

Relationship between Eye-hand Coordination Ability and Flexibility Toward Overhand Throw Accuracy

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Abstract. The purpose of this study was to determine the relationship between eye-hand coordination, flexibility and the accuracy of overhand throwing of female softball athletes. This study uses survey and test methods with correlation data analysis. The sample used in this study were 22 athletes who were female softball athletes in Semarang City. sampling technique using total sampling. The data analysis technique used in this study is bivariate correlation analysis. The results of this study explain that there is a relationship between hand eye coordination and the accuracy of the athlete's throwing results with a correlation of 0.72 with a significance value of 0.000. Furthermore, there is no relationship between flexibility and the accuracy of the athlete's throwing results with a sig value. $0.265 > 0.005$. between eye and hand coordination and flexibility, what has a contribution is eye-hand coordination.

Keywords: *physical ability, throwing accuracy, softball technique, skill performance.*

1 Introduction

In a softball game when the condition is defending one of the dominant and important techniques is the throwing technique. Softball is a sport played in groups consisting of two teams, namely the defending and attacking teams. The techniques in softball games are throwing the ball (throwing), catching the ball (catching), hitting the ball (batting), running from base to base (baserunning), and sliding (sliding). The technique of throwing the ball is a technique that all softball players must master. Players who are said to be successful in throwing techniques are athletes who can perform throwing techniques with power and precisely from one point to another [1].

The overhand throw is one of the throwing techniques found in softball games. Overhand throws involve complex motor skills of the whole body. The development of important techniques and tactics is carried out in sports such as tennis, handball, American football, softball, and baseball [2]. Accuracy and speed are the main variables of the resulting throw. The overhand throw mechanism consists of six phases, namely 1) wind up, (2) stride, (3) arm cocking, (4) arm acceleration, (5) arm deceleration, and (6) follow-through [2]. The overhand throw is one of the throwing techniques in softball that all players must master. Throwing

movements that are fast, accurate, and timely are things that the infielder must do while the outfielder takes advantage of wind conditions to maximize the throw's speed and distance [3].

Softball and hockey are demanding sports that require different physical abilities. This sport requires excellent eye-hand coordination skills, upper extremity strength, handgrip strength, and well-coordinated hip, shoulder, arm, and wrist movements [4]. Some of the physical components that affect overhand throw skills in softball are arm muscle explosive power, eye-hand coordination, and the accuracy required to produce precise and accurate throws. Throwing speed and accuracy is the key in softball games when defending to kill runners from the opposing team [5]. Many factors affect the throwing technique in softball games, both overhand throws, arm throws, and side throws. The result of an effective throw is the result of good technique and the contribution of several physical components possessed by the player. Athletes must have good flexibility, muscle strength, coordination, muscle synchronization, and neuromuscular efficiency to perform overhand throw movements well [6].

The throwing technique is an important basic technique in softball games, especially when defending [7]. Throwing accuracy is the key to success in softball games, especially in turning off runners heading to base. Based on previous research, hand-eye coordination and flexibility contribute to throwing skills in softball games. These two physical components contribute to the quality of the throws produced in softball games. The quality of the throw in a good softball game is if the resulting throw is on target, fast, and reaches a predetermined distance. Previous research has shown that eye-hand coordination positively contributes to throwing accuracy. However, no data informs the contribution of flexibility to the overhand throwing accuracy in softball games.

2 Method

This is a correlational study using survey and tests. The sample in this study were female softball athletes in Semarang City, totalling 22 athletes. The sampling technique used is total sampling. The data collection instrument used was a test and measurement consisting of three tests: throwing and catching tennis balls to measure hand-eye coordination skills, sit and reach tests to measure flexibility, and overhand throw softball accuracy tests. Data analysis used bivariate correlation analysis using SPSS 21. The significance value of $0.05 \leq p < 0.05$ will be considered for data interpretation with the prerequisite test before analysis.

Tennis ball throw and catch test procedures: (1) Throw with one hand and catch with the other. (2) Before doing the test, the sample may make a trial, (3) Each sample is given the opportunity ten times to throw and catch with the preferred hand, followed by ten chances to throw with the preferred hand and catch with the other hand [8]. Sit and reach test procedures: 1) Sit on the floor, with legs straight and feet on the instrument, 2) Place hands on the measuring device with one hand on top of the other and elbows straight, 3) Push the measuring device forward using your fingers slowly and allowed to bend the back, 4) Hold the maximum reach position for 2 seconds [9]. The procedure of overhand throw softball accuracy: (1) Sample throw the ball using the overhand throw technique with a target in the form of a circle with a distance of 65 feet for men and 40 feet for women, (2) 10 experiments were carried out, (3) Throws that hit the target in the middle circle get a score of 3, the second

circle scores 2 and the outer circle scores 1, (4) The score is the total number of points obtained in 10 throw attempts [10].

3 Result and discussion

Based on the result data, 40,91% of athlete have good eye-hand coordination, 59,09% of athlete have sufficient eye-hand coordination, and no athlete has insufficient eye hand coordination.

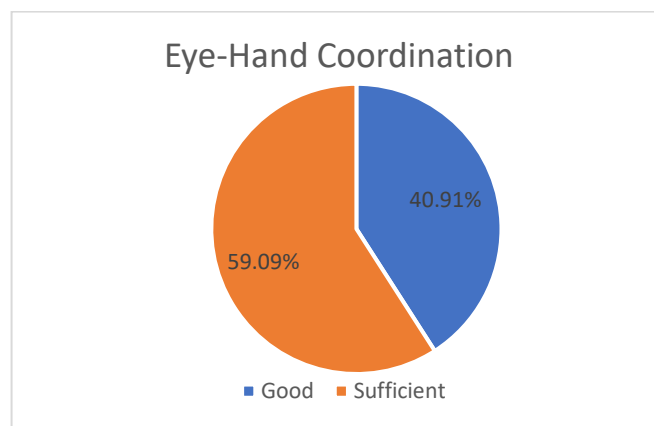


Fig. 1. Eye-Hand Coordination Data

Meanwhile, for flexibility, data obtained by 45.46% of athletes have good flexibility, 36.36% of athletes have sufficient flexibility, and 18,18% of athletes have insufficient flexibility.

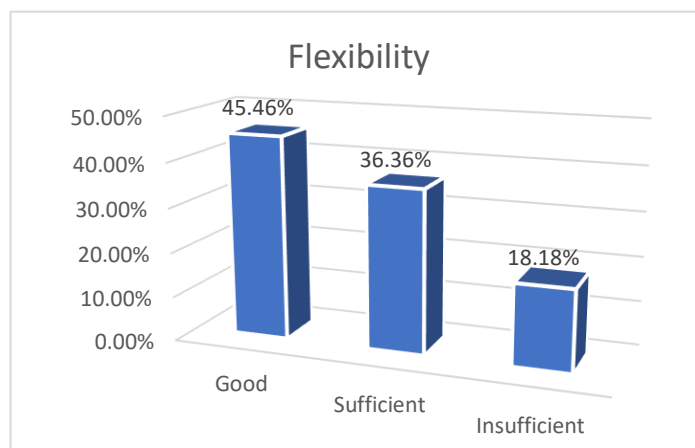


Fig. 2. Flexibility Data of Female Softball Athletes

The data that has been obtained influences the games that take place in sports such as baseball, softball, handball, basketball and cricket. With different throwing techniques, every throw in the game uses the same muscles. other factors and physical conditions affect the power and accuracy of this throw. thus good throwing results result from a variety of influencing contributions [12].

Throwing skills are the dominant defensive skills in softball. Overhand throwing in softball involves flexibility and mobility conditions of the shoulder joint, where this shoulder joint is a multi-axial joint group with three degrees of freedom. the range of motion provided by the shoulder joint allows the projectile to be released over the shoulder by optimizing the long arm moment for rotation of the shoulder and spine[11].

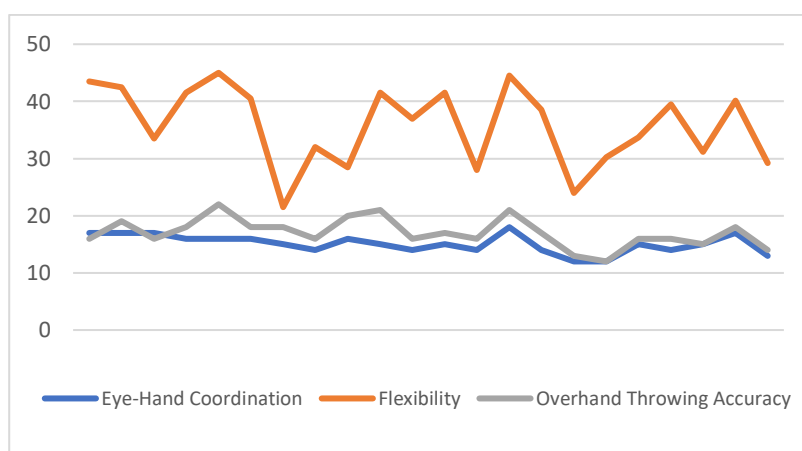


Fig. 3. Eye-Hand Coordination, Flexibility, and Overhand Throwing Accuracy Data

From the results of data analysis using correlation analysis, it was found that there was a significant relationship between hand coordination and overhand throwing accuracy with a correlation value of 0.702 and a sig. 0.000 (Table 1). In the results between flexibility and accuracy of overhead throws, there is no significant relationship with a correlation value of 0.248 and a sig. 0.265. (Table. 2)

Table 1. The Correlation Result of Eye-Hand Coordination and Overhand Throwing Accuracy

Eye-hand coordination	Overhand throwing accuracy	
	Correlation value	.702**
Sig. (2-tailed)	.000	
N	22	

Table 2. The Correlation Result of Flexibility and Overhand Throwing Accuracy

Flexibility	Overhand throwing accuracy	
	Correlation value	.248
Sig. (2-tailed)	.265	
N	22	

Softball is a fun and not boring sport, besides that there are many benefits that can be obtained from playing softball, such as health benefits which in this case are related to physical fitness,

agility strength and upper and lower body coordination. The overhead throw technique in softball is a motor skill that requires complex whole body movements [12]. Many sports require technical and tactical skills such as tennis, handball, rugby baseball and softball in the development of these skills because they are considered important. The throwing mechanism is divided into 6 stages, namely (1) wind up, (2) stride, (3) arm cocking, (4) arm acceleration, (5) arm deceleration, and (6) follow-through. In general, the movement resulting from an overhead throw is a whole body movement that starts from the lower body and then advances to the upper body ending with a whip-like movement that is thrown when the projectile is released. practicing and mastering these skills is important of course by developing manipulative movements and hand-eye coordination.[2].

Based on the skills, the overhead throw is one of the important skills that require special attention to improve softball performance because all softball players must use this skill no matter what position they are in during fielding [13]. In the overhand throw, several physical conditions can affect a softball athlete's throw, such as arm muscle explosion, hand-eye coordination, and the precision needed to produce a precise and accurate throw [5]. Eye-hand coordination is the element that has the most significant relationship and contribution to the accuracy of the top throw in softball games. Eye-hand coordination relates to a player's ability to direct the ball into the target. Coordination is a person's ability to integrate different movements into a single, effective movement pattern. Whether or not a person's movement coordination is reflected in his ability to perform a movement smoothly, precisely, and efficiently. Someone who has good coordination is not only able to complete a skill perfectly but also can easily and quickly acquire new skills [14].

Throwing, being a basic skill, plays an important role in successful participation in softball. Softball features three common throw-overhead, sidearm, and underhand-overhead most often used. To perform the overhead throw successfully, the athlete must demonstrate significant flexibility, muscle strength, coordination, muscle shot synchronicity, and neuromuscular efficiency. Throwing skills in male softball players are associated with physiological parameters such as aerobic fitness, speed, explosive power, flexibility, and right and left-hand grip strength [6]. Softball is a physically demanding sport consisting of several specialties such as hitting, throwing, throwing, throwing, running, etc., requiring different skills and fitness types. It requires upper extremity strength, hand grip strength, excellent eye-to-hand coordination, and coordinated movement of the hips, shoulders, arms, and wrists. It requires speed, strength, and endurance [15].

4 Conclusion

There is a relationship between eye-hand coordination and overhand throwing accuracy of the female softball athletes in Semarang city. There is no relationship between female softball athletes' flexibility and overhand throwing accuracy in Semarang city. Eye-hand coordination contributes to the overhand throwing accuracy, while flexibility does not contribute to the overhand throwing accuracy in female softball athletes in Semarang. Studying more variables related to throwing skills, especially throwing speeds, is necessary for further research.

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