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Original Article

The relationship between Functional Movement Screening Score and Anthropometric Characteristics in Adolescence Volleyball Players of the Iran National Team.

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Abstract

Background: Investigating and understanding the relationship and correlation between functional movement screening (FMS) and anthropometric characteristics play a significant role in predicting and preventing injury. This study investigated the relationship between FMS and anthropometric characteristics in the Iranian national team's teenage volleyball players.

Methods: 22 elite youth volleyball players who were members of the national adolescent volleyball team of the Islamic Republic of Iran participated in this research. Also, two demographic characteristics and FMS were examined. The Pearson correlation test was used to investigate the relationship between the demographic variables and the FMS score.

Result: There was a significant positive relationship between "in-line lunge with upper limb balance, shoulder mobility with active straight leg raise, fat mass index with fat ratio to SM, Body Mass Index (BMI), Total Body Fat (TBF%), Visceral Fat Index (VFI), fat-free mass with fat-free mass index. Bone Mineral Content (BMC), Basal Metabolic Ratio (BMR), the ratio of fat to SM with TBF% and VFI" and “weight with BMI, BMC, and BMR, and BMI with VFI, BMR, and Upper Limb Balance" and "TBF% with VFI" and "BMC with BMR" and "TBW% with SM%" and "body balance with TBW%, SM%, and Upper Limb Balance”.

Conclusion: Based on the analysis of the obtained results, it can be suggested that FMS test results and anthropometric indices can be useful in the initial assessment and prediction of people's susceptibility to functional-motor injuries. Also, athletes' functional movement patterns and body composition are different according to their sport and position. Therefore, it is necessary to pay attention to the positive points of the athlete's performance in his specialized sports field and functional movement disorders in young people, which may help to reduce injuries and improve sports performance.

Keywords: FMS, Anthropometric, Volleyball Players

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Introduction

Volleyball is one of the most popular sports in the world and attracts people worldwide with its unique and extraordinary team appeal. Based on the advancement of volleyball technology and frequent and intense competitions, players must have intelligence, fighting, cardiovascular fitness, and athletic skills. As a comprehensive sport, volleyball requires athletes to have comprehensive sports characteristics such as speed, strength, endurance, flexibility, reaction, and coordination (1). Also, the anthropometric characteristics of athletes are essential prerequisites for successful participation in sports, and they affect the athlete's performance and the acquisition of sports skills (2). In other words, an athlete's success in their specialized sport is directly related to his anthropometric characteristics. Therefore, the physical structure of volleyball players is mainly evaluated by measuring anthropometric parameters such as standing height, body mass index, and some factors related to performance skills such as jumping ability, agility, strength, and endurance (3).

The performance of athletes is a function of their physical fitness, and coaches can increase the success of athletes when they know the physical characteristics of athletes and their effect on sports success (4). In the proper design, planning, and implementation of each sport, the conditions and nature of that sport and the athletes' structural characteristics should be considered. Compiling and planning appropriate sports training depends on the conditions and nature of the sports field and the athlete's abilities (5). Observance of these principles is practical for finding talent and supporting athletes (6). On the other hand, sports expertise and intensive training in young athletes may affect their musculoskeletal conditions, and it is necessary to predict sports injuries in the age group (7). Regardless of the sports level, prevention of injuries is one of the most critical goals in medicine and sports, and this matter is of great importance at the professional level. For example, an injury can prevent an athlete from being prepared and/or even rule out the possibility of participating in competitions (8). However, at the amateur level in most sports clubs, injury prevention is not emphasized much (9).

Recently, researchers have used movement tests that include comprehensive movement patterns to predict injury (10). It is hypothesized that tests that simultaneously assess multiple domains of performance (balance, strength, range of motion) may improve the accuracy of identifying athletes at risk of injury through pre-participation assessment. The Functional Movement Screen (FMS) is a comprehensive test that assesses the quality of fundamental movement patterns to identify an individual's limitations or asymmetries (11, 12). Attempt to obtain movement pattern quality with an initial grading system that begins the process of functional movement pattern assessment in normal individuals that is not used to diagnose but to indicate limitations or asymmetries with respect to patterns of human mobility and, finally, the relationship of these limitations with outcomes, which may lead to a proactive approach to injury prevention (10).

The FMS may be incorporated into the preparticipation physical examination or used as a stand-alone assessment technique to determine deficits that may be overlooked during traditional medical and functional assessments. For example, in many cases, flexibility, balance, and strength, previously identified as important risk factors, can be identified using the FMS. In addition, this movement-based assessment is used to identify functional deficits related to poor proprioception, mobility, and stability (11).

Therefore, Functional movement and sports performance tests assess an athlete's conditions and prevent sport-related injuries (13). These tests could also be used as clinical tests to predict the risk of sports injury because poor physical fitness, improper movement pattern, and insufficient sensorimotor control are vital factors in sports injuries (14, 15). The main goal in performing pre-participation or performance screenings is to decrease injuries, enhance performance, and improve quality of life (10). So, investigating and understanding the relationship and correlation between this FMS and anthropometric characteristics is important and plays a significant role in predicting and preventing injury. Therefore, this study aimed to investigate the relationship between FMS and anthropometric characteristics in the Iranian national team's teenage volleyball players.

Material and methods

Twenty-two elite youth volleyball players who were members of the national adolescent volleyball team of the Islamic Republic of Iran and were in the national team camp participated in this research as the subjects (Mean±SD: Age: 17.24±1.64 yrs. , BMI: 18.32±8.43 kg/m2). In order to enter the research, all subjects had a minimum of five years of experience participating in volleyball training. In addition, subjects were excluded from the study if they had any musculoskeletal or neurological defects and a history of surgery affecting their intervention and evaluation process in this research. Finally, all the participants were informed about the complete details and signed the consent form.

Anthropometric parameters

The anthropometric parameters were measured using the body composition analyzing device Inbody 720. The variables included Fat mass, Fat mass index, Fat-free mass, Fat-free mass index, Rati of fat to Skeletal Muscle Mass (SMM), Weight, Body Mass Index (BMI), Total body Fat (TBF%), Visceral Fat Index (VFI), Total Body weight (TBW%), Bone Mineral Content (BMC), Basal Metabolic Ratio (BMR), Upper Body Balance, Lower body Balance, and body Balance. In order to complete the test, the subject stood on the Body composition analyzing platform with the minimum of clothing free of any additional instrument (especially metal instrument), holding the handles in a comfortable manner (16, 17)

FMS scores:

Hurdle step: The subjects stand with feet together and toes touching the base of the hurdle. Place a dowel on the back of the shoulders and hold it in position to each side. Subjects step up hurdles while maintaining foot alignment. Touch the floor with the heel while keeping weight on the extended supporting leg. Return to the starting position while maintaining foot alignment with ankle, knee, and hip. Repeat with the opposite leg (18).

In-line lunge: The subjects hold the dowel behind their back with both hands, the right hand against the back of the neck and the left hand against the lower back. The bar should be positioned along the spine to make contact with the head, upper back, and buttocks. Place the right foot on board with the front of the foot at the first mark. Step forward and place the left heel at the second mark. Both feet should be positioned flat and pointing forward. While maintaining an upright posture with a dowel maintaining contact with the head, upper back, and top of buttocks, lower body into a lunge position, so the right knee makes contact with the board behind the left heel. Return body to starting position. Repeat with legs and arms in opposite positions. Subject's completion of movement using the following criteria: Dowel remains vertical with no torso movement. Dowel maintains contact with the head, upper back, and top of the buttocks. The hip of the trailing leg completely extends at the lowest position. Both feet are in-line, the knee touches the board behind the heel of the front foot, the knees are aligned with the feet, and balance is maintained throughout the movement.

Shoulder mobility: This parameter assessed bilaterally and reciprocal shoulder ROM, combining internal rotation with the abduction of one shoulder and external rotation with the abduction of the other. In the first step, the hand length by measuring the distance from the distal wrist crease to the tip of the third digit in inches. Then the subjects were asked to make a fist with each hand, placing the thumb inside the fist. Then they do a maximum adducted, extended, and internally rotated position with one shoulder and a maximum abducted, flexed, and externally rotated position with the other. In the end, the distance between the two closest bony prominences was measured.

Active straight leg raise: The subjects first assume the starting position by lying supine with the arms in anatomical position, legs over the 2 × 6 board, and head flat on the floor. The tester then identifies the mid-point between the anterior superior iliac spine and the midpoint of the patella of the leg on the floor, and a dowel is placed at this position, perpendicular to the ground. Next, the individual is instructed to slowly lift the test leg with a dorsiflexed ankle and an extended knee. During the test, the opposite knee (the down leg) must remain in contact with the ground, and the toes pointed upward, and the head in contact with the floor. Once the end range position is achieved, note the position of the upward ankle relative to the non-moving limb. If the malleolus does not pass the dowel, move the dowel, much like a plumb line, to equal with the malleolus of the test leg, and score per the criteria. The moving limb identifies the side being scored. Ensure the non-moving leg (on the floor) maintains a neutral position (no external hip rotation). Both knees must remain extended, and the leg on the floor must remain in contact with the floor. If the dowel resides at precisely the midpoint, score low.

Rotatory stability: The subjects assume the starting position in quadruped, their shoulders, and hips at 90-degree angles relative to the torso, with the 2 × 6 board between their hands and knees. The knees are positioned at 90 degrees, and the ankles should be dorsiflexed. The subjects then flex the shoulder and extend the same hip and knee. The leg and hand are only raised enough to clear the floor by approximately 6 inches. The same shoulder is then extended, and the knee flexed enough for the elbow and knee to touch. This is performed bilaterally for up to three attempts on each side. If the individual cannot complete this maneuver (score a "3"), they are then instructed to perform a diagonal pattern using the opposite shoulder and hip in the same manner as described for the previous test. They are also allowed three attempts at this test. The upper extremity that moves indicates the side being tested. Even if the individual receives a "3", the test must be performed bilaterally and the results recorded on the score sheet. The moving limbs must remain over the 2 × 6 board to achieve a score of "3". The elbow and knee must touch during the flexion part of the movement. Make sure the spine is flat, and the hips and shoulders are at right angles to begin the test. Provide cueing to let the individual know that he/she does not need to raise the arm and leg more than 6 inches off the floor. When in doubt, score low, do not try to interpret the score when screening.

Statistical Analysis

SPSS model 22 software was used for statistical analysis. For this purpose, after using descriptive statistics (mean and standard deviation) and using the Kolmogorov–Smirnov test to measure the normal distribution of the data to investigate the relationship between the demographic variables of the volleyball players of the national junior team and their FMS score, the Pearson correlation test was used at a significance level of $p < 0.05$.

Results

Descriptive statistics were used to introduce the mean and standard deviation and evaluate the normality of data distribution. The average values and standard deviation of the research variables are shown in Table 1.

Table 1. Descriptive statistics of variables (N=22)

	Variable	Mean	Std. Deviation
FMS Acores	hurdle step	2.8810	0.61043
	in-line lunge	2.4524	0.75672
	shoulder mobility	2.9048	0.46419
	active straight leg raise	3.2143	0.40532
	rotatory stability	2.3095	0.66099
Anthropometric Parameters	fat mass (kg)	2.5371	1.68160
	fat mass index	0.6533	0.43496
	fat free mass	67.1914	6.57563
	fat free mass index	17.1990	1.09533
	ration of fat to SM	0.0829	0.06059
	weight	69.7286	6.88282
	BMI	17.8048	1.24156
	TBF%	3.6000	2.27903
	VFI	2.3095	0.53000
	TBW%	69.9238	4.43891
	SM%	45.1571	3.59883
	BMC	3.7762	0.37136
	BMR	1820.7619	142.05242
	upper limb balance	1.0130	0.03033
	body balance	1.0020	0.02158
	lower limb balance	1.0725	0.03839

Table 2 shows the Pearson's correlation coefficient relationship between anthropometric characteristics and factors of the FMS test in the teenage volleyball players of the Iranian national team, which is as follows:

There was a significant negative relationship between hurdle steps with BMI, between upper limb balance with fat-free mass index, between TBW% and SM% with fat mass, fat mass index, ratio of fat to SM, TBF%, and VFI.

Also, there was a significant positive relationship between in-line lunge with upper limb balance, between shoulder mobility with active straight leg raise, between fat mass with fat mass index, between fat mass and fat mass index with fat ratio to SM, BMI, and TBF% and VFI, between fat-free mass with fat-free mass index, between fat-free mass and fat-free mass index with weight, BMI, BMC, and BMR, between ration of fat to SM with TBF% and VFI, between weight with BMI, BMC, and BMR, between BMI with VFI, BMR, and Upper Limb Balance, between TBF% with VFI, between BMC with BMR, between TBW% with SM%, and between body balance with TBW%, SM%, and Upper Limb Balance.

There was no significant relationship between other variables ($P<0.05$).

Table 2. Pearson correlation coefficient between values (N=22)

	hurdle step	in-line lunge	shoulder mobility	active straight leg raise	rotatory stability	fat mass (kg)	fat mass index	fat free mass	fat free mass index	ration of fat to SM	Weight	BMI	TBF%	VFI	TBW%	SM%	BMC	BMR	upper limb balance	body balance	lower limb balance
hurdle step	1	0.204	0.046	-0.144	-0.059	-0.324	-0.332	-0.336	-0.413	-0.271	-0.402	-0.477	-0.290	-0.334	0.337	0.348	-0.197	-0.337	0.387	0.429	0.266
Sig.		0.376	0.842	0.532	0.799	0.164	0.153	0.147	0.070	0.248	0.079	0.034*	0.215	0.150	0.146	0.133	0.405	0.146	0.092	0.059	0.257
inline lunge	0.204	1	-0.263	0.035	0.356	-0.188	-0.190	-0.215	-0.196	-0.142	-0.253	-0.238	-0.156	-0.247	0.052	0.073	-0.191	-0.215	0.659	0.345	-0.172
Sig.	0.376		0.250	0.881	0.113	0.427	0.423	0.363	0.407	0.550	0.282	0.312	0.511	0.293	0.829	0.758	0.420	0.362	0.002*	0.136	0.467
shoulder mobility	0.046	-0.263	1	0.446	0.142	-0.137	-0.191	0.289	-0.030	-0.135	0.245	-0.091	-0.177	-0.112	0.147	0.057	0.283	0.290	-0.043	0.132	0.182
Sig.	0.842	0.250		0.043*	0.540	0.565	0.419	0.216	0.902	0.570	0.299	0.703	0.456	0.639	0.536	0.811	0.226	0.215	0.858	0.579	0.443
active straight leg raise	-0.144	0.035	0.446	1	0.393	-0.300	-0.311	-0.038	-0.017	-0.307	-0.110	-0.128	-0.318	-0.318	0.252	0.197	0.006	-0.038	-0.157	-0.114	-0.012
Sig.	0.532	0.881	0.043*		0.078	0.199	0.182	0.875	0.944	0.189	0.645	0.592	0.171	0.172	0.284	0.405	0.980	0.874	0.508	0.631	0.961
rotatory stability	-0.059	0.356	0.142	0.393	1	-0.392	-0.355	-0.078	0.136	-0.349	-0.171	-0.007	-0.358	-0.428	0.107	0.142	-0.099	-0.078	0.025	-0.080	-0.191
Sig.	0.799	0.113	0.540	0.078		0.087	0.125	0.744	0.567	0.132	0.471	0.977	0.121	0.060	0.652	0.550	0.679	0.743	0.916	0.736	0.419
fat mass (kg)	-0.324	-0.188	-0.137	-0.300	-0.392	1	0.988	0.059	0.115	0.983	0.301	0.448	0.991	0.996	-0.765	-0.774	-0.077	0.060	-0.315	-0.375	-0.198
Sig.	0.164	0.427	0.565	0.199	0.087		0.000*	0.799	0.620	0.000*	0.185	0.042*	0.000*	0.000*	0.000*	0.000*	0.739	0.795	0.164	0.094	0.389
fat mass index	-0.332	-0.190	-0.191	-0.311	-0.355	0.988	1	-0.023	0.171	0.977	0.219	0.500	0.992	0.981	-0.764	-0.762	-0.157	-0.022	-0.358	-0.360	-0.144
Sig.	0.153	0.423	0.419	0.182	0.125	0.000*		0.921	0.459	0.000*	0.339	0.021*	0.000*	0.000*	0.000*	0.000*	0.497	0.925	0.111	0.109	0.535
fat free mass	-0.336	-0.215	0.289	-0.038	-0.078	0.059	-0.023	1	0.520	-0.072	0.970	0.451	-0.059	0.103	0.189	0.157	0.959	1.000	-0.179	-0.183	-0.196
Sig.	0.147	0.363	0.216	0.875	0.744	0.799	0.921		0.016*	0.756	0.001*	0.040*	0.800	0.657	0.411	0.496	0.000*	0.000*	0.438	0.427	0.394
fat free mass index	-0.413	-0.196	-0.030	-0.017	0.136	0.115	0.171	0.520	1	0.001	0.525	0.938	0.066	0.130	0.084	0.112	0.453	0.520	-0.478	-0.187	0.051
Sig.	0.070	0.407	0.902	0.944	0.567	0.620	0.459	0.016*		0.996	0.015*	0.000*	0.777	0.573	0.717	0.629	0.039*	0.016*	0.028*	0.418	0.827
ration of fat to SM	-0.271	-0.142	-0.135	-0.307	-0.349	0.983	0.977	-0.072	0.001	1	0.171	0.343	0.994	0.975	-0.814	-0.820	-0.208	-0.071	-0.249	-0.351	-0.208
Sig.	0.248	0.550	0.570	0.189	0.132	0.000*	0.000*	0.756	0.996		0.458	0.127	0.000*	0.000*	0.000*	0.000*	0.366	0.760	0.277	0.119	0.365
weight	-0.402	-0.253	0.245	-0.110	-0.171	0.301	0.219	0.970	0.525	0.171	1	0.540*	0.186	0.342	-0.006	-0.039	0.897	0.970	-0.248	-0.266	-0.236
Sig.	0.079	0.282	0.299	0.645	0.471	0.185	0.339	0.000*	0.015*	0.458		0.011*	0.420	0.130	0.979	0.867	0.000*	0.000*	0.279	0.243	0.303
BMI	-0.477*	-0.238	-0.091	-0.128	-0.007	0.448	0.500	0.451	0.938	0.343	0.540	1	0.406	0.459	-0.186	-0.162	0.348	0.451	-0.537	-0.280	-0.003

Sig.	0.034*	0.312	0.703	0.592	0.977	0.042*	0.021*	0.040*	0.000*	0.127	0.011*		0.068	0.036*	0.419	0.484	0.122	0.040*	0.012*	0.218	0.989
TBF%	-0.290	-0.156	-0.177	-0.318	-0.358	0.991	0.992	-0.059	0.066	0.994	0.186	0.406	1	0.981	-0.795	-0.797	-0.193	-0.058	-0.297	-0.350	-0.172
Sig.	0.215	0.511	0.456	0.171	0.121	0.000*	0.000*	0.800	0.777	0.000*	0.420	0.068		0.000*	0.000*	0.000*	0.403	0.804	0.190	0.120	0.457
VFI	-0.334	-0.247	-0.112	-0.318	-0.428	0.996	0.981	0.103	0.130	0.975	0.342	0.459	0.981	1	-0.739	-0.751	-0.029	0.104	-0.325	-0.375	-0.193
Sig.	0.150	0.293	0.639	0.172	0.060	0.000*	0.000*	0.657	0.573	0.000*	0.130	0.036*	0.000*		0.000*	0.000*	0.900	0.653	0.150	0.094	0.403
TBW%	0.337	0.052	0.147	0.252	0.107	-0.765	-0.764	0.189	0.084	-0.814	-0.006	-0.186	-0.795	-0.739	1	0.987	0.424	0.188	0.288	0.479	0.283
Sig.	0.146	0.829	0.536	0.284	0.652	0.000*	0.000*	0.411	0.717	0.000*	0.979	0.419	0.000*	0.000*		0.000*	0.056	0.415	0.206	0.028*	0.213
SM%	0.348	0.073	0.057	0.197	0.142	-0.774	-0.76	0.157	0.112	-0.820	-0.039	-0.162	-0.797	-0.751	0.987	1	0.394	0.156	0.260	0.447	0.255
Sig.	0.133	0.758	0.811	0.405	0.550	0.000*	0.000*	0.496	0.629	0.000*	0.867	0.484	0.000*	0.000*	0.000*		0.078	0.500	0.255	0.042*	0.264
BMC	-0.197	-0.191	0.283	0.006	-0.099	-0.077	-0.157	0.959	0.453	-0.208	0.897	0.348	-0.193	-0.029	0.424	0.394	1	0.958	-0.079	-0.034	-0.107
Sig.	0.405	0.420	0.226	0.980	0.679	0.739	0.497	0.000*	0.039*	0.366	0.000*	0.122	0.403	0.900	0.056	0.078		0.000*	0.733	0.883	0.643
BMR	-0.337	-0.215	0.290	-0.038	-0.078	0.060	-0.022	1.000	0.520	-0.071	0.970	0.451	-0.058	0.104	0.188	0.156	0.958	1	-0.179	-0.183	-0.196
Sig.	0.146	0.362	0.215	0.874	0.743	0.795	0.925	0.000*	0.016*	0.760	0.000*	0.040*	0.804	0.653	0.415	0.500	0.000*		0.437	0.426	0.394
upper limb balance	0.387	0.659	-0.043	-0.157	0.025	-0.315	-0.358	-0.179	-0.478	-0.249	-0.248	-0.537	-0.297	-0.325	0.288	0.260	-0.079	-0.179	1	0.665	-0.020
Sig.	0.092	0.002*	0.858	0.508	0.916	0.164	0.111	0.438	0.028*	0.277	0.279	0.012*	0.190	0.150	0.206	0.255	0.733	0.437		0.001*	0.932
body balance	0.429	0.345	0.132	-0.114	-0.080	-0.375	-0.360	-0.183	-0.187	-0.351	-0.266	-0.280	-0.350	-0.375	0.479	0.447	-0.034	-0.183	0.665	1	0.709
Sig.	0.059	0.136	0.579	0.631	0.736	0.094	0.109	0.427	0.418	0.119	0.243	0.218	0.120	0.094	0.028*	0.042*	0.883	0.426	0.001*		0.000*
lower limb balance	0.266	-0.172	0.182	-0.012	-0.191	-0.198	-0.144	-0.196	0.051	-0.208	-0.236	-0.003	-0.172	-0.193	0.283	0.255	-0.107	-0.196	-0.020	0.709	1
Sig.	0.257	0.467	0.443	0.961	0.419	0.389	0.535	0.394	0.827	0.365	0.303	0.989	0.457	0.403	0.213	0.264	0.643	0.394	0.932	0.000*	

*. Correlation is significant at the 0.05 level.

Discussion

The present research was conducted to investigate the relationship between FMS and anthropometric characteristics in the Iranian national team's teenage volleyball players, and the results indicated a significant negative relationship between hurdle step and BMI. This means that the hurdle steps score decreases as the BMI increases and vice versa. In other words, the people who scored high on the hurdle step test had a low BMI, which can be justified considering the functionality of this test. Because the BMI index is one of the factors of physical fitness, people with high physical fitness are successful in optimal performance of functional movements. On the other hand, considering that the hurdle step is one of the FMS tests, the risk of injury can be predicted through FMS. (13, 15). Moreover, it can be concluded that people with high BMI are more vulnerable to injury, which was in line with the results of Campa et al. (19) and Bertrandt et al. (20).

There is a significant negative relationship between upper limb balance (fat-free mass index and TBW%) and SM% with fat mass and fat mass index and ratio of fat to SM and TBF% and VFI, which are all anthropometric factors. This is the inverse relationship between positive and negative factors. On the other hand, there was a significant positive relationship between an in-line lunge and upper limb balance. This means that the more people had a higher upper limb balance, the higher their in-line lunge score was, and vice versa, and considering that in-line lunge has a balancing nature and balance in the body is needed for the optimal performance of this movement, this is justifiable. Moreover, it was consistent with the results of Bonazza et al. (13).

Between (fat mass with fat mass index) , (fat mass and fat mass index with fat ratio to SM, BMI, and TBF%, and VFI) , (fat-free mass with fat-free mass index) , (fat-free mass and fat-free mass index with weight, BMI, BMC, and BMR) , (ration of fat to SM with TBF% and VFI) , (weight with BMI, BMC, and BMR) , (BMI with VFI, BMR, and Upper Limb Balance), (TBF% with VFI), (BMC with BMR), (TBW% with SM%), and (body balance with TBW%, SM% and Lower Limb Balance) which are all anthropometric indicators and as seen, positive anthropometric related factors together and negatively related factors also have a significant positive relationship, for example, weight factor with BMI or body balance factor with SM% and lower limb balance, which is normal.

The difference between the results of this study and some of the previous studies can be related to age, gender, time, physical and mental problems, and the field of sports or different post of players that has been different in different studies.

Conclusion

Based on the analysis, it can be suggested that FMS test results and anthropometric indices can be useful in the initial assessment and prediction of people's susceptibility to functional-motor injuries. Also, athletes' functional movement patterns and body composition are different according to their sport and position. Therefore, it is necessary to pay attention to the positive points of the athlete's performance in his specialized sports field and functional movement disorders in young people, which may help to reduce injuries and improve sports performance.

Competing interests

There is no competing interest to disclose

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