



## Analysis Of Jump Serve Prefix Step Motion On Leg Power In Volleyball Athletes Tunas Semarang

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### Article Info

#### History Articles

Received:  
Mei 2024  
Accepted:  
Juni 2024  
Published:  
September 2024

#### Keywords:

*Jump serve, leg muscle, prefix step motion.*

### Abstract

Motion analysis is a study in sports science to analyze a movement and the results will be evaluated whether there is something wrong with the movement. This study aims to analyze the motion of the jump serve prefix to the leg power of Tunas Semarang athletes. The research conducted was a survey approach. The approach was carried out using data collection through tests and measurements. The subjects used were Tunas Semarang club athletes totaling 10 athletes with certain criteria, measurement of leg power using the vertical jump test and jump serve test, data processing using kinovea software version 0.9.5. The results of the data analysis obtained that Tunas Semarang athletes only use 2 types of prefix steps, namely athletes who use 2 prefix steps and athletes who use 3 prefix steps. Of these types 3 prefix steps are more effectively used referring to the results of the tests carried out. Leg power in Tunas Semarang athletes has 3 athletes with the highest points. The conclusion of this study found that Semarang Tunas athletes used 2 and 3 steps when jump serving, the ideal step refers to the results of the 3-step test, the prefix is more ideal new findings and for Semarang Tunas athletes to improve the quality of leg power by practicing hard because the average Semarang Tunas athlete only has a sufficient category. Further research is expected to look for errors and limitations of athlete motion when jump serving.

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p-ISSN 2252-648X  
e-ISSN 2502-4477

## INTRODUCTION

Sports activities are now increasingly crowded and vibrant, ranging from rural communities to urban communities regardless of age, from children to parents. This is due to the higher level of public awareness and interest in the importance of doing sports to maintain a balanced life (Agus, 2012). Exercise is an activity of the body that involves the organs of the body (heart, lungs, muscles, nerves, blood vessels, muscles, glands etc.). Sports activities will cause reactions from the body's organs in the form of self-adjustment efforts (adaptation). In carrying out daily activities, humans are always moving. Motion is the hallmark of life, improving the quality of motion means improving the quality of life. Sport is a series of regular and planned movements to maintain movement and improve movement ability (Lesmana, 2018). There are so many sports - sports that almost all levels of society enjoy, one of which is volleyball.

Volleyball is a team game, each team has 6 members, volleyball is a sport that has a uniqueness compared to other team sports (Palao et al., 2004), people really enjoy it because of the togetherness in the team that makes harmony, cooperation appear in it. Volleyball is a complex and demanding sport in terms of technique, tactics, and athleticism (Garcia et al., 2022).

Volleyball is one of the game sports. In a volleyball game, players need agility and good teamwork. Each player starts by serving, either using the top serve or the bottom serve. The ability to attack and defend is needed to anticipate the opponent's attack. This makes the volleyball sport game can be modified, so that it can be done by someone who is not able at all. In volleyball games, achieving an atmosphere of joy, satisfaction, and brotherhood is most important for the smooth running of learning (Maliki, 2018). Volleyball games have basic techniques which include serving, passing, smash, block. The serve technique is the opening of the game or the first attack to score points. The smash technique in volleyball is the main attack to score points and win, the smash technique is the most difficult technique and has complex movements so that the smash technique must be trained to athletes from an early age because at an early age it is a stage that is prone to motion errors (Pranopik, 2017). These techniques are usually the serving techniques that must be mastered by a volleyball team because serving has great potential and produce points to achieve victory (Saputra & Gusniar, 2019). Serve

is one of the most important skills a player must have when they step onto the volleyball court (Porter et al., 2007). The game starts with the serve, where players usually hit the ball with hands above the head, either while standing or jumping high in the air (Briner & Kacmar, 2012). Performing the serve technique well is very important to produce points, because ineffective serves will result in defeat for a volleyball team (Zulhajji, 2014). Serve is the basis of volleyball that can be trained under the same match conditions, as there is no interference from the defense (D'Isanto et al., 2017).

Volleyball serve is used to start the game by sending the ball across the net to the opposite side of the court (Bhasi & CS, 2022). According to . Astuti et al., (2020) There are 3 basic serves in volleyball, serve down, serve up, and serve sideways. As time went on, the serve began to be developed a lot to make the game more difficult, starting from floating serve to jump serve, this serve has a uniqueness that has the potential to put more pressure so that the opponent has difficulty receiving the ball that is coming. Jump serve for example, this serve has very strong power. According to (Hayrinen et al., 2011) the most widely used serving technique in volleyball is the jump serve. Jump serve is serving by jumping as a powerful weapon to disrupt the opponent's combination attack. A team needs two to three jump servers who can disrupt the opponent's combination attack. Jump Serve starts with the player throwing the ball into the air from the baseline and jumping into the field to hit the ball towards the opponent (Porter et al., 2007). Jump serve is done with a jumping motion like a smash movement. The advantages of using jump serve include being able to mentally drop the opponent, making it difficult for the opponent to build an attack, making it easier for the blocker to make a dam and making it easier for the defender (Satria, 2019). Jump serve movements in volleyball can be identified and analyzed into several phases of movement. These phases of movement can be broken down into a series of jump serve movements including; (1) Starting Attitude, (2). Motion Implementation, and (3) Advanced Attitude. In a volleyball game, a player is required to be able to make movements that have explosive power, both when going to jump serve, smesh and block. (Suhairi, 2013).

Every volleyball athlete needs to develop jumping ability To improve vertical jumping ability, leg muscles can be trained to produce explosive power that is useful to support jumping

passes to the opponent's area in volleyball games (Mardela & Syukri, 2016). Aspects of motion in volleyball include, agility, speed, strength. One of them is leg power. Limb power has a big role in efforts to support the achievement of an achievement in general, especially in volleyball games. Strength is the driving force for every activity or physical activity. The strength of the limbs possessed by each player will have a positive impact on the development of the technique of serving the ball in volleyball games (Maulana, 2019). Motion in volleyball is part of the concept of biomechanics. Biomechanics is the science of human body motion. Biomechanics is the study of the function and structure of biological systems using mechanical methods. The biomechanical approach to sports is more focused on sports players (athletes), but the biomechanical approach to sports can also extend to the behavior of stationary objects such as footwear, surfaces (fields) and sports equipment that can affect athlete performance (Santoso & Irwanto, 2018).

Leg explosive power is the ability of muscles to overcome loads or resistance with a very high contraction speed (Andiyanto, 2020). According to Achmad (2016) Leg muscles are the muscles found in the legs that will contract when doing activities. Based on the conclusions contained from the above factors, leg power is a component that contributes to the level of ability in playing volleyball.

Motion analysis is an applied science of sports biomechanics that studies how to analyze a movement in sports that is associated with the principles of sports biomechanics to produce efficient and effective movements (Mulyana, 2010). Therefore, researchers will conduct research on Tunas Semarang volleyball club athletes, namely on motion analysis of jump serve prefix steps on leg power, researchers conduct this research because of the problems in athletes when doing jump serve steps, many athletes do not maximize the power they have, the power is in the leg, even though by maximizing the power they have the advantage of winning points in jump serve they will get and help the team win.

From observations made by researchers on April 8, 2023 at the Patemon Village Hall Field, the volleyball championship between clubs in the city of Semarang, Tunas Semarang club athletes who played in the championship there were 7 athletes from various positions, 2 outside hitters, 1 opposite hitter, 2 middle blockers, 1 setter, 1 libero, 5 of them when doing jump serve are still

inconsistent, one of the most prominent inconsistencies is when doing the prefix step (footwork step) they do it with different steps, 1 step, 2 steps, 3 steps, and there are also those who do not use the prefix step when doing jump serve, which results in high jumps. the players are not at the highest point when jumping so that many mistakes are made when serving such as the ball dies itself, concerns the net or does not arrive and the ball goes out of the field. Observations were made to provide an overview of the productivity of jump serves made by Tunas Semarang club athletes at the inter-club championship in the city of Semarang 2023. The purpose of this study was to determine the analysis of jump serve prefix step motion on leg power in Semarang Tunas Athletes. Research is expected to be an evaluation material for athletes and coaches of the Tunas Semarang club.

## METHODS

The type of research conducted in this study is descriptive analytical research with a survey approach. According to Samsu, (2022) The type of research conducted in this study is descriptive analytic, descriptive analytic is a statistic used to analyze data by describing or describing the data that has been collected as it is without intending to make conclusions that apply to the public or generalizations (Sugiyono, 2013) in this study researchers recorded video of jump serve motion using a camera and then analyzed it with the kinovea version 0.9.5 application. The survey approach taken by researchers is to conduct data collection treatment using measurement tests. The data collection method uses observation and measurement tests. There are several tests carried out, namely the vertical jump test and the jump serve test. The research to be carried out analyzes the jump serve prefix step motion on leg power, which will later become an evaluation material for athletes and coaches of the Tunas Semarang club. The sample technique used is purposive sampling, with a population of 20 athletes and the sample in this study amounted to 10 athletes who have jump serve skills and have participated in regional championships. This research has passed the Ethical Clearance (EC) authorized by the Health Research Ethics Committee (KEPK) of Semarang State

University with the published number 113/KEPK/FK/KLE/2024. Step time 3 0,20 ± 0,16 0,28 (s) 0,05

**RESULTS AND DISCUSSION**

The results of this study begin with measuring anthropometric data on Tunas Semarang athletes, following the anthropometric data of Tunas Semarang athletes.

Tabel 1. Data Antropometri

n=10	Mean SD1	± Min	Max
Age (year)	18 0,674	± 16	18
Height (cm)	179,7 4,056	± 187	175
Body Weight (kg)	70,9 2,233	± 68	75
BMI (kg/m <sup>2</sup> )	19,721 0,288	± 19,33	20,38
Limb Length (cm)	95,6 7,515	± 88	110

Motion analysis on the Jump serve prefix step movement is carried out by means of the Jump serve test according to AAHPERD, this test is carried out with 10x repetitions. From the results of the Jump serve test that has been carried out, researchers will analyze using Kinovea software version 0.9.5 which will later obtain kinematic data with several indicators, namely step distance and step time. The following is the kinematic data of Tunas Semarang club athletes.

Tabel 2. Data Kinematic

n=10	Mean SD1	± Min	Max
<b>Step Distance</b>			
Step 1 (m)	0,85 0,368	± 0,36	1,48
Step 2 (m)	1,1 0,320	± 0,62	1,5
Step 3 (m)	0,7 0,346	± 0,45	1,35
<b>Step Time</b>			
Step time 1 (s)	0,56 0,144	± 0,32	0,76
Step time 2 (s)	0,4 0,149	± 0,24	0,72

The following are the results of kinematic data for Tunas Semarang club athletes, the average length of step 1 is 0.85 with a standard deviation of 0.368, the average time of step 1 is 0.56 with a standard deviation of 0.144. The length of step 2 obtained an average of 1.1 with a standard deviation of 0.320, the average time of step 2 is 0.4 with a standard deviation of 0.144. The length of step 3 obtained an average of 0.7 with a standard deviation of 0.346, the average time of step 3 is 0,20 with a standard deviation of 0.053. So after analyzing using kinovea software version 0.9.5, it was found that Tunas Semarang athletes used only 2 and 3 steps, from a total sample of 10 athletes, there were 4 athletes using 2 steps in doing the Jump serve prefix step and 6 athletes who used 3 steps in doing the prefix step when Jump serve.

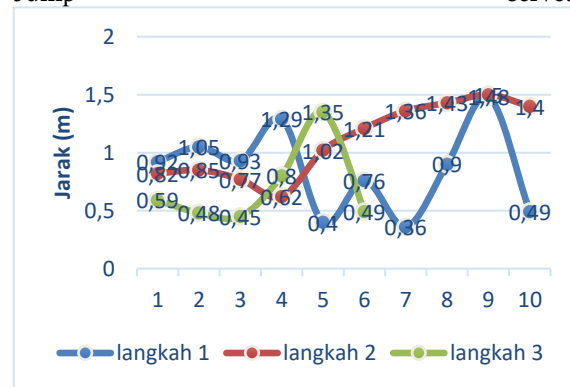


Figure 1. Step length 1 2 3

The results of the analysis carried out at step 1 obtained an average athlete length of 0.858 with a standard deviation of 0.368, at step 2 obtained an average athlete length of 1.098 with a standard deviation of 0.320, and for step 3 obtained an average of 0.69 with a standard deviation of 0.346.

Based on the analysis that has been done by the researcher, of the three steps for those who use step 2, the dominant average is longer than the average step 1, and the average step 1 is dominantly longer than the average step 3. Which means that step 3 is the beginning of repulsion so that when doing step 3 the length of the steps taken by Tunas Semarang club athletes is shorter.

Next is to calculate the ability of leg power in Semarang Tunas athletes. The results of

the vertical jump test that has been done are. Tabel 3. Hasil Tes Vertical Jump

n=10	Mean SD	± Min	Max
Result	56,4 6,850	± 41	63

Based on the data in the table, as many as 10 Tunas Semarang club athletes have 3 athletes in the Very good category, and 6 athletes in the Above average category, and 1 athlete has an Average category.

Based on the results of the vertical jump test data and the Jump serve test, Tunas Semarang club athletes have 3 athletes who have the highest vertical jump, 6 athletes above average, and only 1 athlete who has an average category. For the Jump serve test results obtained the highest test with a value of 26, and the lowest value obtained with a value of 6 for the average acquisition obtained by Tunas Semarang athletes, namely 15.1. So athletes who have excellent leg power ability categories are 3, above average ability there are 6 athletes and only 1 athlete who has an average category. Tabel 4. Hasil Power Tungkai

n=10	Mean SD	± Min	Max
Result	3,3338 ± 0,4337	2,425	3,823

Based on the results of the calculation, it shows that Tunas Semarang athletes have an average leg power of 3.3338 with a standard deviation of 0.4337, athlete 1 obtained 3.675, athlete 2 obtained 3.823 athlete 3 obtained 2.975, athlete 4 obtained 3.4, athlete 5 obtained 3.5, athlete 6 obtained 3.105, athlete 7 obtained 2.425, athlete 8 obtained 3.55, athlete 9 obtained 3.105, athlete 10 obtained 3.78. The contribution of leg power to jump serve skills is 34.34%, this means that the higher the explosive power of the legs that the athlete has, the better the jump serve he has (Rifki et al., 2021).

## CONCLUSION

The conclusion of this study found that Semarang Tunas athletes use 2 and 3 steps when jump serving, the ideal step refers to the test results. 3 step prefix is more ideal new findings and for Tunas Semarang athletes to improve the quality of leg power by practicing hard because the average Tunas Semarang athlete only has a sufficient category.

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