



Relationship of Arm Muscle Strength and Hand-Eye Coordination with Pointing Throwing Ability in Petanque Game of Banggai Regency Athletes

Muhammad Salahuddin¹(✉), Hariadi Said², Abu Bakar¹, Ardiansyah Nur¹, and Frischa Priscillia Mongguwi¹

¹Pendidikan Jasmani Kesehatan dan Rekreasi Department, Universitas Muhammadiyah Luwuk, Banggai, 94711, Indonesia

muhmmadsalahuddin252@gmail.com

²Pendidikan Jasmani Kesehatan dan Rekreasi Department, Universitas Negeri Gorontalo, Gorontalo, 96112, Indonesia

Abstract. Athletes from the Banggai Regency will participate in a study to ascertain the relationships between arm muscle strength and pointing throwing ability, hand-eye coordination and pointing throwing ability, and arm muscle strength and hand-eye coordination with pointing throwing ability. The samples of this research were 10 petanque athletes of Banggai Regency. This research has used descriptive method research. The results showed that the value of r is 0.942 and the value of Sig is $0.000 < \alpha 0.05$, it had the meaning that has stated that the hypothesis is accepted. Hence, there was a very significant correlation between arm muscle strength and hand-eye coordination, and the ability to throw pointing in petanque games in Banggai Regency athletes.

Keywords: Arms Muscle Strength, Hand-Eye Coordination, Pointing, Petanque.

1 Introduction

Petanque Sports came to Central Sulawesi in 2016. The management of the Indonesian Petanque Sports Federation (FOPI) of Central Sulawesi Province was then socialized for each region to produce administrators for each district under the direction of Dr. Iskandar Ahmad, M. Hum. So, there is the Fopi board of Banggai Regency in 2019. The petanque sport has also begun to compete at the Central Sulawesi Provincial Sports Week in 2022.

Petanque sports in Banggai Regency, were introduced through students of Penjaskesrek Unismuh Luwuk. By bringing in Provincial Fopi administrators in Banggai Regency, petanque was a new sport that was first recognized in 2019, so the study program began to include petanque games as an elective at that time. Through this course, petanque sports began to look for athletes as coaches for Banggai Regency administrators.

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Z. B. Pambuko et al. (eds.), *Proceedings of the 4th Borobudur International Symposium on Humanities and Social Science 2022 (BIS-HSS 2022)*, Advances in Social Science, Education and Humanities Research 778,

https://doi.org/10.2991/978-2-38476-118-0_70

Petanque sport in Banggai Regency is a new thing for Regency athletes, of course, it will be a concern in the development of Regency KONI sports. So, it needs special attention in future development. Both in terms of basic techniques and strategies in petanque matches. In the matches that are participated in in the championship, several important things are a problem for athletes, such as physical condition and game technique.

The throws that were made far from the desired goal throughout the match indicate that the athletes from Banggai Regency were unable to provide the greatest outcomes while competing in the tournament. As a result, the coach may have concerns about this due to factors that prevent throwing from performing as planned. Therefore, researchers try to formulate existing problems such as in arm muscle strength, where this strength is a determining factor for athletes in throwing and eye-hand coordination. In this case, the combination of athletes throwing targets must be in rhythm between hands and eyes so that they can achieve the target.

Petanque sports characters tend to require accuracy, without excessive effort, anyone who wants to play petanque is allowed to play this sport, regardless of age, position, and gender. So anyone who can become an athlete is as important as having the will and motivation in training. Understanding errors in ball motion and movement will help athletes who have the ability to win championships by helping them execute tactics totally and precisely [1].

A challenge for athletes in Banggai Regency was that their arm muscle power was not ideal for throwing. It made throwing only a short distance within several distances, namely throwing from 6 meters to 10 meters. So, this study was used as a benchmark in increasing arm muscle strength as one of the driving factors in doing pointing throws. It is following the understanding that strength is the main factor for creating optimal performance. Strength is a physical quality that is one of the prerequisites for a person to be able to perform an activity. The capacity of the muscles to contract and create tension in the face of opposition is known as strength [2]

In addition, the capacity of a muscle group to produce the greatest amount of contractile force is referred to as muscle strength [3]. Muscle strength, on the other hand, is the physiological capacity of a muscle or set of muscles to exert one maximum contraction against resistance or load. As a result, every athlete needs strength in every sport in order to exert himself as much as possible during the intended activity or movement. Meanwhile, hand-eye coordination is also an important part of throwing pointing because, with eye sight in determining the target, it must be in rhythm with the hand in determining the target to be achieved. Coordination is the harmony of the movements of a group of muscles during the performance of these movements to produce a skill) [4]. Consequently, cooperation is required to hit the intended goal in the petanque game.

Success in petanque is mostly determined by height, arm length, arm muscular strength, wrist flexibility, balance, and hand-eye coordination [5]. It means that in petanque sports, especially novice athletes must focus more on improving their physical condition to improve their technique in throwing pointing. Based on its main mechanics, petanque is a sport that aims to achieve maximum balance and accuracy. In order to score the winning point, the throw must land precisely on a predetermined target.

A method known as "pointing" seeks to bring a metal ball or boules up close to a wooden ball (the "jack") [6]. A pointing throw is one in which the iron ball is brought up to the wooden ball, which serves as the target. Pointing Throw is a natural way of throwing or delivering iron balls. This technique is well-liked for many different forms of field characters, not just one particular type [7]. Therefore, sportsmen use this strategy more often when playing petanque. The better the pointing throw, the easier it will be to get points, so every petanque athlete must strengthen the basic technique of doing the pointing throw because it is the key to success in getting points in a match.

Looking at prior research [5] on petanque players' hand-eye coordination, arm muscular strength, and wrist flexibility, it was chosen to measure shooting ability. These studies showed a substantial presence in shooting ability by involving various current physical conditions. Different from previous studies, this study focused on looking at the same physical conditions but the target is the ability to throw a pointing in petanque.

Thus, the research that has been done before then obtained results where arm muscle strength can provide changes to the ability to throw pointing, as well as eye-hand coordination is needed in carrying out basic petanque game techniques so that if an athlete wants to improve his throwing ability, he needs to make improvements in physical condition because there are interrelationships in a petanque sports game. In the future, novice athletes must be equipped with good basic techniques and better physical conditions.

The objectives of this study were to use research methods to evaluate arm muscle strength in relation to the capacity to throw a point in petanque games, hand-eye coordination in relation to the capacity to throw a point in petanque games, and arm muscle strength and eye coordination in relation to the capacity to throw a point in petanque games. Quantitative by conducting measurement tests according to standards based on the variables used.

2 Method

This research method uses descriptive research or the design used is a correlational research design to know the relationship between variables without giving an effect. The research method is a scientific way to obtain data with specific purposes and uses, which are the object of research or attention in research) [8]. So that in this study there were independent variables which were divided into arm muscle strength (x_1) and hand-eye coordination (x_2) and the dependent variable, namely pointing throwing ability (y). This research was conducted at the Alun-Alun (Petanque) Field, Luwuk District, Banggai Regency, carried out from May to June 2022, and consisted of 10 petanque athletes who were sampled in the study.

The following data gathering methods are dependent on the variables used: the "Push-Up for 30 seconds," the "Bouncing the ball against the wall/wall as many as 10 baseballs," and the "Pointing Throw" test, which involves throwing BOSI toward a target at a distance of 8 meters [9].

3 Result and Discussion

3.1 Presenting the Results

Following tests and measurements based on the independent and dependent variables, the data was processed using SPSS to get the desired results. Descriptive data were used to collect results that described and explained data in general. The following tests have been carried out in order to assess the data, which includes details on arm muscular strength, eye-hand coordination, and throwing and pointing abilities.

Data analysis results. To find out the relationship between arm muscle strength, hand-eye coordination, and point ability in petanque games for athletes in Banggai district. Based on descriptive analysis, the results can be described in Table 1.

Table 1. Results of the descriptive analysis data on arm muscle strength, hand-eye coordination, and throwing-pointing ability.

Variabel	Descriptive Statistics					
	N	Range	Minimum	Maximum	Mean	Std. Deviation
Arm muscle strength	10	6	24	30	26,80	1,932
Hand-eye coordination	10	4	16	20	17,80	1,317
Throwing-pointing ability	10	10	14	24	18,90	3,073

The results of Hypothesis Testing. To find out the relationship between arm muscle strength and eye-hand coordination on the ability to throw pointing at petanque games for athletes in Banggai district, the hypothesis was tested using product moment correlation analysis using the SPSS application. Can be explained in Table 2.

Table 2. Hypothesis test results for arm muscle strength, eye-hand coordination with throwing-pointing ability

Variabel	r	Sig.	A	Notes
Arm muscle strength – pointing-throwing ability	0,914	0,000	0,05	Significant
Hand-eye coordination – pointing-throwing ability	0,901	0,000	0,05	Significant
Retrieve data simultaneously on arm muscle strength and eye-hand coordination – throwing pointing ability	0,942	0,000	0,05	Significant

3.2 Discussion

Relationship of Arm Muscle Strength with Pointing Throwing Ability. Based on hypothesis 1 above, the r -value is 0.914 and the Sig value is $0.000 < \alpha 0.05$, meaning that the hypothesis is accepted or there is a very significant relationship between arm muscle strength and pointing throwing ability in the petanque game for athletes in Banggai Regency. Thus, arm muscle strength is needed in pointing throwing skills, because without strength you will not be able to throw various distances in petanque games.

The Relationship between Hand-Eye Coordination and Pointing Ability. Based on hypothesis 2 above, the r -value is 0.901 and the Sig value is $0.000 < \alpha 0.05$, meaning that the hypothesis is accepted or there is a very significant relationship between hand-eye coordination and pointing throwing ability in the petanque game for athletes in Banggai Regency. The physical condition of hand-eye coordination is the most important part of improving accuracy in a throw so that good hand-eye coordination will produce a pointing throw according to the desired target.

Relationship between Arm Muscle Strength and Hand-Eye Coordination with Throwing-pointing Ability. Based on hypothesis 3 above, the r -value is 0.942, and the value of Sig. is $0.000 < \alpha 0.05$, indicating that the theory is correct or that there is a strong correlation between arm muscle strength, hand-eye coordination, and the athletes from Banggai district's ability to throw a point in the petanque game. The combination of strength and eye-hand coordination is related to each other, so having both of them will be even better for the Banggai Petanque athletes to participate in championships to get maximum results. Thus in the sport of petanque to get good results in throwing a pointing throw you should pay attention to supporting factors such as arm muscle strength and hand-eye coordination because without strength all athletes will have difficulty making a good contribution in a game. Likewise, eye-hand coordination must be in rhythm between the rhythm of the hands and eyes so that they can reach the desired target.

4 Conclusion

The following recommendations can be drawn from this study's examination of the research findings and discussion: 1) with the game of petanque, arm muscle strength and throwing accuracy are significantly correlated with athletes from the Banggai Regency. 2) In the game of petanque, athletes from Banggai Regency have a very strong correlation between hand-eye coordination and throwing accuracy. 3) In athletes from Banggai Regency, there is a significant correlation between arm muscle strength, hand-eye coordination, and the capacity to toss points in the game of petanque. Petanque athletes in the Banggai district must pay more attention to the elements of physical condition in improving the pointing-throwing technique to be even more accurate in getting the desired target. As input material for future research, we can examine other

variables that can support the implementation of pointing and focusing throws, providing new training methods so that they can improve performance again in the future.

Acknowledgement. The final text of this comprehensive study paper is gratefully acknowledged to the Rector and Dean of the Faculty of Teacher Training and Education at Muhammadiyah Luwuk University. Our thanks also provided to the Petanque management of Banggai Regency for the support so they can carry out this research, and thank you also to all the athletes who have helped and become samples in the research. A big thank you goes out to everyone who helped with the idea development, data collecting and analysis, conference planning, and finishing the project but who cannot be named individually here.

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