The Relative Contribution of the Flexibility for the Hip Joint, the Angle of the Knees, and the Muscular Strength for Arms of Performance of the Front and Back Rolling Skills, Opening on the Floor Movement Mat

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Abstract

In order to improve the students' performance level in some of the skills that are implemented on the mat device of ground movements, including the front and rear rolling, it is necessary to study the most important indicators that have a clear impact on the performance of those rolls. Among the objectives of the research: To identify the percentage of the contribution of flexibility of the hip joint, the angle of the knees and the muscular strength of the arms in the performance of the front and rear rolling skills, an opening of the research sample. The researchers used the descriptive method in the survey method for its suitability to the nature of the work, and the research community was represented by students of the third stage of the Department of Physical Education and Sports Sciences at the College of Education for Girls / University of Kufa, and their number reached (26) students, and the research sample was chosen by the random method by drawing a lot from the original community and their number (20) a student, and with this, the percentage of the research sample is (76.9%).

Key words: *relative contribution of flexibility, muscular strength of the arms, artistic gymnastics.*

Introduction

In recent years, gymnastics has promoted a great deal in many developed countries of the world, and it is possible to observe this through sporting achievements and the amazing and advanced skillful performance during the Olympic Games and World Championships. Some of them are in performance [1], so the development of sports activities in general and the sport of gymnastics in particular did not come about by chance. Rather, it came as a result of the broad technical development and the conduct of many research and studies by specialists and researchers to find new and modern methods aimed at improving the level of performance and achieving the best achievements, as it is not possible for specialists to accurately judge the correctness of performance through observation only [2], no matter how large his training capacity and field experience is, and one of the actual support and procedures with the greatest sobriety is the use of photography as a reinforcement of the observation and what requires recording the motor skill by videography that provides opportunities to repeat the observation at any time without the learner or player suffers from repeating the movement in order to make observations on it when using [3] slow motion or when the image is stabilized, in addition to that, physical abilities have a clear impact and great importance in performing gymnastics skills, and among these abilities are the muscular strength of the arms, flexibility of the hip joint and the angle of the knees, as to obtain the best performance, the player must possess good muscle strength. which works on granting the ability to lift the body during the performance of the front and rear rolling skills breakthrough [4]. It is worth noting that flexibility is of great importance in demonstrating the two skills in a streamlined and consistent manner in performance.

Research problem:

By looking at a lot of previous research and studies, it was found that most of them dealt with rolling without

looking into the contribution of the muscle strength index of the arms and the flexibility of the hip joints and knees, especially since the success of the performance of both rollers depends largely on the thrust force of the arms and the flexibility of the hip and the lower extremities. Hence the research problem, as many female teachers depend during the learning process on issuing directives based on self-observation. Therefore, the researchers believe that following the process of kinematic analysis based on scientific foundations through which digital facts can be reached that serve the learning process and then achieve optimal performance, in order to improve the students 'performance level in some of the skills that are implemented on the mat device of ground movements, including the front and rear rolling, it is necessary to study the most important indicators that have a clear impact on the performance of these rolls.

Research Objectives

- Identifying the values of flexibility of the hip joint, the angle of the knees and the muscular strength of the arms of the research sample.

- Identifying the contribution of hip joint flexibility, the angle of the knees and the muscular strength of the arms in the performance of the front and back rolling skills, opening of the research sample.

Research methodology and field procedures:

Research Methodology:

The two researchers used the descriptive approach to suit the current study.

Research community and sample:

The research community was represented by students of the third stage of the Department of Physical Education and Sports Sciences / College of Education for Girls / University of Kufa for the academic year (2020-2021). Student.

Devices, tools and methods used in the research:

- Arab and foreign sources and references.

- A performance evaluation form.

- Kinovea program for kinematic analysis.

- A video camera, with a speed of 60 images / sec, (2).

- A tape measure (15 m) in length.

- Medicine ball (3 kg).

- Electronic balance industry (U.S.A) (2008 YA).

- DELL computer, count (1).

- Three (3) DVD discs.

Field research procedures:

Determination research variables:

Flexibility of the hip joint: It is the vertical distance between the mid-hip point and the ground, measured in the terminal section of the skill.

Left knee joint angle: It is the angle formed from the thigh bone and the shin bone at the left knee joint and is in the terminal section of the skill.

Right knee joint angle: It is the angle between the thigh bone and the shin bone at the right knee joint and is determined in the concluding section of the skill.

Determining the muscle strength test of the arms: After reviewing the sources and research, a special test was determined to measure the muscular strength of the arms, which is a test of throwing a medical ball weighing (3 kg) with the hands from the sitting position on the chair.

Throwing medicine ball weighing (3 kg) with two hands from a sitting position on a chair:

The purpose of this test is to measure the explosive force of the muscles of the arms, the laboratory sits on the chair and carries the medical ball with the hands above the head and the torso is adjacent to the edge of the chair, the belt is placed around the torso of the laboratory and connected with the back edge of the chair for the purpose of preventing the laboratory from moving forward during the throwing of the ball with the hands to complete the throwing process Ball without using a trunk, each lab has 3 attempts to score the best.

Exploratory experience:

It conducted an exploratory experiment on

(26/1/2120) on three female students of the third stage and targeted the following:

- Identify the obstacles that may accompany the work and try to avoid them.

- Ensuring the validity of the tools and devices used in the research.

- Ensure that the test is suitable for the level of the research sample.

Main experience:

The muscle strength test of the arms was performed on (20) students from the third stage, and the imaging was done taking into account the adjustment and calibration of the camera used before starting, as the first camera was placed in front of the field of movement performance at a distance (3.30 m) and a height (1.30 m). The second is placed on the side of the middle of the performance field and at a distance of (3.30 m) and a height (1.30 m), in addition to that, a simple explanation of the goal to be implemented was given before starting the filming, and after that each student performed two attempts to perform the skills of front and back rolling open on Tuesday (2/2/2021) and the performance evaluation of the two skills was conducted using the performance evaluation form on through the use of technical gymnastics specialization teachers, who numbered (3), to evaluate performance, and the evaluation score was (10) scores, then after that the performance analysis was conducted through the (Kenova) program and the biochemical indicators of the two skills were extracted to compare them with the muscle strength test.

Statistical means:

The researchers used the statistical bag (spss) to statistically treat the results.

Presentation, analysis and discussion of results:

Table (1) shows the values of the statistical parameters of the searched variables in the research sample.

Variables	The front roll open				The back roll open			
	Mean	Median	Std. Deviation	Skew ness	Mean	Median	Std. Deviation	Skew ness
Flexibility of the hip joint	29.16	30	3.430	0.734-	37.33	38	3.669	0.547-
Left knee angle	153.26	152	4.962	0.761	148.35	149	5.213	0.374-
Right knee angle	151.83	150	6.453	0.850	147.83	148	7.526	0.067-
The muscular strength of the arms	5.41	5.5	0.466	0.579-	5.23	5	0.736	0.937
The muscular strength of the arms	7.33	7.5	0.886	0.575-	7.16	7	0.926	0.518

Table (1) shows the statistical description of the variables, as the table shows the arithmetic mean, the mean and the standard deviations, as well as the torsion coefficient whose degree is limited to all variables between (± 1). This confirms that the sample is distributed in a normal distribution and is appropriate for the research work procedures.

Table (2) shows the values of the regression equation coefficients for the forward rolling skill opening to the variables searched for the research sample.

Variables	Coefficients		Correlation coefficients	Nature correlation	F value	Level sig	Contribution rate
	Nature coefficient	value coefficient					
	Fixed limit	28.570	0.789	Multi	7.561	0.0001	0.623
Flexibility of the hip joint	B1	1.234					
Left knee angle	B2	0.408					
Right knee angle	B3	8.652					
The muscular strength of the arms	B4	5.663					

Table (3) shows the values of the parameters of the regression equation for the back-rolling skill, opening to the variables searched for the research sample.

Variables	Coefficients		Correlation coefficients	Nature correlation	F value	Level sig	Contribution rate
	Nature coefficient	value coefficient					
	Fixed limit	3.643	0.714	Multi	9.744	0.000	0.510
Flexibility of the hip joint	B1	2.107					
Left knee angle	B2	0.625					
Right knee angle	B3	7.944					
The muscular strength of the arms	B4	4.658					

Table (3.2) shows the existence of a good positive correlation between the investigated variables and the open front roll performance degree, reaching (0.789). The correlation value between the investigated variables and the back rolling performance score reached (0.714).

From the two tables themselves, the researchers see that these variables came in effective contribution ratios, where the performance level of both rollers can be predicted as the variables in the flexibility of the hip joint and the angle of the knees as well as the muscular strength of the arms, Basman Abdel Wahab indicates that each movement is subject in its performance to a set of mechanical variables. Once the movement is performed according to these variables well, it appears in its desired form. In most individual game movements, especially gymnastics, we find that each skill consists of a series of movements and each movement of the body

parts has a special importance. If all the movements of the body parts are done in perfect harmony and with accurate timing, this will lead, to good performance [1].

The total contribution rate for all the variables mentioned in the performance of the forward rolling skill was calculated openly, as it reached (0.623), and the contribution percentage of the same variables was (0.510) in the back-rolling skill openly, and that the contribution value is good in both skills confirming the effective effect of the variable of each of the detailed flexibility The hip, the angle of the knees, and the muscular strength of the arms in the performance of both rolls, as the nature of the performance of the front and back rolling skill is a breakthrough that requires the student to open the legs as far as possible aside, the moment the hip touches the ground in the main section of the movement and to keep this position until the completion of the movement, in addition to Emphasis on the complete extension of the knee joint. Therefore, mastering the performance of the two skills depends on the extent to which the requirements for this performance have been developed in terms of flexibility and the hip joint and knees, Saeb Atiyah stresses that the closer the center of gravity of the body (the hip joint) is to the ground, the easier and more accurate the implementation of movement will be. Therefore, he indicates the importance of flexibility of the hip joint [2].

Also, the muscular strength of the arms is one of the important and necessary abilities that the student must possess when starting to train to perform the two rolls, since without it the student cannot carry out the rolling successfully. The muscles of the arms through special strength exercises [3]. As the student relies mainly on the hands to push and lift the hips and torso from the ground and reach it to the final position, and Qasim Lazam indicates the importance of developing strength exercises in a way that makes it easier for the player how to deal with the requirements of the game [4]. The researchers also attribute that the percentage of the variables' contribution to the performance of the back rolling is less than the percentage of the contribution in the performance of the front roll, opening to the difficulty of performing the back roll.

Conclusions and Recommendations

Conclusions: In light of the findings of the researchers, the following conclusions were drawn:

- The presence of a relative contribution between the flexibility of the hip joint, the angle of the knees and the muscular strength of the arms in the front and back rolling performance.

- The variable muscle strength of the arms is of great importance in achieving good performance of the two skills.

- The good flexibility of female students can increase the range of movement (angles) of the joints of the body in a way that serves the performance of the front and back rolling skills openly.

Recommendations:

- Emphasis on the development of the muscular strength of the arms, due to their active role in the movement performance in a consistent and coordinated manner and with minimal effort.

- Work to develop flexibility to increase the range of motion of the joints of the body and thus achieve better performance with less effort.

- Adopting quantitative analysis (biomechanical) in order to identify the movement path and then identify weaknesses and work to address them in order to properly evaluate performance.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the University of Baghdad, Iraq and all experiments were carried out in accordance with approved guidelines.

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