



Biomechanical Analysis of Pointing Motion in Petanque Sport

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ABSTRACT

Petanque is a type of ball game sport where the goal of this game is to throw an iron ball (bosi) as close as possible to a wooden ball (boka) as a target with both feet inside a small circle called a circle. The purpose of the study was to analyze the biomechanics of pointing motion in the sport of petanque which is divided into three parts, namely the prefix, execution, and end. This research is a quantitative study with a descriptive analysis approach method. The method used is using the survey method of the pointing throw test and the video recording documentation method, analyzing the video using kinovea software. The results of the biomechanical analysis of pointing motion data on South Sulawesi PON athletes produce an arm backswing angle of 55° - 60° and the right arm release angle of 78° - 90° which produces a ball height of 1.00 - 1.77 meters.

Keywords: *Analysis Biomechanic, Motion, Pointing*

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INTRODUCTION

Petanque is a type of ball game sport where the goal of this game is to throw an iron ball (bosi) as close as possible to a wooden ball (boka) as a target with both feet must be inside a small circle called a circle. Petanque originated in France. Petanque sport there are two basic techniques that must be mastered by every petanque athlete, the first is pointing and the second is shooting. Teknik pointing is a type of throw that aims to bring the iron ball closer to the wooden ball (target). Meanwhile, the shooting technique is a throwing technique that aims to eliminate the opponent's bosu by shooting the opponent's bosu which is close to the wooden ball (target) (Pelana, 2020). Pointing technique is one of the techniques that must be mastered by every petanque athlete.

According to Confederation Mondiale Sport Boules (2015), Petanque is a form of boules game in which the goal is to throw an iron ball (boules) as close as possible to a wooden ball called a jack and both feet must be in a small circle with a minimum diameter size of 7.05 cm and a maximum of 8.00 cm and a weight between 650 grams and 800 grams delivered. Players under 11 years of age may use a bosu weighing 600 grams and 65 mm in diameter

provided that the iron ball is made by an authorized manufacturer. Boka is a ball measuring 0.3 cm in diameter and must weigh between 10 - 18 grams made of wood and cannot be lifted by a magnet. Apart from wood there are other materials such as plastic. According to Hermawan (2012: 17), based on the purpose of the main mechanics of the game petanque is included in a sport that has the aim of achieving balance and maximum accuracy. This means that the throw must be right on a specific target to get the winning point.

In the sport of petanque, there are four indicators that can affect the results of throwing the ball, the first is the backswing angle, the second is the swing, the third is the release angle, and the fourth is the height of the ball, the four indicators are interrelated and affect each other (Kharim & Nurkholis, 2018). biomechanical motion analysis can be done in several ways. One of them is by using kinovea technology. Kinovea technology is a technology that can combine a camera with a computer that can analyze the angle, speed, and height of the throwing ball both pointing and shooting in petanque sports. Kinovea has more menu options that are easy and not too complicated to use for motion analysis, especially pointing and shooting movements in petanque sports. Kinovea can change the video speed with slow motion so that the video motion is slower and easier to analyze.

Using technology in the sport of petanque can help to find out what the pointing movement of petanque athletes looks like. Each movement can affect the pointing results of the petanque game. With that, the analysis that will be carried out aims to find out the movement patterns and ball movements that will create the ideal movement. So that athletes can become more potential to have better technique accuracy.

METHODS

This research is a quantitative study with a descriptive analysis approach method. The method used is using the survey method of the pointing throw test and the documentation method. In this study examined pointing motion to find facts with various steps in the sport of petanque. The research subjects were 4 South Sulawesi petanque pre-pon athletes who had qualified for PON Aceh 2024. The software application used to analyze the video taken in the data is using kinovea software.

The data analysis technique in this study uses kinovea software on the pointing movement of petanque athletes, the video that is successfully recorded is then entered into the analyzer and then analyzed to find out the amount of angles in each movement and it is possible

to find out if there is an error in the movement. The implementation of the pointing test requires the help of instruments and tools in the form of petanque sports equipment and a camera, tripod. Before the test process is carried out, the researcher first explains the test implementation procedure. There are several phases that will be analyzed, namely the backswing, swing, and release phases where each phase will be analyzed based on the movements in the video and concluded based on the theories that have been developed by the experts.

RESULTS AND DISCUSSION

Results

This research is a biomechanical movement analysis. Analysis of pointing movements is carried out using kinovea technology. Kinovea technology combines camera data with a computer that can analyze the angle, speed, and height of petanque sport pointing throws. Kinovea has more menu options that are easy and not too complicated to use to analyze movements. Kinovea can change the video speed with slow motion so that the video movement is slower and easier to analyze.

The results of the Pointing movement are that there are four factors that affect the accuracy of pointing in the sport of petanque, the four factors are back swing, swing, release, and maximum ball height where the four factors influence each other even though it does not rule out the possibility that there are other factors that can influence. The following are the results of the research data:

Table 1. Pointing Motion Analysis Result

No	BS (°)	R (°)	S (m/s)	TB (m)
1	60	78	1.05	1.00
2	58	87	1.20	1.35
3	59	80	1.00	1.00
4	55	90	0.87	1.77

The data above is the data from the analysis of the pointing of PON South Sulawesi athletes. In the data it is explained that the arm angle during the backswing is between 55° - 60° according to what the subject does which gives good space to adjust the swing speed so that the ball release will be easier with the right time. If the backswing angle is above 60° and below 55° is a bad angle because when the backswing angle is too large, the elevation angle that will occur is even greater. If the momentum is too great, the speed will also be greater so that it will exceed the target or target.

Discussion

From the results of this research and analysis, it can be seen in the results above that the throwing speed also affects to produce the maximum height of the ball. The arm backswing angle is 55° - 60° and the right arm release angle is 78° - 90° which produces a ball height of 1.00 - 1.77 meters. if the release angle is too fast, the ball does not reach the maximum height. Meanwhile, if the release angle is too small, the elevation angle formed will also be small. These three indicators can produce a ball throw that stops at the best distance.

There are some previous research results mentioning that proper throwing also requires good motor control and also upper limb coordination, which is a challenge for athletes with quadriplegic athetosis, hypertension or ataxia. Wagner et al., (2012) said that wrist and elbow angles compensate each other to achieve consistent throwing results. According to Widodo & Hafidz (2018) success in throwing cannot be separated from the role of eye-hand coordination. Good eye-hand coordination will be able to produce the right throw. Irawan et al., (2019) explained that concentration and hand-eye coordination and mechanism also have a significant effect on shooting techniques. Not only in shooting techniques that require concentration and hand-eye coordination, but pointing techniques also require it.

CONCLUSION

The conclusion of the results of the analysis of pointing motion in terms of biomechanics in South Sulawesi PON athletes has been presented in the discussion, it can be concluded that there are several main indicators that greatly affect the results of pointing in petanque sports, namely backswing, swing, release, and also ball height. The bakswing angle is 55° - 60° , release 78° - 90° with a maximum ball height of 1.00 - 1.77 meters. This research is expected to help in improving pointing motion skills, in terms of the correct biomechanics of motion. This study only measures kinematic data such as: time and body segment angle. In addition, kinematic data is also needed to complement the kinematic data in this study so that the aspects that become indicators will be more complete.

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