

Tanta University  
Faculty of Physical Education  
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# **Qualitative Exercises To Develop The Skill Of Falling On The Leg For Female Wrestlers In Light Of Biomechanical Analysis**

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## **Introduction and research problem :**

The tangible progress witnessed by the sports field in general and wrestling is evident through the achievements in regional and international sports championships, and at various levels of events . This progress has emerged through interest in scientific research and the development of scientific technological devices and tools and precise means through which the minutes of movement can be recorded and evaluated in the correct scientific manner instead of judging the correctness of the movement by general estimation, even if it is linked to mechanics and is called the science of movement or biomechanics. Biomechanics , which was linked to some medical sciences, was called functional kinesiology until ( Manel ) appeared, so he took kinesiology in another direction, as he said that the view of sciences on sports movements is limited to the extent of applying physical and physiological laws, which are very important but need careful review, and to be put in another form if we want to benefit from that information in our practical sports fields, as we need to limit it and benefit from it by evaluating the external appearance of the movement, taking into account the influence of historical, social, physiological and educational aspects on the course of sports movements and skills and their form, and human movement is defined from the mechanical point of view as a change in the position of the body or its relations in space and in time in relation to other bodies.

Biomechanics studies forces and their effect on living organisms, while biomechanics in sports and physical activity studies forces and their effect on humans in sports and physical activity. Biomechanics is a useful tool for coaches, researchers in kinesiology and sports training to improve performance in sports or sports activity and prevent sports injuries, as biomechanics has the ability to make modifications to sports exercises for skills. Through these sciences, it is possible to identify the method for describing exercises and exercises for different diagnoses, i.e. dealing with each special case, whether educational , training or pathological, in particular . Therefore, biomechanics helps to describe and diagnose exercise and training. In a better way and with a clearer vision, which contributes to developing the effectiveness of the trainer's role in the training process.

women's wrestling has achieved great accomplishments, whether at the global or Olympic level. In order to maintain these accomplishments, we must pay attention to the skill performance and try to raise the level of the players and bring them to the highest skill levels. And planning.

And that the Freestyle (FS) wrestler, if he wants to control the opponent, must first control the opponent's legs, whether he is on one leg or both together, because the skill of falling on the leg is considered one of the most important skills in freestyle wrestling, from the high wrestling position to trying to turn the opponent on his back or throw him to the ground in a prone position.

There is a close relationship between technical performance and tactical performance. Tactics: The more diverse the technical performance, the more the wrestler can use different tactical means. If we say that fitness is the effective weapon of technique, then tactics refer to the player's ability to use this weapon according to the course of the conflict.

The set of footfall movements also occupies an important and fundamental position in the technical performance of freestyle wrestling. The wrestler who is skilled at executing this set with sufficient skill can surprise his opponent and achieve an early advantage over him, thus deciding the outcome of the struggle in his favor in most cases. It is necessary to pay special attention to footfall movements due to the importance of these movements for the wrestler in order to score the largest number of points early in the match, as well as to have the offensive initiative, which confuses the opponent and is superior to him and achieves an early victory. Whereas the kinetic analysis depends on knowing the body in its dialogue and the way it performs, as an integrated system, which helps trainers to make optimal use of it.

And that specific exercises are a means of harnessing the individual's capabilities to accomplish the required motor task, as developed countries have been able to reach the optimal use of the players' capabilities within each of the technical stages of skill performance through specific exercises whose movements are similar in their composition, requirements, direction of work, and the

prevailing contractions of the muscle groups working in them with those movements during performance , which leads to saving time and effort until reaching Mastering motor skills in the type of activity.

Therefore, the research problem crystallizes through the findings of a study on the importance of biomechanical analysis of wrestling and the use of its results in developing the technical performance of wrestlers. And through an analytical study of the London Olympics wrestling championship, it was found that falling on one leg accounted for 3% of the total movements , as the researcher sees from her follow-up of the results. Tokyo Olympics for girls' wrestling The fall on the leg increases in the percentage of the total moves performed in girls' wrestling competitions from the total moves, and most of the players have They lose He causes weakness Mastery skill Falling on the man where It is considered This is amazing Skill from Most important Skills Offensive that Performed by female wrestlers , And it returns that To lack Develop it I have a lot from Wrestling Which affects results matches , in While the competing players who They win the fight get on greater number from Points And achieve win because of Their proficiency For this Skill Basic in sports wrestling , Whereas skill Falling on the man you need to development Capabilities Specialized physical, especially Elements power Muscular And the power Featured With speed and muscular endurance, this is what prompted the researcher to analyze the biomechanical movement of the skill of falling on the leg as a basis for developing a qualitative training program for female wrestlers to try to develop the wrestlers' attempts to quickly enter the field of competition and thus either obtain technical points or put the competitors in a negative position as a result of the speed of performance and repetition of falling on the leg, which contributes to developing the athletic achievement of Egyptian female wrestlers.

**Objectives :**

**The research aims to identify:**

- Identify some of the biomechanical characteristics of the leg fall skill under study.
- Develop specific exercises based on biomechanical analysis of the leg fall skill under study.

### **Questions :**

- What biomechanical characteristics contribute to determining the performance level indicators of the leg fall skill for female wrestlers?
- What are the specific exercises for the leg fall skill for female wrestlers based on biomechanical analysis?

### **Search procedures:**

#### **methodology:**

The descriptive approach was used to suit the nature of the research.

#### **Sample:**

The research sample was deliberately selected from (1) female wrestler by performing three attempts at the skill of falling on the leg, and the filming was done at the player's training site in the military institution in Alexandria.

#### **Data collection tools and methods:**

The researcher used the following tools to collect data in accordance with the nature of the study and the data to be obtained as follows:

#### **Analysis of references, scientific research and reference studies:**

The researcher analyzed references and reference studies to identify studies that focused on kinetic analysis and biomechanics, as well as those that focused on sports skills in general and those that focused on wrestling in particular.

#### **Anthropometric devices and tools:**

- A device for measuring length in centimeters.
- medical scale for weight measurement.
- Tape measure to measure the lengths of body joints.

**Tools :**

- Laptop
- SkillSpector 1.3 3D Biomechanical Analysis Software
- Calibration box 1m x 1m .
- Number ( 3 ) Gopro Hero 6 video camera
- Number ( 3 ) tripod.
- number (2) Flash Memory
- Links Electric.
- stopwatch
- Phosphoric markers to determine the joint points of the body .
- tape (meter).
- A scale drawing is used as a mark in front of cameras.
- Computer
- mat .

**Forms :**

**The researcher designed the following questionnaires:**

- Experts ' opinion survey form on skill performance evaluation for the skill of falling on the man .
- Expert opinion poll form on best attempts at the skill of falling on the man .
- Data registration form .

**Experience Exploratory:**

The researcher did Conducting the pilot and baseline experiment. The pilot experiment was conducted on Saturday, February 3, 2024 , 2023. The study resulted in:

- Suitability of the place and equipment for measuring.
- Locations identified Phosphorescent markings on body joints .
- Explain the steps that The player must perform it.
- 100% agreement of experts on the acceptance of the performance level assessment form for the skill under study .

### **Basic experience :**

After determining the methodology, selecting the final sample, and determining the means of data collection, and in light of what the exploratory study showed, the selected research sample was photographed according to the research areas mentioned above on the same day of the exploratory experiment , Saturday, February 3, 2024 .

### **Treatments:**

SPSS statistical package on the computer through the following processors:

- Average Arithmetic .
- deviation Standard .
- Contribution ratio.

### **Conclusions and recommendations:**

#### **conclusions :**

In light of the limits and characteristics of the research sample and to achieve the research objectives, it was possible to reach some conclusions as a basis for developing exercises for the skill of falling on the leg for female wrestling players, which are:

- The vertical displacement index ( Z ) of the knee of the falling leg is the biomechanical index that contributes the most to the effectiveness of the performance of the skill in the research sample, with a contribution rate of 100.00 %.
- The knee joint angle index of the pivot leg in degrees is the most contributing biomechanical index to the effectiveness of skill performance in the research sample, with a contribution rate of 100 %.
- The horizontal movement index of the body's center of gravity is the most biomechanical indicator contributing to the effectiveness of skill performance in the research sample. His contribution rate was 65%.
- The left ankle angular velocity index is the second most contributing biomechanical index to the effectiveness of skill

performance in the research sample. His contribution rate was 12%.

- The horizontal displacement index ( X ) in meters for the support foot is the most contributing biomechanical index to the effectiveness of skill performance in the research sample, with a contribution rate of 99%.
- The knee joint angle index of the pivot leg, the second biomechanical indicator contributing to the effectiveness of skill performance in the research sample, amounted to 1%.
- Biomechanical indicators of the lower part (vertical displacement (Z) For the knee of the falling leg - the angle of the knee joint of the pivot leg - the horizontal displacement ( X ) in meters of the pivot foot ) is more influential and contributes to the fall on the leg for female wrestlers to develop performance .
- Biomechanical indicators of the upper limb (left elbow joint angle) that contribute least to falling on the leg for female wrestlers to improve performance .
- Identifying some specific exercises for (6) biomechanical indicators that contribute to developing the performance of the skill of falling on the leg for female wrestling players to raise the level of performance of the skill under study.

### **Recommendations:**

Through the conclusions reached by the researcher, she recommends the following:

- The necessity of directing specific exercises in light of biomechanical analysis to develop the skill of falling on the leg for female wrestlers.
- Applying the specific exercise to the similarity in the time course of the force for the skill of falling on the leg for female wrestlers.
- The necessity of directing specific exercises according to (body position/ range of motion/ time course of the force) for the skill of falling on the leg for female wrestlers.
- The necessity of describing the biomechanical analysis to determine the percentage of contribution of the working body

parts to the skill when designing training programs and standardizing the specific exercises for each part of the body.

- Paying attention to the biomechanical indicators that contribute to the level of performance of the skill of falling on the leg in developing educational and training programs.
- The necessity of studying the mechanical aspects periodically to correct movement errors for the male/female wrestler.
- Conducting predictive studies for the skill of falling on the leg for wrestling players.
- Conducting such a study in other skills for wrestlers.
- The necessity of studying the individual differences between males and females in the mechanical aspects controlling the development of the skill of falling on the leg for female wrestlers.

## **Abstract**

**Name: Shrouk Mohammed Hassan Shams**

**Title: Qualitative exercises to develop the skill of falling on the leg for female wrestlers in light of biomechanical analysis**

**year : 2025**

The research aims to identify some of the biomechanical characteristics of the skill of falling on the leg under study and to develop specific exercises in light of the biomechanical analysis of the skill of falling on the leg under study. The researcher used the descriptive method, and the research sample was chosen intentionally for the number (1) female wrestling player by performing three attempts at the skill of falling on the leg, and the filming was done at the player's training place in the military institution in Alexandria, and the study reached the following results:

- Biomechanical indicators of the lower part (vertical displacement (Z) For the knee of the falling leg - the angle of the knee joint of the pivot leg - the horizontal displacement ( X ) in meters of the pivot foot ) is more influential and contributes to the fall on the leg for female wrestlers to develop performance.
- Biomechanical indicators of the upper limb (left elbow joint angle) that contribute least to falling on the leg for female wrestlers to improve performance.
- Identifying some specific exercises for (6) biomechanical indicators that contribute to developing the performance of the skill of falling on the leg for female wrestling players to raise the level of performance of the skill under study.