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A Comparative Study of the Muscular Leg Speed and Power of Female Hockey and Basketball Players

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ABSTRACT

Aim of the Study: The aim of this study was to compare the muscular leg speed and power of female hockey and basketball players in Awka Educational Zone.

Methodology: Out of 184 registered female hockey and basketball players who voluntarily participated in the study, 30 female students were purposefully chosen from the Awka educational zone and recruited from female students with body mass indices (BMI) between underweight and normal weight (≤14.5±18.9) (height, x=1.50±1.17cm; body weight, x=50.31±70.15kg). Female students between the ages of 14 and 18 who had practiced consistently for at least three years (three days per week) and had participated in combined training and competitive play once a week chose to take part in the study. Anthropometric factors, weight, speed, and power assessments are part of the tests. 50-meter sprint was chosen to test leg speed while the vertical jump was used to test for leg power. The investigation was conducted using Quasi-experimental research design. The female students who volunteered have been participating in three days per week of consistent practice, combined training, and competitive play for at least three years. Players evaluated their leg speed (50-meter sprint) and leg power (vertical leap) after the warm-up regimen was finished. The t-test, mean, and standard deviation were used in the statistical analysis.

Findings: The findings showed that there is no discernible difference in the leg speed and power of female basketball and hockey players in the Awka educational zone.

Conclusion: Study concluded that there is no significant differences between the leg speed and leg power of female hockey and basketball players in Awka educational zone Nigeria.

Keywords: Leg Speed, Leg Power, Physical Fitness, Players.

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Introduction

Hockey is a game that requires a great speed to propel a vulcanized rubber disk, the puck, past a goal line and into a net guarded by a goaltender, or goalie. Because of the nature of the game, a player is required to constantly moving but most of running is short sprints with many changes of direction. The over-

lapping half-back must be able to run to meet a forward while also recovering quickly enough to return to her defensive position in the event of a sudden break through from an opponent. Players need strong leg muscles to carry their bodies' weight while doing techniques like pushing, flicking, passing, and hitting. The goalkeeper should have good leg strength and speed. This is due to the fact that she is continually kicking the ball out of the shooting circle and also needs to sprint out of the goal post to kick out an oncoming ball. Goalkeepers must develop strong leg muscles in order to absorb and save shots at goal. In contrast to basketball, physical contact with opposing players is permitted to some level in hockey. Because of the fast-moving ball and rapid changes in direction, the player must be able to cover ground quickly

Basketball is a sport that does not require any physical contact. It is a fast-paced sport that necessitates eye-hand coordination as well as adherence to basic regulations by all players. The basic objective of the game is to put the ball into the hoop as many times as possible in the 30 minutes allotted. It's crucial to keep the ball in your hands at all times. Due to the requirement of the basketball game to do complicated movements that require high anticipatory skills in challenging conditions, players with more playing experience may be able to improve their performance. These excellent anticipating abilities can be applied in a variety of situations. Indeed, these excellent anticipatory skills can be translated into variables related to scoring and passing in game-related data (Triplett, Erickson & Jeffrey, 2012). Balance, speed, and good leg power are required for jump shots, ball dribbling, shooting, and passing since she must dribble quickly and jump high in order to take a shot. As a result, basketball players should have a high level of leg speed and power.

Both hockey and basketball need players to be physically fit in order to put a ball in a net. For efficient performances in their sports, players must have a combination of speed, muscular power, muscular strength, agility, and coordination. It will depend on your first step on the field whether you get the ball or not. An athlete must be able to repeatedly sprint with the same level of explosiveness. Given that the player rarely sprints in a straight line, this is useful to them (Batholomei et al., 2021).

In a recent study, Bartholomei et al. (2021) examined the performance of male and female athletes in terms of body mass (BM) and lean body mass (LBM), as well as the associations between muscular architecture and strength in both sexes. The vastus lateralis (VT), pectoralis major (PEC), and trapezius muscles' muscle thickness (MT) were measured in 16 men and 14 women (TRAP). The findings showed that women's maximal strength values in the bench press, squat, deadlift, and mid-shin pull were lower than men's. Men perform better than women when MT and LBM are taken into account, which may be a result of differences in the distribution of LBM and muscle morphology between the sexes. These results are comparable to those that have previously been recorded for powerlifting competitions of both sexes (Palma-Lafourcade et al., 2019; Graci et al., 2012; Coratella et al., 2020). The anatomical properties of muscles as well as anthropometric and task-specific factors may potentially have an impact on the gender gap in power.

Perez-Gomez et al. (2008) discovered that both males and females' lower limb muscle mass standardised to a similar power output. Numerous neuromuscular parameters, including muscle morphological traits like specimens were subjected, pennation angle, and fascicle length, are confirmed to have an impact on maximum strength and power (Bartolomei et al., 2019; Blazevich & Sharp, 2005).

Recent studies have found a weak association between vastus lateralis muscle architecture and maximal isometric force measured at the mid-shin pull in resistance-trained athletes. Additionally, the vastus intermedius muscle's architecture and the late stage of the force production rate during isometric leg extension were found to be significantly correlated (Coratella et al., 2020). Additional research revealed strong connections between the vastus lateralis muscle's architecture and the peak power and time to peak power in an all-out Wingate test (Coratella et al., 2020). Resistance training may have an impact on certain muscle architecture metrics in male and female athletes. Blazevich and Giorgi (2001); Nimphius and colleagues (2012) As far as we know, no research has compared the muscular leg speed and power

performances of female hockey and basketball players in the Awka educational zone. In order to determine whether there is any substantial variance in the aforementioned characteristics, this study compared the muscular leg speed and power of female hockey and basketball players in the Awka Educational Zone.

Objective of the Study

To Compare Muscular Leg Speed and Power of Female Hockey and Basketball Players.

Study Hypotheses

The following null hypotheses were stated and tested at 0.05 level of significance.

1. There will be no significant difference in the leg speed of female hockey and basketball players in the Awka Educational Zone
2. There will be no significant difference in the leg power of female hockey and basketball players in Awka Educational Zone.

Method and Materials

This study employed an experimental approach as its research strategy. The study uses a 2 x 2 factorial design with two subject groups: the experimental group and the control group. Since it is a true experimental research design, it is suitable for this investigation. The goal of the study is to determine whether there are any appreciable differences in the leg speed and power of female basketball and hockey players in the Awka Educational Zone.

Participants

The population was made up of 184 registered female hockey and basketball players aged 14-18 years in Awka Educational Zone. The participants were those who have participated in one or two local and school team competitions from the zone. All players have been practicing on a regular basis for at least 3 years (three days per week). A total of 30 female students out of 184 registered female hockey and basketball players in Awka educational zone were selected and used for the study. The subjects were selected purposively. They were assigned into three groups namely Group A (10) 50 meter Dash, Group B (10) Vertical Jump (VJ), and Group C (10) Control. Athletes were verbally told of the study's guidelines at the outset, and their written agreement was sought before they could take part in it.

Instrumentation

The instrument used to collect data for this study included:

1. Body Mass Index (Height & Weight)
2. 50 meter Sprint for leg speed
3. Vertical Jump for leg power

Weighing

Equipment*:* A Standard Weighing Balance Machine

Standard Stadiometer: The participants' heights were measured using a standard stadiometer to get their centimetre heights. From 60 to 200 cm, the height scale is calibrated in centimetres. Using a Standard Stadiometer and the individual standing upright, body height was measured with an accuracy of 1 cm.

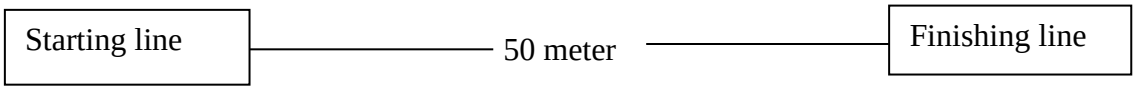
The Calibrated Bathroom Weighing Scale: The participants' total body weight was determined using a calibrated bathroom weighing scale, model number BR9011. The weighing scale's calibration ranges from 0 to 180 kg in kilogrammes. Subjects were lightly clothed and wearing stocking feet as the body weight was measured to the nearest 0.1kg.

50 Meter Sprint Test

***Equipment**:* A Stop Watch, a Whistle and a Marked Area

The goal of this test was to assess how well the athlete has developed their ability to quickly and effectively accelerate from a standing start to their top speed. A 50-meter demarcated area on the straight field, a stopwatch, and a measuring tape were needed for this test. On the "GO" command the participants ran quickly with speed from starting line and the assistants start the stop watch. When the participants pass the finishing line the assistants stop the stopwatch and record the time for the participants to complete the 50meter.Three trials were given to the subject and out of these the best time was record.

Purpose: To determine the athlete's muscular leg speed.



Procedure: The test includes a single, 50-meter maximum sprint, with the timing being recorded. There should be a thorough warm-up and some practice accelerations and starts. As you remain still, place one foot in front of the other (your hands cannot contact the ground). Back from the starting line, the front foot must be planted. Once the subject is ready and still, the starter commands "set" and "go" are given. The researcher offers advice on how to increase speed while encouraging participants to keep running until they cross the finish line (such as staying low and pushing hard with the arms and legs). When the athlete first moves, the timer is activated by the administrator. The participants sprint to the marked end of the line as quickly as possible. The researcher stops the timing device when the athlete finish. The training partner record the time. Rest fully and repeat three times.

Table 1: *Running time division*

Excellent	**Above average**	**Average**	**Below average**	**Poor**
10.50 sec	9.50 sec	8.00 sec	7.50 sec	5.00 sec

Test Administration: The trainees standing at starting line of one cone. On a signal of "Marks – set – Go "by the administrator, the administrator starts the timing device when the athlete first moves. The participants sprint to the marked end line as quickly as possible. The administrator stops the timing device when the athlete finish. The training partner record the time. Rest fully and repeat three times.

Scoring: This is taken from the recorded seconds each athlete scored, the best score from the results from the three trails.

Vertical Jump

Purpose: To determine the leg power of an athlete.

Facilities and Equipment: A wall, a piece of chalk and a measuring tape.

Procedure: The athlete leans sideways against the wall and reaches up with the hand closest to the wall. While keeping the feet firmly planted on the ground, the point of the fingertips is marked or documented. This refers to the reach height while standing. Taking a step back from the wall, the athlete then leaps as high as they can, propelling their body forward with the aid of their arms and legs. Try to touch the wall as you jump to its highest point. The distance between the standing reach height and the leap height is used to calculate the score. The top attempt out of the three is kept.

Table 2: *Jumping time division*

Excellent	Above average	Average	Below average	Poor
0.6m	0.4m	0.3m	0.2m	0.2m

Scoring: The jump height is usually recorded as a distance score from the best of three attempts.

Results

Summaries of the analysis were presented in tables to highlight the findings.

Hypothesis 1: There will be no significant difference in the leg speed of female hockey and basketball players in the Awka Educational Zone

Table 3: *Summary of t-test of Leg Speed of Hockey and Basketball players*

Leg Speed	Mean	S.D.	df	N	t-cal	t-crit	P>0.05	Decision
Hockey Players	7.7	1.58	9	10	0.151	2.878	0.05	Null Hypothesis supported
Basketball Players	7.8	1.37	9	10	0.151	2.878	0.05	

The t-test comparison in Table 3 indicates that the mean leg speed of the hockey players was 7.7sec. with a standard deviation of 1.58 and degree of freedom of 9, while the basketball players showed a mean leg speed of 7.8 sec with a standard deviation of 1.37 and degree of freedom of 9. Table 3 shows that t-calculated is less than t-critical i.e (0.151<2.878). Therefore hypothesis 1 is accepted. Hence there is no significant difference in the leg speed of hockey and basketball players in Awka educational zone.

Hypothesis 2: There will be no significant difference in the leg power of female hockey and basketball players in the Awka Educational Zone

Table 4: *Summary of t-test of Leg power of Hockey and Basketball players*

Leg Power	Mean	S.D.	df	N	t-cal	t-crit	P>0.05	Decision
Hockey Players	38.7	10.5	9	10	0.84	2.878	0.05	Null Hypothesis not supported
Basketball Players	89.1	10.7	9	10	0.84	2.878	0.05	

Table 4; shows that the mean leg power of the female hockey players was 38.7 in kg with a standard deviation of 10.5 and degree of freedom of 9 while the female basketball players showed a mean leg power of 89.1kg with a standard deviation of 10.7 and 9 as the degree of freedom with a t-vale of 0.84 and a t-critical value of 2.878 at 0.05 level of significance. Since the t-critical value of 2.878 was greater than t-value of 0.151, the hypothesis which stated that there will be no significant difference between the leg power of female hockey and basketball players in Awka educational zone was therefore rejected.

Discussion

Strength and conditioning programmes for team sports athletes should definitely include speed, power and strength. The aim of this study was to find out whether there was any significant difference between the leg speed and leg power of female hockey and basketball players in Awka Educational Zone. The results showed that the running speed of female hockey players is significantly related to the leg power of female basketball players in Awka educational zone. Speed is found to be an important predictor of strength performance among the two team games.

The results of the present study do not support (Ates, 2018) who claimed that speed running performances depend on a number of factors induced by growth and maturation and that being able to run quickly and move quickly has an important prerequisite for success in most sporting and recreational physical activities. This might be as a result that the hockey and basketball players fell within the same age range. The age of the players ranged from fourteen to eighteen years. Age is a factor in obtaining speed and power respectively. They also submitted that an individual's ability in speed and power reaches its peak when one is about 20 years of age and declines rapidly after 24years of age because it imposes a considerable task upon the heart and there is a gradual increase in less of vascular resilience. The above information has shown evidence that the tests yielded a maximum result.

Both hockey and basketball players need to be physically fit and both games require speed, muscular power, muscular strength, agility and coordination. Speed is based on quick muscular reaction, and practicing speed activities improve co-ordination and reaction time. In most life situations muscular speed is necessary in varying degree for the youths to be able to run fast, throw fast and combine speed with strength, skills and endurance which are basic for normal growth and development by (Hurst et al., 2018). Players of these games therefore should acquire these factors for effective performance in their sports activities.

Conclusion

The study concluded that both two games require quick actions during play that is why extensive use of leg power and leg speed is required. For the fact that the two games require extensive use of the leg power and leg speed there is need to find out if there is any significant between leg power and leg speed of female hockey and basketball players. Hence, study concluded that there are no significant differences between the leg speed and leg power of female hockey and basketball players in Awka educational zone Nigeria.

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None

Conflict of Interest

Author has no conflict of interest.

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