjects before and after correction

Parameters	Mean	Minimum	Maximum	SD
FMS before	14.6	12.0	17.0	1.5
FMS after	16.3	14.0	19.0	1.4

Before the period of corrective exercises, 26 (52%) of the subjects obtained the FMS test score above 14 points, while 24 (48%) of the subjects obtained the result up to 14 points. After the period of corrective exercises, 46 (92%) of the studied obtained the FMS test score over 14 points, while 4 (8%) of the studied obtained the result up to 14 points.

Deep squat

The test result in the subjects before the applied correction was on average 1.9 points (SD = 0.7), however, after it 2.1 points (SD = 0.4), which gives a result higher by 10%. The result of the test, thanks to the exercises, improved and the average difference was 0.2 points (Tab.3).

Table 3. Statistical Student's 't' test result for the 'Deep squat' pattern, before and after correction

Parameters	Mean	SD	Difference	t	P
Before	1.9	0.7			
After	2.1	0.4	-0.2	-2.4749	0.0168

Hurdle step

On the basis of the test, a significant difference was found in the test result before and after the corrective exercises. The average female athletes' score for the lower right limb was 2.4 points before the correction (SD = 0.6), and 2.7 points after the correction (SD = 0.6). The athletes' score for the lower left limb was 2.2 points before the correction and 2.8 points after the correction. As a result of the applied exercises, the test result significantly improved, and the average difference was 0.2 points for the lower right limb and 0.6 points for the lower left limb. The final total result for both lower limbs after 8 weeks of correction improved significantly and increased by 0.5 points / 22% ($p < 0.0001$) (Tab. 4).

Table 4. The result of the statistical Student's 't' test for the 'Hurdle step' pattern, before and after correction

Parameters	Mean	SD	Difference	t	P
Right before	2.4	0.6			
Right after	2.7	0.6	-0.2	-2.5849	0.0128
Left before	2.2	0.7			
Left after	2.8	0.5	-0.6	-6.1491	< 0.0001
Total before	2.2	0.6			
Total after	2.7	0.5	-0.5	-5.6875	< 0.0001

In-line lunge

On the basis of the test, a significant difference was found in the test result before and after the corrective exercises. As a result of the applied exercises, the test result improved significantly, and the average difference was 0.2 points for the lower right limb, 0.2 points for the lower left limb and 0.2 points for the total score. The result of the third FMS motility test for the lower right limb was 2.8 points (SD = 0.4) before the correction and after the correction 3 points (SD = 0.0). The test result for the lower left limb was 2.7 points before the correction and 2.9 points after the correction. The final result improved significantly and amounted to 2.8 points, and was higher than the result before the correction by 0.2 points, which gives a 7% higher result ($p < 0.0193$) (Tab. 5).

Parameters	Mean	SD	Difference	t	P
Right before	2.8	0.4			
Right after	3.0	0.0	-0.2	-3.5000	0.0010
Left before	2.7	0.5			
Left after	2.9	0.4	-0.2	-2.2589	0.0254
Total before	2.6	0.5			
Total after	2.8	0.4	-0.2	-2.4188	0.0193

Shoulder mobility

On the basis of the test, a significant difference was found in the test result of shoulder mobility before and after the corrective exercises. The result for the upper right limb was 2.7 points before the correction, and after the correction – 2.9 points. The result for the upper left limb was respectively 2.4 points and 2.6 points. As a result of the applied exercises, the test result improved significantly, and the average difference was 0.2 points for the upper right limb, 0.2 points for the upper left limb and 0.2 points for the total score of both upper limbs, which gives a 12% higher score (Tab.6).

Table 6. Result of the statistical Student's 't' test for the 'Shoulder mobility' pattern, before and after correction

Parameters	Mean	SD	Difference	t	P
Right before	2.8	0.4			
Right after	3.0	0.0	-0.2	-3.5000	0.0010
Left before	2.7	0.5			
Left after	2.9	0.4	-0.2	-2.2589	0.0254
Total before	2.6	0.5			
Total after	2.8	0.4	-0.2	-2.4188	0.0193

Active lower limb raise (ASLR)

Before the exercises, the average test result of the active lower limb raise test was 2.5 points, and after the exercises 2.7 points. For the lower left limb the result increased from 2.3 points to 2.6 points after the exercises. The total score for both lower limbs was 2.6 points. As a result of the applied exercises, the test result improved significantly and the average difference was 0.2 points for the lower right limb, 0.3 points for the lower left limb and 0.3 points for the total score of both lower limbs. On the basis of the test, a significant difference was found in the active lower limb raise test (ASLR) before and after corrective exercises ($p < 0.0015$). The improvement in the result was 13% (Tab.7).

Table 7. The result of the statistical Student's 't' test for the 'Active lower limb raise (ASLR)' pattern, before and after correction

Parameters	Mean	SD	Difference	t	P
Right before	2.5	0.6			
Right after	2.7	0.5	-0.2	-3.2796	0.0019
Left before	2.3	0.7			
Left after	2.6	0.6	-0.3	-3.2796	0.0019
Total before	2.3	0.7			
Total after	2.6	0.6	-0.3	-3.2796	0.0019

Trunk stability push up

On the basis of the 'Trunk stability push up' test, a significant difference in the test result before and after the corrective exercises was found. The initial average result was 1.2 points, and after the correction – 1.5 points. As a result of the applied exercises, the result of the test improved by 25% ($p < 0.0006$), and the average difference was 0.3 points (Tab. 8).

Table 8. The result of the statistical Student's 't' test for the 'Trunk stability push up' pattern, before and after correction

Parameters	Mean	SD	Difference	t	P
Before	1.2	0.6			
After	1.5	0.8	-0.3	-3.6453	0.0006

Rotational stability of the trunk

On the basis of the trunk rotational stability test, no significant difference was found in the test before and after the corrective exercises ($p < 0.4197$) (Tab.9).

Table 9. The result of the statistical Student's 't' test for the pattern 'Rotational stability of the trunk', before and after correction

Parameters	Mean	SD	Difference	t	P
Right before	2.0	0.3			
Right after	2.1	0.3	-0.1	-1.4289	0.1594
Left before	2.0	0.3			
Left after	2.1	0.2	-0.1	-1.4289	0.1594
Total before	2.0	0.3			
Total after	2.0	0.0	0.0	-0.8137	0.4197

The total result of the FMS test

The average total result of the FMS test before the applied correction was 14.6 points (SD = 1.2 points). This result is by 1.7 point lower than the result after the correction, where the result was 16.3 points (SD = 1.4 points). This gives a higher result by 11%. On the basis of the test, a significant difference was found in the test result before and after the corrective exercises ($p < 0.0001$). The conducted correction increased the overall efficiency of the tested female floorball players (Tab.10).

Table 10. The result of the statistical Student's 't' test in the group of female floorball players before and after correction

Parameters	Mean	SD	Difference	t	P
Before	14.6	1.5			
After	16.3	1.4	-1.7	-9.6348	< 0.0001

Discussion

For the needs of the work, the following foreign databases were reviewed: PubMed, Google Scholar, Science Direct, Wiley Online Library, Ovid, with the use of the following key words: functional movement screen, functional training, functional exercises, FMS test, exercises program, training, floorball. Among Polish databases, the Polish OPI Data Base and E-publications of Polish Science were used, based on the following key words: floorball, functional training, Functional Movement Screen test, movement patterns, training program, functional exercises.

The key words were entered in various configurations in the period from 10/05/2018 to 10/06/2018. It was assumed that the articles since 2005 to the latest (the search day) were included in the initial analysis. Not publication on how the program of functional training affects the outcome of the FMS and reduces the risk of injury among female floorball players was found, therefore, in this paper the authors referred to the research conducted among disciplines of sports having a competitive and contact nature.

Functional Movements Screen (FMS) is getting more and more popular, both in the methodology of physical education and in physiotherapy. The FMS test allows the assessment of functional deficits, existing asymmetries, determination of the weakest link in the kinematic chain and risk factors for injury, and is considered by many authors as a valuable screening test because it allows comprehensive assessment of movement patterns and the risk of injuries [17, 18].

Appropriate training focused on a given discipline is crucial. Therefore, functional exercises, whose aim is to improve stability, flexibility and strength, are conducted more often. According to the study of volleyball players conducted in 2004, functional exercises have an influence on reducing the number of injuries. An additional benefit of the exercises is faster recovery in case of an injury [19].

Flexibility and muscle strength have long been recognized as an essential in the improvement of sports fitness and technique, and flexibility is closely related to injuries. Following Bradley et al. [20], the screening test for players' flexibility should take place in the pre-seasonal period, and a flexibility training should be recommended to players with reduced mobility, in order to reduce the risk of muscle damage. Developing a training program aimed at increasing the strength and flexibility of athletes, the FMS test should be followed and the appropriate adjustments should be made on its basis to improve athletic performance. The authors selected the training program based on the results of the FMS test and they focused on improving the weakest patterns.

Bodden et al. [21] assessed the basic movement patterns of mixed martial arts athletes (MMA) using the FMS test and determined whether the intervention program effectively improves the performance of the sportsmen. The study group, consisting of 31 people, was required to perform a corrective exercise program four times a week, continuing MMA training at the same time. The results of the study suggest that the 4-week intervention program was sufficient to improve the results of FMS. Analysis χ showed that the participants in the intervention group more often had an FMS score > 14 than the participants in the control group in the 4th week ($\chi = 7.29$, $p < 0.01$) and in the 8th week ($\chi = 5.2$, $p \leq 0.05$). In the authors' own work, the FMS result improved in the intervention group after 8 weeks.

FMS, as a way of preliminary checking of functional efficiency, was used in testing baseball players. The impact of the FMS training program on the strength and flexibility of 62 elite male baseball players (31 people in the training group and 31 in the control group) was studied. All the players who received less than 2 points for each FMS test pattern had to join a 16-week FMS training program, three times a week. The FMS correction program increased the strength and flexibility of the elite male baseball players. The results obtained by the authors confirm the effectiveness of the correction program through improving the competitors' results, which indicates an increase in muscle flexibility [22].

Goss et al. [23] noted a significant improvement in performing the FMS test on average by 2.5 points in soldiers after applying a 6-week training program based on functional movements, hence the strengthening of functional movements is considered to be an important factor in improving endurance, and current FMS results confirm this view. In the authors' own work, the average FMS result obtained by floorball female players after an 8-week training program was higher by 1.7 points.

Kiesel et al. [24] tested 62 professional American football players before the season based on the FMS test, with an intervention time of 7 weeks. The aim of the study was to determine if the off-season intervention program was effective in improving the results of FMS. The initial assessment of competitors determined the level of fitness at the level of trunk stability disorders. In the test after the intervention 41 players were free from asymmetry compared to 31 competitors recorded in the first test. Based on the assessment, the authors of the study believe that strengthening the trunk stability may contribute to the improvement of the body balance and overall strength. However, in terms of strength, the training group indeed showed a significant drop in the squat test compared to the control group. Collective data shows that the FMS training program positively contributed to the change of strength and flexibility. Kiesel's et al. study indicates that the FMS training program can improve physical strength if the FMS results are used as basic data during creating a training program.

Engin et al. [25], in order to increase mobility and reduce the risk of overloading in young players, implemented a special program of functional exercises based on FMS functional training. 67 young athletes aged 14-19 from the Super League Football Club Academy took part in the study. Movement patterns were evaluated using the FMS evaluation protocol. The control group consisted of 43 people and the intervention group of 24. The correction program consisted of one-hour sessions lasting for 12 weeks. The first four weeks of the training were focused on mobility, next four weeks on stability, and last four on functional exercises. At the end of the 12-week intervention, the groups were again assessed using the FMS protocol. In the intervention group, the difference of all FMS results ($p < 0.01$), deep squat ($p \leq 0.001$), hurdle step ($p < 0.05$), in-line lunge ($p < 0.01$) and also trunk stabilization ($p < 0.01$) was statistically significant.

A properly planned functional training reflects the overloads typical of a given sport discipline or a motor task in everyday life. In addition, it prepares the ligament-joint apparatus together with the muscular system for starting loads, stimulating the body to appropriate reactions, which can prevent serious injuries. The functional training also helps to improve efficiency, which consists of aerobic and heart-vascular endurance and helps align the muscle imbalance, increasing the range of motion in joints, improving flexibility and coordination, balance and the feeling of deep muscles responsible for stabilization.

The authors' own research carried out on the female players of the senior floorball club showed a higher FMS test result after the application of the 8-week functional training than before the correction. The average result of the tested female floorball players before the intervention was 14.6, and after the correction 16.3, which classifies the risk of injury at the level of 25-35%. The functional training, performed three times a week, increases the efficiency, hence the difference in the results obtained.

Observation of the group which was limited in size in one season may not have provided an appropriate framework to draw conclusions. Further research is, therefore, needed to cover a larger, more diverse group of male and female athletes in order to confirm the effectiveness of the FMS test. Future research should focus on determining whether the risk of injury is reduced when the player's score improves over the set limit of 14 and / or asymmetry will be deleted.

Conclusions

1. Female floorball players, based on the FMS test, present a good level of basic mobility with the risk classification of 25-35%.
2. Introducing correction according to the FMS test after just 2 months improves the functional efficiency of the female floorball players.
3. Thanks to the FMS test, it is possible to detect functional disorders in the kinematic chain of female floorball players.
4. The conducted research confirmed the predisposition of female players to the occurrence of injury at the level of 50%, and after the program the percentage of the tested with the predisposition to injury decreased to 8%.

Adres do korespondencji / Corresponding author

Tomasz Ridan

e-mail: tomasz.ridan@awf.krakow.pl

Piśmiennictwo/ References

1. Cook G, Burton L, Hogenboom B. Pre-participation screening: The use of fundamental movements as an assessment of function – Part 2. North American Journal of Sports Physical Therapy 2006; 1(3):132-9.
2. Cook G, Burton L, Hoogenboon B. Pre-participation screening: The use of fundamental movements as an assessment of function – Part 1. North American Journal of Sports Physical Therapy 2006; 1(2): 62-72.
3. Korsman J, Mustonen J. Floorball manual. Salibandyn käsikirja [in Finnish]. UNIpress 2011; 47-52.
4. Wikström J, Andersson C. A prospective study of injuries in licensed floorball players. Scand J Med Sci Sports. 1997 Feb; 7(1): 38-42.
5. Tranaeus U, Götesson E, Werner S. Injury Profile in Swedish Elite Floorball. A Prospective Cohort Study of 12 Teams, 2016; 477-481.
6. Leppänen M, Pasanen K, Kujala U. Overuse injuries in youth basketball and floorball. Open Access Journal of Sports Medicine 2015; 6: 173-179.
7. Snellman K, Parkkari J, Kannus P. Sports injuries in floorball: a prospective one-year follow-up study. International Journal of Sports Med. 2001; 22(7): 531-536.
8. Pasanen K, Parkkari J, Pasanen M. Neuromuscular training and the risk of leg injuries in female floorball players: cluster randomised controlled study. Br J Sports Med 2008; 42(10): 802-805.
9. Pasanen K, Bruun M, Vasankari T. Injuries during the international floorball tournaments from 2012 to 2015. BMJ Open Sport & Exercise Medicine 2017; 1(2): 2-4.
10. Kiesel K, Plisky P, Voight M. Can serious injury in professional football be predicted by a preseason functional movement screen? N Am J Sports Phys Ther. 2007; 2(3): 147-152.
11. Urita S, Chorba, P, David J. Use of a Functional Movement Screening Tool to Determine Injury Risk in Female Collegiate Athletes. N Am J Sports Phys Ther. 2010; 5(2): 47-53.
12. Tiffert J, Niewiadomy P, Nowacki T, Kwaśna K. Wykorzystanie metody Functional Movement Screen do oceny funkcjonalnej kolarzy górskich Grupy Gomola Trans Africo, Praktyczna Fizjoterapia i Rehabilitacja, 2013, maj, 12-21.
13. Adamczyk J, Pepłowski M, Boguszewski D. Functional evaluation of competitors practising weightlifting with using Functional Movement Screen Test. Polish J Sport Med. 2012; 28(4): 267-76.
14. Cook G, Burton L, Kiesel K. Movement. Functional movement systems: screening, assessment and corrective strategies. On Target Publications, Santa Cruz, California 2010.
15. www.functionalmovement.com
16. www.mobilitywod.com
17. Lisman P, O'Connor F, Deuster P. Functional movement screen and aerobic fitness predict injuries in military training. Med Sci Sports Exerc. 2013; Apr; 45(4): 636-43.
18. Tervo T, Nordström A. Science of floorball: a systematic review. Open Access J Sports Med. 2014; Oct; 5: 249–55.
19. Verhagen E, Van der Beck A, Twisk J. Board training program for the prevention of ankle sprains. Am J Sports Med 2004; 32: 1385-1393.
20. Bradley P, Portas M. The relationship between preseason range of motion and muscle strain injury in elite soccer players. J Strength Cond Res. 2007; 21: 1155-1159.
21. Bodden J, Needham R, Chockalingam N. The effect of an intervention program on functional movement screen test scores in mixed martial arts athletes. J Strength Cond Res. 2015 Jan; 29(1): 219-225.
22. Hong-Sun S, Seung-Seok W, Wi-Soung S. Effects of 16-week functional movement screen training program on strength and flexibility of elite high school baseball players. J Exerc Rehabil. 2014 Apr; 10(2): 124-130.
23. Goss D, Christopher G, Faulk R. Functional training program bridges rehabilitation and return to duty. J Spec Oper Med. 2009 Spring; 9(2): 29-48.
24. Kiesel K, Plisky P, Butler R. Functional movement test scores improve following a standardized off-season intervention program in professional football players. Scand J Med Sci Sports. 2011 Apr; 21(2): 287-92.
25. Engin D, Bekir E, Muge B. Effects of special exercise programs on functional movement screen scores and injury prevention in preprofessional young football players J Exerc Rehabil. 2017 Oct; 13(5): 535-540.