Volume 10, Number 1, 2025

INTERNATIONAL JOURNAL of Human Kinetics, Health and Education (IJoHKHE)

ISSN: 2449-0326

editor.ijohkhe@unn.edu.ng

Comparison of Leg Power and Balance among Basketball and Handball Players in Public Secondary Schools in Nsukka Local Government Area, Enugu State

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Abstract

Quality physical education and supportive school environments can provide physical fitness profiles such as power and balance and health literacy for long-lasting health. The study adopted the ex-post-facto research design to assess the power and balance of basketball and handball players in public secondary schools in Nsukka Local Government Area (LGA). A total of 206 students were selected from 30 registered public secondary schools using the simple random sampling and purposive sampling techniques. Standardized Test Battery of the Council of Europe (EUROFIT 1983) was used to collect data. Mean and standard deviation were used to analyse and answer the research questions. The results showed that basketball players had higher power levels than handball players, while handball players had lower balance levels compared to basketball players. The findings highlight the need for improved sports facilities and coaching programmes to enhance the power and balance of handball and basketball players in public secondary schools in Nsukka LGA.

Keywords: Power, Balance, Handball game, Basketball games, Physical fitness, Physical ability

Introduction

Globally, power and balance are recognized as essential components of success in sports, particularly in basketball and handball. The ability of athletes to explosively jump, quickly change direction, and maintain control over their movements is crucial for achieving optimal performance (Haff & Triplett, 2016). Research shows that power and balance are critical determinants of athletic performance, and deficiencies in these areas can increase the risk of injury and decrease overall performance (Cronin et al., 2017). However, there is growing concern that many student players in public secondary schools in Nigeria may not be developing the necessary power and balance to compete effectively in these sports. Specifically, in Nsukka Local Government Area (LGA), anecdotal evidence suggests that basketball and handball players may be experiencing difficulties with explosive movements, agility, and overall athletic performance, which may be attributed to inadequate development of power and balance. This situation motivated this study, which aims to compare the power and balance among basketball and handball players in public secondary schools in Nsukka Local Government Area.

Basketball and handball games are two of the most physically demanding sports. Basketball and Handball games are both a two team sports that are popular in many parts of the world and predominantly played with the hands. Among various sports, basketball and handball are very popular and highly entertaining. Simiret (2014) asserted that team basketball and handball are exciting sports to watch and exhilarating to play. The both (basketball and handball) push athletes to their limits with their exceptionally fast-paced nature. According to Simiret (2014), basketball is the fastest game on court, requiring quick bursts of speed, rapid changes of direction, and explosive jumping ability. Similarly, handball is characterized by

rapid movements, quick passes, and powerful throws, making it a highly demanding sport that requires a unique combination of strength, speed, agility, and endurance (Michalsik et al., 2015). Basketball and handball games are both played between two teams. In basketball, each team comprises of five court players and twelve substitutes (National Federation of State High School Associations [NFHS], 2020), while in handball, each team is made up of seven court players and seven players' substitutes (International Handball Federation [IHF], 2020). These team sports require a high level of physical fitness, coordination, and strategy to outmaneuver the opposing team.

Physical fitness is essential for human existence and effectiveness. It is a vital component of overall health, derived from regular physical activity. Engaging in physical activity has numerous benefits, including improved health, social, cognitive, and economic outcomes, which contribute to achieving sustainable development goals (Lee, 2012; US Department of Health and Human Services [USDHHS], 2018). In the sports context, physical fitness is categorized into various profiles, including muscle endurance, strength, flexibility, balance, speed, agility, cardiovascular endurance, power, and balance. Basketball players, for instance, demonstrate superior power and balance, which are essential components of physical fitness. Notably, basketball players exemplify superior power and balance, which are critical components of physical fitness (American Council on Exercise, 2018; Simenz & Lutsch, 2017). Studies have proved that power and balance are essential in team sports. Specifically, balance is crucial in sports such as soccer, basketball, and tennis, where quick changes of direction and rapid movements are necessary (Federation International de Football Association [FIFA], 2020; Federation International de basketball Association [FIBA], 2020; International Tennis Federation [ITF], 2020).

Ordinarily, power is being strong but does not always translate to being powerful. Power, in particular, is essential for explosive movements, such as jumping and sprinting, while balance enables players to maintain control and stability during quick changes of direction. Lower body can do a heavy squat slowly, but it cannot necessarily generate the power to do the same lift with speed (Okwulu, 2020). According to the National Academy of Sports Medicine (NASM, 2022), Basketball players demonstrate an acceptable threshold of power and balance, characterized by their ability to generate rapid, powerful movements while maintaining control and agility. This exceptional power and balance are attributable to their rigorous training regimens, which emphasize strength, conditioning, and agility exercises (National Strength and Conditioning Association [NSCA], 2020).

Power requires a well-structured training programme that incorporates resistance exercises, plyometric and explosive training, and progressive overload (Cronin et al., 2024). This can include exercises, such as weightlifting, jump squats, box jumps, and burpees, which target multiple muscle groups simultaneously and challenge the neuromuscular system to generate force quickly. Also, balanced diet and adequate rest and recovery support power development. In the other hand, a combination of exercises that challenge the body's stability and proprioception are the basic requirement for balance development. Therefore, to improve balance, single-leg squats, balance boards, and heel-to-toe walking, among others, are usually incorporated into training programme (Granacher, 2024). These exercises target the muscles of the ankle, hip, and core, which are essential for maintaining balance. Additionally, incorporating plyometric exercises, such as single-leg hops and lateral bounds, can enhance balance by challenging the body's ability to rapidly change direction. However, these exercises are mostly essential for the execution of basic skills in basketball and handball games respectively.

Power is classified into two following their arears of exertion. Power exerted on the upper regions of the body is called the arm power and on the lower region is leg power. Leg power according to Coskun and Sahin (2014), is important to increase safety during certain

functional tasks in trail populations (e.g., climbing stairs or stabilizing the body after losing balance). Hence, increasing the ability to produce lower (leg power) or higher (arm power) external resistances in the lower limbs is a key factor in everyday task performance. According to Kuldeep (2017), leg power is the ability to exert maximum muscular contraction instantly in an explosive burst of movements. Contextually, power is the ability to generate a great amount of force by the players targeted to deliver a shot during playing a game of basketball and handball with the help of accuracy and balance.

In common parlance, balance means maintaining a spatial orientation. It is a component of physical fitness means gaining an uninterrupted stand or fitness. In sports, balance refers to the ability of an athlete to maintain control and stability of their body position during movement or while stationary (Granacher et al., 2020). It involves the integration of various physiological and biomechanical components, including; proprioception, vestibular system, flexibility, and mobility, muscular strength and endurance and neuromuscular coordination. Balance is essential in various sports, including basketball and handball. According to Granacher et al. (2020), balance training can improve athletic performance and reduce the risk of injury. Suffice it to stating the obvious that balance exercises should be incorporated into training programmes of handball and basketball games to enhance overall player's ability for effective participation. However, players can improve their power and balance through various training methods, including; balance exercises such as the single-leg squats, and balance boards, (Willardson, 2020), plyometric training such as jumping, hopping, and bounding exercises (American Council on Exercise, 2020), agility drills, such as shuttle runs, cone drills, (National Academy of Sports Medicine [NASM], 2020), core strengthening exercises targeting the abdominals, obliques, and lower back muscles (American College of Sports Medicine, 2020), flexibility and mobility exercises such as stretching and mobility exercises to improve range of motion and reduce injury risk (Simic et al., 2019). Balance is a crucial component of fitness, complementing strength, endurance, and flexibility (Asogwa, 2023).

Balance component can further be broken down into two; static balance, and dynamic balance. According to Paillard and Noé (2020), static balance, involves maintaining equilibrium while stationary or dynamic balance involves maintaining control while moving. However, both components are very important in sports, such as handball, basketball and other sports requiring extreme control, more especially when the heart, lungs and muscles are working together to keep the players active during games. In this study, balance is the ability of the player to maintain stability or control his/her body's position during basketball or handball game in order to effectively utilize other components of physical fitness such as power.

By studying the physical fitness profiles of basketball and handball players, we can gain insights into the optimal thresholds for leg power and balance, informing training programmes and promoting overall physical fitness (Hoffman, 2019). Meanwhile, in comparing basketball and handball games, they are two fast-paced, team-based sports that share similarities in required skills, despite differences in court dimensions and rules (NFHS, 2022). Both games are played between two teams, with basketball teams consisting of five court players and twelve substitutes, handball teams comprise seven court players and seven substitutes (IHF, 2022). Additionally, American Council on Exercise. (2018) noted that handball courts are slightly larger than basketball courts, and the ball used in handball is smaller than a soccer ball, however, the fundamental skills required for both sports are similar. These skills include speed, agility, power, and balance, which are essential for optimal performance in both games (NASM, 2022).

Therefore, given the similarities in required skills for both basketball and handball, this study aims to investigate and compare the development of power and balance in basketball and

handball among student players in public secondary schools in Nsukka Local Government Area.

Secondary school students in Nigeria should have access to adequate sports facilities, opportunities for regular physical activity, and a lifestyle that promotes physical fitness and overall well-being. Unfortunately, most Nigerian secondary schools lack sports facilities, including playgrounds, courts, and fields, and even when available, they are often inadequate. Furthermore, the economic status of most average families, added to urbanization has led to a decrease in domestic chores involving physical exercise. Worse still is that insecurity and transportation patterns have eliminated trekking to school, rather patronizing motorcycles (okada), tricycles (keke) and taxis as a viable option.

Worst the rapid urbanization of Nigerian cities has led to increased elimination, force-claiming and substitution of recreation grounds, while insecurity concerns have reduced opportunities for outdoor physical activity. As a result, many secondary school students in Nigeria lead sedentary lifestyles, engaging in minimal physical activity and spending excessive time on screens. This sedentary lifestyle poses a significant threat to the physical fitness and health of secondary school students, increasing their risk of developing non-communicable diseases.

This gap is characterized by inadequate sports facilities in schools, limited opportunities for physical activity, increased risk of non-communicable diseases due to sedentary lifestyle, negative impact on physical fitness and overall health of secondary school students. Therefore, there is a critical need for identifying sports that can be adapted to small, affordable spaces, promoting physical fitness and healthy lifestyle among secondary school students. Specifically, this research seeks to investigate the comparative effects of handball and basketball on power and balance development among secondary school students, with the ultimate goal of preventing non-communicable diseases, promoting good health, and fostering stability in team games. However, the objective of this study was to compare leg power and Balance among basketball and handball players in public secondary schools in Nsukka Local Government Area. Specifically, the study determined the: differences in leg power and balance between student basketball and handball players in secondary schools in Nsukka LGA. The study findings would be beneficial to policymakers, school authorities, coaches and sports stakeholders to invest in state-of-the-art sports facilities and equipment to promote physical fitness and health literacy among secondary school students.

Materials and Methods

The study adopted an ex-post-facto research design. The design seeks to establish cause-effect relationships among already existing variables (Nworgu, 2015). The ex-post-facto was considered appropriate for the study because the study sought to compare the existing basketball and handball games on the leg power and balance of secondary schools students' basketball and handball players in Enugu State. For instance, Chinurun (2016) conducted a study using the ex-post-facto design to assess, and compare the physical fitness status of male students in private and public secondary schools in AkwaIbom State, Nigeria. It is based on this fact that the design was deemed suitable for the study, because leg power and balance are part of physical fitness profiles.

Area of the Study

Nsukka is one of the LGAs in Enugu State and headquarters of Enugu North Senatorial District, Enugu State. As at 2006 National Census, Nsukka had a population of 309,633 individuals. The most popular federal university 'University of Nigeria, Nsukka" is domiciled in Nsukka town. This makes it an academic city, attracting both public and private secondary

schools into Nsukka and the surrounding. This large numbers of secondary schools in Nsukka necessitated the quest for carrying out the study in Nsukka LGA.

Population

The population for the study comprises all secondary school students in Nsukka Local Government Area. There are 30 registered public secondary schools in Nsukka Local Government Area with a total population of 15,928 students for the 2024 academic session. These figures were based on available records of students as provided by Post Primary School Management Board (PPSMB) Nsukka (2024) academic section.

Sampling procedures

The simple random sampling and purposive sampling techniques were used for draw te study sample size. Firstly, the simple random sampling technique of balloting without replacement was used to draw six secondary schools in Nsukka LGA. The second stage involved the use of purposive sampling technique to select 206 students with special skills from the drawn secondary schools. The criterion for the selection was based on those students that have been playing the games of basketball and/or handball games in or outside the school.

Instrument for Data Collection

The instrument for data collection was a standardized instrument of the Council of Europe (EUROFIT, 1983) test battery. The EUROFIT test batteries was used to collect data on power and balance, the standing broad jump test was used to measure lower body muscle power and flamingo balance test was used to measure balance. The EUROFIT test batteries are international accepted instrument for this purpose. Both instruments are all international certified sports instruments and are binding to giving accepted result.

The EUROFIT test battery was administered to 12 students from secondary schools in Igboeze-South LGA. Split- half method was used to separate the test into even and odd numbers. The data of the two groups was analyzed which established .746 (74.6%) correlation coefficient of the instrument using Cronbach's Alpha method. A reliability coefficient of 70 and above is considered reliable enough for use (Madan & Kensinger, 2017).

Method of Data Collection

An introductory letter from the Head, Department of Human Kinetics and Health Education, University of Nigeria, Nsukka, to carry out the study was presented to the principals in charge of the schools. Approval was granted before the researcher gained access to the estimated population. Parental informed consent form and students' informed form were used. Approval from their parents was also granted before the researcher gained access to the estimated populations. The EUROFIT Protocols was used in administering the tests. To assess power, the Standing Broad Jump (SBJ) test was administered, where participants' jump distances were measured in centimeters over three trials, with the best attempt recorded. A valid jump required participants to take off and land on both feet, without stepping backward or forward after landing. For balance assessment, the Flamingo test was used, where participants stood on one leg for 30 seconds with their eyes open. Participants had up to three attempts to successfully balance. Failure to meet the criteria, such as touching the ground with the lifted foot or losing balance, resulted in a "fail" outcome. Conversely, a "pass" result indicated good balance and stability. Only the participant's best attempt with the highest score among the three trials is recorded.

Method of Data Analysis

The research questions were answered using standard deviation and mean score. The data obtained was analyzed using Statistical Package for Social Sciences (SPSS) version 21.

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Results

Table 1

Power development of students players of Basketball and Handball games in Public Secondary School in Nsukka Local Government Area (n=99)

Hand ball					Basketball			
Gender	**N**	$\bar{x}$	**S**	**Decision**	**N**	$\bar{x}$	**S**	**Decision**
Males	7	194.1	21.1	**Very high**	4	183.2	30.6	**High**
	6	204.8	16.3	**Very high**	2	226.0	7.0	**Very high**
	1 1	207.8	25.8	**High**	3	212.0	8.1	**High**
	9	206.1	8.6	**Average**	2	192.0	14.1	**Low**
	2	187.5	31.8	**Low**	2	251.0	42.4	**Very high**
Total	**3 5**	**202.9**	**20.0**		**1 3**	**208.2**	**32.0**	
Females	8	187.2	19.5	**Very high**	8	177.0	17.3	**Very low**
	4	180.5	31.8	**Very high**	5	171.4	18.7	**Very low**
	2	195.5	20.5	**Very high**	1 0	194.2	16.5	**Very low**
	2	198.0	53.7	**Very high**	5	194.2	10.8	**Very low**
Total	**1 6**	**187.9**	**25.2**		7	191.1	19.4	**Very low**
Total					**3 5**	**186.4**	**18.5**	

Table 1 shows mean leg power in student players of basketball and handball games in secondary schools in Nsukka Local Government Area. The table reveals that the total mean power of male (208.2 ± 32.0) basketball players was higher than the total mean power of male (202.9 ± 20.0) handball players, while, the total mean power of female (187.9 ± 25.2) handball players was higher than female (186.4 ± 18.5) basketball players.

Table 2

Balance Development in Basketball and Handball Games Players in Secondary Schools in Nsukka Local Government Area (n=99)

Hand ball					Basketball			
Gender	**N**	$\bar{x}$	**S**	**Decision**	**N**	$\bar{x}$	**S**	**Decision**
Males	7	. 1	. 3		4	. 5	. 5	
	6	. 0	. 0		2	. 0	. 0	
	1 1	. 3	. 5		3	. 3	. 5	
	9	. 4	. 5		2	. 0	. 0	
	2	. 5	. 7		2	. 5	. 7	

Total	**35**	**.2**	**.4**	**13**	**.3**	**.4**
Females	8	1.0	1.1	8	.3	.5
	4	.0	.0	5	.6	.8
`	2	.5	.7	10	.4	.9
	2	.0	.0	5	.2	.4
Total	**16**	**.5**	**.9**	7	.1	.3
Total				**35**	**.3**	**.6**

Table 2 shows mean balance in student players of basketball and handball games in secondary schools in Nsukka LGA. The table reveals that total mean balance of male (.2 ± .4) handball players was less than that of male (.3 ± .4) basketball players, while, the total mean balance of female (.3 ± .6) basketball players was less than female (.5 ± .9) handball players in secondary schools in Nsukka LGA. Although, the mean was less among males' handball players than males' basketball players and females' basketball players. This implies that male handball players had better mean balance than male basketball players and female basketball players had better balance than female handball players in secondary schools in Nsukka LGA.

Discussion

The study revealed that male basketball players had higher mean power than male handball players, and this result is consistent with Mishra et al. (2015) reports. This is likely due to the dynamic nature of basketball, which requires jumping and quick movements. In contrast, female handball players had higher mean power than female basketball players, supporting Vishwanatha and Suthakar (2017) reports. The study's findings that male handball players had better mean balance than male basketball players, while female basketball players had better balance than female handball players in secondary schools in Nsukka LGA., suggests that there may be differences in the balance requirements of the two sports. This may be attributed to the effect of training on the players. However, this finding is consistent with recent research that has highlighted the importance of balance in sports reporting that balance training can improve balance performance in youth (Granacher et al., 2022), This is also in consonance with numerous emphasis on the importance of balance in sports, particularly in activities that require quick changes of direction (Hill, 2020). The similar training drills for both handball and basketball may have contributed to the equal balance levels between the two sports. Both sports require quick movements, rapid changes of direction, and explosive jumping, all of which require strong balance and stability (Paillard & Noé, 2020).

Furthermore, on the study's conclusion that balance levels are equal between handball and basketball players in secondary schools in Nsukka LGA., recent research has earlier highlighted the importance of balance training in sports revealing that balance training can improve postural control in athletes and reduce the risk of injury in sports. (Lesinski et al., 2020; Paillard & Noé, 2020).

The study's findings have implications for coaches and trainers who work with handball and basketball players. Specifically, it suggests that balance training should be a key component of training programmes for both sports, as it can improve performance and reduce the risk of injury, highlighting the need for balance training in both sports and provide insights into the similarities and differences in balance requirements between the two sports.

Conclusion

The study was carried out to compare the game that can better contribute to the leg power and balance of secondary school students' basketball and handball players in Nsukka LGA. Male basketball players had higher mean power than male handball players, while, female handball players had higher mean power than female basketball players. Despite different mean scores. Evidence from the study revealed the potential of handball game in development of power and balance components of physical fitness. However, government, non-governmental bodies, individuals and school authorities should try as much as possible to provide in the absence and of adequate land for other sports, provide sports facilities and equipment for handball and basketball games, and employ and motivate physical education teachers to facilitate and develop sports activities to enhance physical fitness profiles (power and balance) for physical fitness development in students of secondary schools in Nsukka LGA. The study highlights the need for improved sports facilities and coaching programmes to enhance the power and balance of handball and basketball players in public secondary schools in Nsukka LGA.

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