Journal of Humanities and Social Sciences Researches
(JHSSR)
ISSN: 2958-3160 (Online)

Functional strength training and its effect on some biokinematic variables and the performance of the forward Somersolt skill on the gymnastic floor of the players

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Received: 28/03/2023 Accepted:02/06/2023

Abstract

The diversity of the training requirements makes it imperative for the coaches to find the latest training methods that will raise the level of the players, and functional strength training is one of the modern exercises used in sports training. The importance of the research lies in an attempt to raise the level of performance of the forward Somersolt skill for young players by improving their physical and motor capabilities by organizing functional strength training aimed at developing some of these capabilities, through which the player can achieve good results and perform physical and skilled duties in the best way. The researcher used the experimental method, and the research was applied to a sample of (26) beginner gymnastics players aged (16-18) years. The researcher used functional tests as a means of obtaining information for the purpose of designing a training curriculum in order to develop some bio-kinematic variables and the skill of the forward Somersolt for the experimental group and for (30) training units, and then the post-test was conducted.

The researcher concluded:

1- The functional strength exercises led to the development of the biokinematic variables and the performance of the forward Somersolt skill in the research sample.

2- The development in the biokinematic variables led to the development of the performance level of the forward Somersolt skill in the research sample.

3- The diversification of exercises and the use of auxiliary tools contributed significantly to the development of the performance level of the forward Somersolt skill of the research sample.

Keywords: Gymnastic, Somersolt, strength, biokinematic, training.

1. Introduction

The diversity in the training requirements makes it imperative for the coaches and those in charge of the game to find the latest methods, methods, and exercises that will raise the level of the players' special capabilities. Functional strength training is one of the modern exercises used in the field of sports training. The musculature of the body on the basis of the complex relationship between the nervous and muscular systems, especially the muscles of the center of the body, which is the origin of movement,

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its strength, its motor path, and the mechanical variables that occur in the body and the degree of its accuracy.

Functional strength training is very suitable for beginner players, as it does not depend on large resistances and weights that focus on specific muscles that may be a negative factor in the occurrence of injuries and deformities in individuals of this age stage in terms of growth and physical build.

Through the foregoing, the importance of the research is evident in the researcher's serious attempt to raise the performance level of the forward Somersolt skill for the players, by improving their physical and motor capabilities by organizing functional strength exercises aimed at developing some of these capabilities, because of their essential and important role in the skills through which the player can Achieving good results and performing the physical and skilled duties in the best way.

Research Objectives:

1- Preparing exercises for Functional strength training and its effect on some biokinematic variables and the performance of the forward Somersolt skill on the gymnastic floor of the players

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2- To identify the effect of these exercises on the development of some biokinematic variables and the performance of the forward Somersoltskill on the gymnastic floor of the players

2. Research methodology and field procedures

The researcher used the experimental approach and followed the one-group design with two pre and post-tests, because it is appropriate to the nature of the research problem.

2-2 Research population and sample:

The research community was determined which is the players of Karbala governorate clubs (2021-2022) at the ages of (16-18) years, while the research sample was chosen randomly, numbering (26) players out of (30) players.

In order to verify that the results are moderately distributed among the members of the research sample, the researcher sought to find homogeneity among the members of the research sample by adjusting all variables that may affect performance in terms of (height, mass, age, training age), and as shown in the Table (1)

Table (1): It shows the homogeneity of the research sample with the torsion coefficient of the variables (height, mass, age, training age).

Factor skewness	Mediator	deviation normative	the middle Arithmetic	loneliness measurement	variants
0,599	158	5,902	160	cm	height
0,137	51	5,977	50,40	kg	Bloc
0,534	14,5	0,85	14,75	year	the age
0,381	2,75	0,859	2,85	Year	training age

It is noted from Table (1) that the values of the torsion coefficient were all between (1 ±) and this indicates the homogeneity of the research sample.

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Field Research Procedures:
Determination of biokinematic variables
- Identifying and measuring the biomechanical variables under study
The motor path and the biomechanical variables affecting the skill of the forward Somersolt were determined through a survey of scientific sources and literature. The analytical program (kinovea) was determined as a means for analyzing the biomechanical variables, and it was as follows.
1- Trunk angle: It is the angle confined between the trunk line (from the point of the hip to the shoulder) and the thigh line (from the point of the hip to the point of the knee joint). The angle of the trunk is measured from the rotation of the trunk on the longitudinal axis of the body and is measured in degrees
2- Performance time: It is the total performance time from the moment of starting to the moment of reaching a full stop position, measured in a second.

Pre-test:
The pre-test was conducted for the research sample on Sunday (3/17/2022), and the conditions related to the tests were fixed in terms of place, time and tools used in order to achieve similar conditions as much as possible and ensure their availability in the post-tests.

The main experience:
The main experiment started on Sunday (3/21/2022) and was completed on Wednesday (5/24/2022). In order to follow the sound scientific methods to reach the most accurate results to solve the research problem and in order to achieve the objectives of the research, the researcher prepared a set of exercises for functional strength in order to develop some biokinematic variables and the skill of the forward Somersolt of the experimental group. :
- The principle of diversifying exercises in the training unit to avoid boredom among the players.
The principle of gradation from easy to difficult.
- **Individual differences.**
Note that these exercises were applied at the end of the general preparation period and the beginning of the special preparation period, and the researcher's work was limited to taking (30-60) minutes from the time of the main part of the application of the exercises, and the training unit was characterized by the following:
- The researcher used the two methods of interval training (low intensity, high intensity) and repetitive training.
- The number of training units prepared by the researcher (30) training units distributed over (10) weeks, for each week (3) training units.
- Work with the experimental group was limited during the time allotted by the main section.
ϖ The intensity of the training load started from 60% and reached 100%.
- The intensity of the exercises was determined by the best achievement as follows (Mowafaq Asaad Mahmoud Al-Hiti: 2011 pp. 86-87):
Exercises that include running:
Required intensity = (best achievement x 100) ÷ required percentage

Post-test:
The post-tests were conducted on Thursday, on (27/5/2022), two days after the completion of the scheduled training period. The researcher was keen to provide similar conditions as much as possible in terms of place, time, means and tools used, and the method that was followed when implementing the pre-tests.
- Statistical Methods:
The researcher used the ready-made statistical package (SPSS) to extract the following laws:

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- Arithmetic mean.
- standard deviation.
- Mediator.
- Torsion coefficient.

The simple correlation coefficient (Pearson).
The t-test for correlated samples.
The t-test for uncorrelated samples.

3 - Presentation, analysis and discussion of the results:

Presentation and analysis of the results of the tests of biokinetic variables in the pre and post-tests of the experimental research group.

- Presenting and analyzing the results of the tests of the biokinematic variables in the pre and post-tests of the experimental group and discussing them.

Table (2): shows the arithmetic means, standard deviations, and t-tests between the results of the pre and post-tests in the biomechanical variables of the experimental group.

Variables	Unit of measurement	test	m	Std	f	f.std	t.test	Morale level	Indication Type
Torso degree	degree	Pre	42.20	4.81664	14.8	2.853	5.187	.007	Moral
		Post	27.40	3.91152					
Performance time	second	Pre	2.6020	.15770	.390	.07162	5.445	.006	Moral
		post	2.2120	.04147					

Through Table (2) it was found that there are significant differences between the pre-test and the post-test in all bio-kinematic variables (torso angle, performance time) and in favor of the post-tests.

The researcher attributes these differences among the experimental group to functional strength training and rationing training loads in a scientific manner suitable for the dental and training stage of the research sample and the use of training that develops the level of biokinematic variables, and what it includes of related exercises in developing these capabilities, which led to their improvement and development. This is consistent with what was indicated by (Mowafaq Asaad Mahmoud Al-Hiti: 2011) that sports training is "the process of continuous and organized preparation to develop the capabilities of the individual and raise the level of his competence to achieve the requirements necessary to perform a specific work, to achieve a specific goal and to increase productivity for the individual and society, or it is to raise physical and technical competence to the player using the available means and capabilities".

The researcher attributes the development of the torso angle variable to the functional strength exercises prepared by the researcher, which generally depended on body weight as well as the resistance of the colleague, especially bow exercises, jumping exercises forward and backwards, and jumping with rotation at an angle of 90 degrees, and this was confirmed by (Zaki Darwish: 1998). The various jumping exercises have a significant and effective impact on the development of the level of some mechanical variables, the most important of which is the angle of the torso, as this development worked to stimulate the largest possible number of muscle fibers necessary during the performance, as the sources indicate that increasing the number of joint muscle fibers increases Of the productive force required by the motor performance, and this was confirmed by (Mowafaq Majeed Al-Mawla and others: 2017) "The explosive force is shared by the largest possible number of motor units at the same time".

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As for the development in the time variable, the researcher attributes it to the effectiveness of the functional strength exercises implemented by the research sample, as the exercises that developed the explosive power and the power characteristic of the speed of the trunk muscles contributed greatly to the development of the accuracy and time of performing this skill, and this is confirmed by (Abu El-Ela Ahmed Abdel-Fattah 1997: "The explosive power and the power characteristic of speed are related to the degree of mastery of skilful performance",

This means that the increase in the muscle strength of the working muscle groups led to the creation of neuromuscular compatibility between these groups, which led to increased control and control in directing the body quickly and accurately, and the development in the speed-distinguished strength of the abdominal muscles also contributed to the development of the performance of this skill, as These exercises led to the development of the muscles of the trunk, which in turn helped in the development of this skill, and this is confirmed by (Hanafi Mahmoud Mukhtar: 1990).

Also, the development in kinetic flexibility contributed to the development of this skill by increasing the movement of the joints on which this skill operates, which represents the mechanical system of the body if it helped to achieve motor coordination in performance by allowing the performance of this skill smoothly and far from restriction. Thus, the speed and accuracy of the performance enhanced the skill of the forward Somersolt, as (Abu El-Ela Ahmed Abdel-Fattah: 1997) confirms that "inadequacy in the degree of flexibility leads to difficulty in motor performance and slowing down the performance of motor skills"

This is confirmed by (Hanafi Mahmoud Mukhtar: 1990) "The player's lack of flexibility results in the player's inability to quickly acquire and master the performance of skills", and this is also confirmed by (Saad Hammad Al-Jumaili: 2014) attention must be paid to developing flexibility so that we can secure motor performance.

The development in the special agility also contributed to the development of the performance of this forward Somersolt skill through the development of the player's ability to control the positions of his body and change them in proportion to the nature of the performance of the forward Somersolt skill, and therefore the player can be able to integrate more than one basic skill in a movement framework One to perform a specific vehicle skill.

- Presentation and analysis of the results of the forward Somersolt skill tests in the pre and post-tests of the two research groups.
- Presenting and analyzing the results of the forward Somersolt skill tests in the pre and post-tests of the experimental group and discussing them.

Table (3): The arithmetic mean, and standard deviations of the experimental group between the results of the pre and post-tests show some forward Somersolt skill.

Variables	test	M	Std	F	f.std	t.test	Morale level	Indication Type
performance of the forward Somersolt	Pre	3.0000	.61237	-1.40000	0,773	-1,810	0,054	Moral
	Post	4.4000	.54772					

Through Table (3) it was found that there are significant differences between the pre-test and the post-test of the experimental group in the forward Somersolt skill tests and for the two variables and in favor of the post tests.

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The researcher attributes the significance of the differences between the mean scores of the pre and post measurements of the experimental research sample in the forward Somersolt skill variables to the functional strength exercises, which included functional strength exercises (strength + balance) that led to the development of the forward Somersolt skill in question by raising the level of biokinematic variables for the experimental sample members. And this is confirmed by (Mofti Ibrahim Hammad: 1998) "Without very high levels of physical capabilities, it is difficult to achieve the goals of developing the competence of skillful performance",

This was also confirmed by (Hashem Yasser Hassan, 2011) "Many experts and specialists in the field of sports training and biomechanics advise the need to develop skillful performance through the development of mechanical variables and motor capabilities specific to each activity because the performance of sports movements requires fluidity of movement that is performed in a coherent manner that produces In the end, it is necessary to obtain a correct skillful performance.
Also, the development in dynamic balance also contributed to the development of the performance of this skill, as this skill resulted from merging more than one mechanical variable in one frame, and this means that when the player moves from one part to another, he will inevitably lose his balance for a short period of time as a result of his flight. In the air for a period of time without the body being connected to the ground, which necessitates the necessity of restoring balance very quickly in order to be able to perform the skill easily and smoothly in order for the performance to be carried out smoothly, quickly and accurately, whether for the studied skill or other skills in gymnastics, and its importance appears in the performance of motor skills that require a change in Movements in which the player loses his balance and the need to quickly restore this balance to start a new movement (1).

4- Conclusions and recommendations

1. Conclusions

Based on the foregoing, the following conclusions were drawn:
1- The functional strength exercises led to the development of some bio-kinematic variables and the performance of the forward Somersolt skill on the gymnastic floor of the players.
2- The development in the biokinematic variables led to the development of the performance level of the forward Somersolt skill on the gymnastic floor of the players
3- The development of skilful performance came as a result of the development of biomechanical variables in all parts of the skill
4- The diversification of functional strength exercises and the use of auxiliary tools such as Swiss balls, rubber ropes, sticks and medical balls contributed greatly to the development of bio-kinematic variables, which reflected positively on the development of the performance of the forward Somersolt skill under study among the players.

2. Recommendations

Based on the foregoing, the researcher recommends the following:
1- Conducting training courses by the concerned authorities for gymnastics trainers to make them aware of functional strength programs.
2- Emphasizing the need to diversify the use of training means and tools when applying functional strength training to develop bio-kinematic variables for players and not being satisfied with free exercises only.
3- Conducting research and similar studies using (functional strength) exercises for different age stages, for both sexes and for other sporting events.

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Appendix

Appendix 1. Table (4) Supplements Appendix 1. Sample Training Module
Sample Training Module

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s	Details	Duplicate	Rest between repetitions	groups	Rest between groups	Intensity	Observations
1	-Handstand pushing the ground with shoulders and performing consecutive jumps, then rolling and returning to the standing position.	10	60 s	3	90 s	85	Confirmation of players' attendance -Ensure the safety of the assistance -Commitment to the exercises set within the curriculum using - Here the rubber ropes work as resistance first and then as an aid to pull the body
2	Making an arc in the body and walking on all fours using weighting by placing rubber ropes and connecting them to the legs	10	60 s	3	90 s	85	
3	Holding the parallel bar and performing a quick lift of the legs straight back and back to the position	15	60 s	3	90 s	85	

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