

Relationship Between Anthropometric Parameters and Jump Height with Ball Throwing Velocity of Male Handball Players

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Abstract-

Aim of the study- the objective of the study was to investigate the relationship between anthropometric parameters which were height, weight, back strength, leg strength, palm-size, hand length and jump height with handball throwing velocity. *Materials and methods-* fifty-six inter-university male handball players were selected for this study. Anthropometric parameters were measured, jump height was measured by using BTS G-Sensor and throwing velocity was measured by a Radar gun. Pearson product-moment correlation coefficient was used for analyzing the data. *Results-* The results showed that there was a significant correlation between ball throwing velocity and height, back and leg strength, palm-size and jump height whereas insignificant relation with weight and hand length. *Conclusion-* The parameters which are correlated to throwing velocity can be used by coaches to improve the throwing velocity of players and these parameters can also be used by researchers to predict throwing velocity.

Keywords- Handball, Throwing Velocity, Anthropometric parameters, Radar gun, Jump height.

Introduction-

Throwing velocity is one of the most important factors in handball. Handball is an intermittent and contact sport that involves high-intensity endeavours in the shortest possible time, such as running, jumping and throwing the ball followed by low intensity or rest moments (Sarvestan, Riedel, Gonosova, Linduska, & Pridalova, 2019). Handball players increase their chances of scoring by throwing the ball as fast as possible and by accurately aiming at the goal. The faster the ball is thrown towards their goal, the less time the defenders and goalkeepers have to save the goal (Ferragut, Vila, Abraldes, & Manchado, 2018). Handball coaches and scientists are seen to agree that the main determinants of throwing velocity are throwing technique, the timing of the consecutive actions of body segments, and upper and lower extremity muscle strength and power.

Segment length and muscular body shape are too essential advantages in Handball. The most successful Handball teams are generally taller and possess less body fat, whether male or female. Additionally, young handball players are reported to be taller with more body mass compared to peers

who play different sports. Theoretically, longer segmental length could significantly increase the linear velocity of the projectile at the throwing moment, however, segmental length could also decrease throwing velocity by an excessive moment of inertia (Sarvestan, Riedel, Gonosova, Linduska, & Pridalova, 2019).

In previous studies, significant and positive correlations have been reported between ball velocity and general anthropometric characteristics ($r=0.23-0.62$) body mass, lean body mass, body height, and body mass index. Further studies focused on anthropometric variables specific to handball (hand size and arm span) and even reported significant and positive correlations ($r=0.29-0.37$) with ball velocity. However, in all these studies, general anthropometric variables were better predictors than those specific to handball (Sarvestan, Riedel, Gonosova, Linduska, & Pridalova, 2019).

Based on reviews, only a few studies had explained the importance of anthropometric parameters, jump height and their relationship with throwing velocity. Therefore this study aimed to investigate the relationship between anthropometric parameters and jump height with throwing velocity.

Methods:

A sample of fifty-six ($n=56$) elite male inter-university Handball players were selected for this

study. Their age was between 18-25 years. All the players were medically fit during the data collection. Each subject performed 5 minutes warm-up before an assessment on anthropometric parameters, jump height, and throwing velocity.

Anthropometric parameters were height, weight, back strength, leg strength, palm-size, and hand length. Body height was measured with a stadiometer(in cm), Body weight was measured with weighing machine(in kg), BS and LS were measured by using back and leg strength dynamometers(in kg) whereas PS and HL were measured with the help of measuring tape (in cm).

Jump height was measured by using BTS G-sensor which has a tri-axial accelerometer and was placed at the back(sacrum 1 of the spinal cord) with the help of a belt. Each subject was asked to perform three trials of counter-movement jump with maximal effort. The scores of maximum jump height were taken from G-studio software (Monnet, D., & L., 2014).

Throwing velocity was measured by using a Rader gun (in miles/h). Three trials were given to each subject to perform jump shot from the behind free-throw area (9m line), they were instructed to throw the ball directly to goal without bouncing it with maximum effort. The jump shot was performed without goalkeeper and the radar gun was placed exactly opposite to the ball to record the speed of the ball. The best of three trials score was used for further analysis.

Results:-

To analyze the relationship between anthropometric variables and jump height with throwing velocity product-moment correlation coefficient was used. The analysis was done using SPSS software. The values of mean and standard deviation for all the variables are shown in Table 1. The throwing velocity of the ball was found to be significantly correlated with all the variables except weight and hand length. Height, back strength, and jump height were significant at 1% (p<.01) whereas leg strength and palm-size were significant at 5% (p<.05) as shown in Table 2.

Table 1. Descriptive Statistics of Anthropometric parameters, Jump height, and Throwing velocity.

	Mean	Std.Deviation	N
Throwing velocity	48.69	3.33	56
Height	172.43	5.80	56
Weight	69.41	9.83	56
Back strength	115.69	18.29	56
Leg strength	123.10	16.76	56
Palm size	18.33	1.29	56
Hand length	76.61	3.28	56
Jump height	39.01	3.03	56

Table 2. Correlation Coefficient Values of Throwing Velocity and Anthropometric Parameters and Jump Height

Variables	r	Sig.
Height	.419	.001**
weight	.225	.096
Back strength	.372	.005**
Leg strength	.337	.011*
Palm-size	.306	.022*
Hand length	.104	.444
Jump height	.402	.002**

**significant at 0.01 level
*significant at 0.05 level

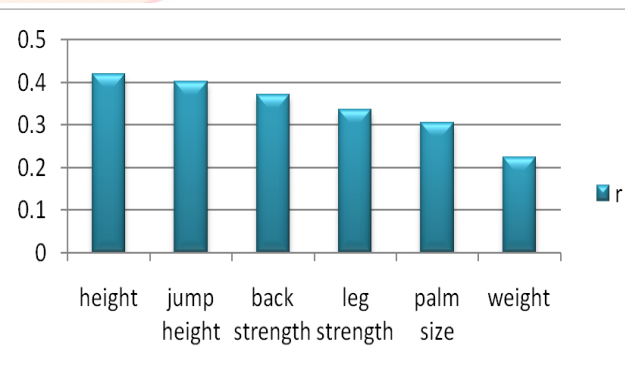


Fig. 1 Graphical representation of r values for significant anthropometric parameters, jump height with throwing velocity

Discussion:-

In this present study, we investigated the relationship between ball throwing velocity and anthropometric parameters along with the jump height of interuniversity level male handball players. The main finding is along with height, jump height, and palm-size, back strength and leg strength are equally important contributing factors for increasing throwing velocity as shown in figure 1. There are several studies on the relationship between anthropometric variables and throwing velocity but only a few studies have explained the relationship of throwing velocity with back strength and leg strength.

Body height and arm span are positively correlated to the throwing velocity. It is generally accepted that body height is positively affecting all body dimensions (Tillaar & Ettema, 2004). This positive correlation of the height to the ball velocity is per previous studies involving male and female athletes (Tillaar & Ettema, 2004), based on few studies increased length and hand spread are important for a stable ball grip and accordingly for proper throwing technique (Burton AW, 1993). a positive correlation was found between the ball throwing velocity with the hand size (spread) and hand length (Zapartidis, Skoufas, Varelziz, Christodoulidis, Toganidis, & Kororos, 2009) whereas in this study we have found that throwing velocity was significantly correlated with palm-size but insignificantly correlated with hand length. The novelty of this study is we have included back and leg strength which very few researchers had done. In this study, we found that both the back and leg strength are positively correlated with throwing velocity. The contribution of jump height is also explained by this study, it is also positively correlated to throwing velocity. Few studies explained the difference in the vertical jump, squat jump, and counter-movement jump among playing positions (Vila, Machado, Rodriguez, Abraldes, Alcaraz, & Ferragut, 2012).

Conclusion:-

The results of this study lead to the following conclusions: height, back strength, leg strength, palm-size, and jump height affects the throwing velocity whereas weight and hand length do not

significantly affect throwing velocity. These variables can help coaches for improving the throwing velocity of players as well as selecting players for their teams. Considering these variables researchers can also predict the throwing velocity of handball players.

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