Analysis of Angular Kinematic Variables at Knee Joint of Volleyball Players in Serve

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Abstract

The purpose of this study was to analyze the relationship of angular kinematic variables with the performance of Volleyball players in float serve. The subjects for this study were ten male volleyball players of match practice of Lakshmibai National University of Physical Education, Gwalior. The performance of subjects was evaluated by Russell Lounge test.

The digital photography was used as a technique for Biomechanical analysis of Float serve in volleyball. The Pearson's Product moment Correlation was calculated between selected kinematics variable and performance of the subject in float serve. For testing the level of significance was set at 0.05.

The variables which might have contributed to the effectiveness of the technique could be identified and undertaken to analyze the technique of float serve were:-

1. Angular Kinematic variables:
   a) Knee joint (right)
   b) Knee joint (left)

The score of independent variable of angular kinematics variables were correlated with the performance of subjects in volleyball float serve. The calculated value of coefficient of correlations in both variables were less than the required value at selected level of significance, therefore, these selected angular kinematic variables at selected moment have shown insignificant relationship with the performance of subjects in float serve of volleyball.

KEYWORDS: Float Serve, Kinematics

Volleyball, which is an excellent around team sport, has been widely accepted as a highly competitive as well as a recreational game throughout the world. It is now recognized as of the most breath taking and dramatic sport of the Olympics both from the player and spectators view point.

Volleyball is a continuous struggle between defense and attack. The attack continuously fights the opponents block and floor defense, attempting to overcome them with power or to outwit them by deception. The success of a team's attack reflects the quality of the team's technical and tactical abilities. A smooth attack, created by precise movement of the players, embodies the grace and beauty of volleyball.

Played competitively the game requires concentration, quick thinking and a great deal of movement. The speed of the game means that players must be thinking one

moment attack and the next about defense. They must be concentrating all the time, if they are to keep up with play. Volleyball is an all action game with none of the players acting as involuntary spectators for part of the game as in other games such as football, hockey and netball. As the game is played for best of three or five it is possible to win despite playing badly for a particular period of the game. In many sports mistakes made at the beginning of the game can have a disastrous effect on the rest of the game.

Adequate training time for serving should he allocated in every practice. A player should serve fifty balls every practice session. The float serve can also be used effectively to regulate the rhythm of the game and disrupt the opponent's concentration. To speed up the pace of the game the players should get to the serving position as quickly as possible and serve immediately after whistle is blown or vice-versa. The serve is the only time in volleyball when a player completely possesses the ball and can choose the moment to initiate action.

Service requires a lot experience and training to control the ball's speed, trajectory and direction in a game situation under pressure. The serve is one of the most emotionally charged and difficult to moments of the game, because while the server has complete possession of the ball he is also the focal point of attention. Repeated training in a game like situation, relaxation technique and proper serving routine can help reduce the anxiety level during serving.

Serves are divided into two broad categories according to the ball movement after it is struck. Floats serve and spin serves. Volleyball serving is one of the most fundamental skills in volleyball. Anyone can do it – you don't have to be tall or unusually strong. All you have to do is practice. And you're in luck, because it is the one skill in volleyball you can practice by yourself. Just find a court, get a bucket of balls and keep serving.

If you can master the art of the serve and keep your opponents off balance, they won't be able to make a perfect pass. If they can't make a perfect pass, they will likely not get a perfect set. If they can't get a perfect set, they will have trouble putting the ball away and your blockers will be able to set up on their hitter early since it will be obvious where the ball is going. But it all starts with the serve.

The float serve has little or no spin at all. Because a ball with no spin is very unstable, the float serve travels through the air with a wavering, breaking, sinking action, moving from side to side and up and down like a knuckleball. This unpredictable flight pattern makes it a very difficult serve to pass. The fairly low risk involved in serving the floater, and its high effectiveness have made float serves the most popular among top men's and women's teams.

To produce a float serve, the force of the impact must pass through the ball's center of gravity in the direction of the desired flight. The center of gravity in a symmetrical round object is in its center. It is generally considered that the ball's floating; wavering action is due to what is known as Bernoulli's effect. This theory states that when a flying stream of gas speeds up, its pressure decreases, and vice versa. If an air foil is made to move through air, the stream of air entering the region just above the air foil is

forced to flow into a constricted area and its speed is increased. When the speed increases, the pressure decreases. A ball has the shape of a three dimensional foil and therefore when travelling through the air, it creates a funnel or a tunnel of low pressure around it. If the low pressure areas around the ball are exactly balanced, the ball will fly with no wobbling effect at all. However, because the friction at the face of the ball is not even, and because the ball has seams that break up its spherical surface, the air breaks around

The best method to analyze or evaluate is called cinematography. This is a quantitative method which is very accurate at the same time costly and time consuming. The role of cinematography in biomechanical research involve from as simple form of recording motor movement to a sophisticated mean of complex analysis of motor efficiency. Over the years, new techniques in filming, timing have been perfected to aid the research in achieving accurate time measurement of both simple and complex locomotion patterns.

A good float serve or floater is a necessary tool to have in your arsenal. If you are playing in a drafty gym, a float serve can be a killer because it has no spin. The air catches it and can move it in many directions as it crosses over to your opponent's side of the net. Some serves float and then drop suddenly, making it extremely difficult for a passer to handle.

Statement of the Problem

The purpose of the study was to analyze the angular kinematics variable at knee joint of volleyball players during service.

Delimitations

1. The study was delimited to ten male volleyball players only, age group of 19 to 23 years.
2. The study was further delimited to the float serve in volleyball.
3. The study was further delimited to the angular kinematics variables.
4. Angular Kinematic variables were
   a) Knee joint (right)
   b) Knee joint(left)

Hypothesis

It is hypothesized that there may not be significant relationship between the angular kinematics variables at knee joint of volleyball players during service.

Significance of the Study

The research in this field may add lot in improvement in the performance of volleyball players.

1. The findings of the study may help to form the basis of efficient structure of the float serve.

2. The findings of present study may reveal the contributing factors to the performance of float serve in volleyball.
3. The study may help in drawing conclusions and generalizations which may be used by physical education teachers and coaches for better teaching and coaching.
4. The findings of the study may also help to make the biomechanical module of float serve.

Selection of subjects

Ten male volleyball players of Lakshmibai National Institute of Physical Education were selected as subjects for the study. The ages of subjects were between 19 to 23 years.

Criterion Measure

The Criterion measure for the study was the performance of the subjects as assessed by Russell-Lange test with only difference the subjects used float serve instead of Overhead Serve.

Filming Protocol & Analysis of the Film

The digital photography was used as a technique for Biomechanical analysis of Float serve in volleyball. A standard motor driven camera i.e. Nikon D -100 was used to obtain photo sequences of selected movements during the float serve, moment execution in sagittal plane.

Fig1. Float Serve at Moment Execution

The camera was mounted on a tripod at a height of 1.46mt from the ground. The camera was placed perpendicular to the initial line and parallel to horizontal plane at a distance of 4.70mt from the mid-point of initial line. The serving skills of float serve of different subjects were filmed at Lakshmibai National University of Physical Education, Gwalior. The photographic sequence was taken under controlled conditions. The subject performed the skill 10 times.

The photographs as obtained by the use of digital photography were analyzed by standard analysis method. Only one moment was analyzed. Selected variables were as under.

Analysis of the Data

The Pearson's product moment correlation was used in order to analyse the angular kinematics variables at knee joint of Volleyball players in float serve. For testing the level of significance was set at 0.05.

Findings

The score of independent variable of angular kinematics variables were correlated with the performance of subjects in volleyball float serve. The value of correlation of angular kinematics variables i.e. angle at knee joints at selected moment with the performance of subjects in float serve are presented in Table 1.

Relationship of selected angular kinematic variables at knee joint of subjects in float serve

S. No.	Variables	Mean (degree)	Coefficient of correlation(r)
1-	Knee joint(left)	177.2	0.601
2-	Knee joint(right)	169.50	0.200

Required value of 'r' for 8 degree of freedom is 0.632.

As shown in Table 1 the required value of correlation r = 0.632 for 8 degree of freedom. However the calculated value of coefficient of correlations in both variables were less than the required value at selected level of significance, therefore, these selected angular kinematic variables at selected moment have shown insignificant relationship with the performance of subjects in float serve of volleyball.

Discussion of findings

As shown by the table 1 shows insignificant relationship that may be due to the nature of score that it showed the relationship but mechanism of float serve depends upon the point of application of force on ball. The force of the impact must pass through the ball's center of gravity in the direction of the desired flight and to avoid spin. However the angular kinematic variables left knee joint and right knee joint did not shows the significant relationship with the performance of float serve in volleyball.

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