ICFBE 2024

The 8th International Conference on Family Business and Entrepreneurship

WRIST WEIGHTS FOR FITNESS OF BADMINTON PLAYERS

Belenda P. Nufable, EdD[1], *Lauro E. Estecomen, EdD[2], Berlouie L. Baga-an[3]

[1,2,3] West Visayas State University-Pototan Campus
Pototan, Iloilo, Philippines
belenda.nufable@wvsu.edu.ph

ABSTRACT

This descriptive-experimental study sought to determine the effectiveness of wrist weights on the thirty (30) purposely chosen respondents from the WVSU Pototan Campus in terms of muscular strength, flexibility, muscular endurance, and power. In addition, the accuracy of shuttle cock landing for both high and low serves across the court was investigated. To ascertain whether there was a significant difference in the participant's level of fitness before and after using wrist weights and the accuracy of shuttle cock landing in cross-court for both high and low serve. Quasai-experemental method was employed, the data were gathered, and analyzed using the mean, standard deviation, frequency, and t-test. High muscular strength, with low flexibility were found in the study, however, muscular endurance and power got very high results. Both high and low serve exhibited very effective accuracy for shuttle cock landings. The level of fitness of the articiants showed significant differences in terms of muscular strength, flexibility, muscular endurance, and power. Similarly, the accuracy of shuttle cock landing for both high and low serve showed a noticeable difference. It was suggested that additional research be done in this direction utilizing different parameters and variables to verify the accuracy of the study's findings.

Keywords: *Sports, Badminton Players, Badminton Training,Wrist Weights*

1. Introduction

Badminton is a racket sport that has been practiced in Asia and Europe for over 2000 years. The ancient sport of battledore and shuttlecock, which involved striking the shuttlecock back and forth, had already gained popularity in India, China, Japan, and Greece. Today, badminton is one of the most popular racquet sports in Malaysia, as well as China, Indonesia, Korea, and Denmark. The game is often played by two opposed players in singles matches or opposite partners in doubles matches. Moreover, badminton is the fastest racquet sport by shuttlecock speed along with tennis and squash, Tan, et al. (2021). The efficacy of training delivery is largely dependent on coaching, but skill development is largely determined by the use of the technique or the development of new equipment. In Zulueta and Sevilla (2012), learning physical skills for ordinary games is acquired as the bones and muscles grow and develop. Yuksel, et al. (2015) cited (Zekan 2007), in badminton as in other sports, many training programs have been developed to improve the fitness parameters of badminton players. Elite and junior badminton players have been reported to improve their endurance and strength by incorporating strength and endurance workouts into their training. Creativity and resourcefulness are critical endeavours in the process of developing elite badminton players. Some coaches used exercise equipment in training centres to help enhance their players' fitness to help mitigate the problem of instructional inadequacies in coaching players to develop arm strength and power. In this study, the use wrist weights during training were applied to see how they

affect the development of arm strength and power of badminton players.

Currently, weights for use in fitness facilities are made to increase strength and power, the players must spend a lot of time, money, and energy traveling to and from regular workouts. Furthermore, the coaches continue to struggle with the shortage and high cost of brand-new or even surplus training equipment, as well as the acquisition of such. Thus, the existing situations motivate the researchers to use locally fabricated wrist weights. The wrist weights were designed as foldable that can simply be opened, closed and used as a bracelet for arm strength by players. It was proven helpful to coaches/trainers in improving the skills of badminton players for it is user-friendly, safe, affordable and readily available. This also helped school administration to minimize the expenses in bringing players to fitness centres for training or buy equipment in developing the strength and powers of the players.

In recent years, the playing style and pace have shifted drastically. Technical advancements have a significant impact in playing badminton today. The effectiveness of technology on muscular strength, muscular endurance, flexibility, and accuracy of service using high and low serve was examined in this study, with a focus on how technology altered the game standard through the use of new materials in equipment construction. The strength demands in badminton is one area that should be given focus. Strength, according to the National Strength and Conditioning Association, can be categorized in several ways: absolute strength refers to the maximum amount of force a muscle or muscle group can develop; strength endurance refers to the ability to perform a high volume of sub-maximal contractions without fatigue; and speed strength, which is better known as power, is a strength expressed at speed (Dale, 2018). The training intervention may attach incremental loads to either the whole body or regional limbs to practice real-competition movements with high-velocity, thus forming motor adaptation. Lin Yu and Mohamad N.I. (2022) stated that the adaptation from task-specific training may increase footwork efficiency and transfer to match situation. Yuksel et al. (2015), conformed that, badminton necessitates jumping, shifting directions, quick arm movement, and a wide range of body positions.

Since badminton players rely primarily on explosive movements, the majority of which are powered by the legs, such as running, lunging, smash jumps, and quick changes of directions. A vertical leap (VL), which has been proven to yield data that is both valid and trustworthy could be used to evaluate the power jump in place of laboratory-based measures (Huang, 2019). Likewise, to assess the good service skills of a badminton player, the wrist weight was cuffed on the racket arm of the subjects during training. Several repetitions of serving were done to get the results. Serving backhand for low serve and forehand for high serve along with the accuracy of the shuttle cock landing were measured.

Furthermore, badminton aficionados in the area where badminton is their sport seek out new ways to enhance their abilities. Due to the shortage of funds, they opted to rely on what is available during training, as well as the fact that they only train when the tournament is approaching. The researchers focused on the total skills development of a player, and all other skills naturally follow if these are developed. Likewise, the researchers evaluated the effectiveness of the Wrist Weight on the respondent's ability to generate a score with a precise shuttle cock landing. The findings of the study served as basis for an extension training activity through a sports clinic to help coaches, trainers, and badminton players in improving their skills in playing the game. Specifically, this study sought to determine the fitness level of the respondents in terms of muscular strength, flexibility, power, and muscular endurance before and after introducing the wrist weights in playing badminton; determine the shuttlecock landing accuracy in cross-court for both high and low serve among the respondents; analyse the significant difference in the level of fitness of the respondents before and after using wrist weights in playing badminton; determine if there is a significant difference in the shuttlecock landing accuracy in cross-court for both high and low serve among the respondents before and after using the wrist weights in playing badminton.

2. Material and Methods

The Wrist Weights in improving the fitness of badminton players was determined through a

quasi-experimental research design, the respondents were purposively identified and selected, and the accuracy of the shuttle cock landing is the determinant of the effectiveness of the intervention made. The quasi-experimental research, David, F. (2017 resembles experimental research. The respondents was done through purposive sampling and certain criteria were set for the selection, Almeida (2016), a set of predefined characteristics known as the inclusion criteria was followed.

2.1 Inclusion Criteria

Students of WVSU-PC in the province of Iloilo, who have participated in any tournament in badminton. Must have undergone Body Mass Idex (BMI) evaluation, and undergone the physical fitness test. Must have filled up and signed the PAR-Q+ (Physical Activity Readiness Questionnaire). At least 18 - 25 years old, with a parent's waiver.

2.2 Exclusion Criteria

Students of WVSU-PC residing outside of Iloilo, Did not participate in any tournament in badminton, and failed to undergo BMI evaluation. Did not undergo a physical fitness test. Did not fill up and sign the PAR-Q. Not within 18-25 years old and have not submitted the parent's waiver.

The respondents of the study were the students of WVSU-PC in the province of Iloilo. The whole population of the study was composed of thirty (30) purposely selected students both males and females. During the implementation, external badminton enthusiasts/experts were invited as observers in the implementation and pilot testing of the wrist and ankle weights application. The project started with brainstorming and was followed by the administering of the pre-test to determine the baseline data of the respondent's level of fitness. In determining the fitness level of the respondents, the following assessments were done. For muscle strength, one-minute sit-ups; for flexibility, sit and reach; for muscular strength, one-minute push-ups, and for leg power, 3 trials of vertical jump. In addition, the accuracy of the shuttle cock landing in serving through forehand for high serve, and backhand for low serve was done. The planned activities were executed by the respondents without weights. After gathering the pre-test data, the intervention was implemented based on the six-week planned schedule of activities with the use of wrist weights. After six weeks of intervention, a post-test was given similar to the assessment done during the pre-test evaluation. A Semi-Structured Questionnaire was utilized as the instrument, divided into two parts. Part One, Participant's Personal Profile, and Part Two, Participants' Rating Sheet.

2.3 Implementation Procedure

Ethical considerations such as voluntary participation and informed consent addressed to the students, and parents/guardians of students were taken into account before implementation. The study followed the ten-points that represent the most important principles related to ethical considerations in research by Bryman and Bell (2015). (1) Research participants should not be subjected to harm in any way whatsoever. (2) Respect for the dignity of research participants should be prioritized. (3) Full consent should be obtained from the participants before the study. (4) The protection of the privacy of research participants has to be ensured. (5) An adequate level of confidentiality of the research data should be ensured. (6) The anonymity of individuals and organizations participating in the research has to be ensured. (7) Any deception or exaggeration about the aims and objectives of the research must be avoided. (8) Affiliations in any form, sources of funding, as well as any possible conflicts of interest, have to be declared. (9) Any type of communication concerning the research should be done with honesty and transparency. (10) Any type of misleading information, as well as representation of primary data findings in a biased way, must be avoided.

As a rule, all training routines of badminton games shall be played under covered and in a predictable environment (e.g. inside a sports center). Safety protocols especially during this pandemic were observed on top of the usual safety protocol practiced by all the players. Before the conduct of

training for leg power, the following should be observed: (1) Stretching exercises can always be used to warm up players. As a result, a few warm-up games will relax the body and ready it for a match. Warming up entails a combination of stretching exercises and mild aerobic operation. To loosen up your muscles, try running on the spot or doing a few jumps and smash shot warm-ups. (2) Anyone who is not directly involved in the game should be kept out of the training area. Outside badminton courts should be free of obstructions and possible hazards. Grit debris, loose stones, dirt, and standing water are all potential hazards. (3) Use legal and secure rackets, shuttlecocks, and accessories for badminton. Beginners are prone to unintentional bumps and racket swing collisions. Also, try to keep your hand grip dry and keep an eye out for any slick sweat puddles on the court. (4) It is important to wear the right footwear for running and indoor sports. It may be the most significant badminton health and safety rule of all. Sufficient shock absorption shoes will help avoid sprains and strains in the ankles and knees.

The fitness components lifted from health-related fitness and skills-related fitness suitable for developing the skills of the respondents were used as the basis of the training design. The instrument underwent face validity testing.

The data gathered was tabulated, analyzed, and interpreted using the Statistical Package for Social Sciences (SPSS). Then subjected to the following statistical treatments: Mean, Standard Deviation, Frequency, and t-test.

3. Results and Discussion

Table 1. The level of fitness of the participants in terms of muscular strength, flexibility, muscular endurance, and power before and after using the wrist weights in playing badminton.

Fitness Component	Very Good		Good		Average		Poor		Very Poor		Mean	SD	Description
	f	%	f	%	f	%	f	%	f	%			
Pre-Strength	0	0	0	0	1	3.3	2	6.7	27	90	1.13	0.43	Very Low
Post-Strength	6	20	15	50	9	30	0	0	0	0	3.9	0.71	High
Pre-Flexibility	0	0	0	0	0	0	26	86.7	4	13.3	1.87	0.35	Low
Post Flexibility	0	0	0	0	3	10	27	90	0	0	2.1	0.31	Low
Pre-Endurance	0	0	2	6.7	2	6.7	20	66.7	6	20	2	0.74	Low
Post-Endurance	12	40	15	50	3	10	0	0	0	0	4.3	0.65	High
Pre-Power	0	0	8	27	8	27	1	3.3	13	43.3	2.37	1.3	Low
Post-Power	17	56.7	6	20	7	23	0	0	0	0	4.33	0.84	High

Scale	Description
4.51 – 5.00	-Very High
3.51 – 4.50	- High
2.51 – 3.50	- Moderate
1.51 – 2.50	- Low
1.00 – 1.50	- Very Low

Table 1 demonstrates that the respondent's level of fitness in terms of muscular strength was very low (M=1.13, SD= 0.43) before using the wrist weights in playing badminton, but the level of muscular

strength was high (M=3.90, SD=0.71) after using the wrist weights. Both the pre-test (M=1.87, SD=0.35) and the post-test (M=2.10, SD=0.31) of the respondents had low levels of flexibility. A low level of pre-muscular endurance (M=2.00, SD=0.74) was followed by a high post level (M=4.30, SD= 0.65). Respondents exhibit low levels of muscular power (M=2.37, SD= 1.30), however, following the intervention, the level of power was high (M= 4.33, SD= 0.84).

This simply shows that the muscular strength of the respondents was not yet develop before the badminton training, however after the training with the use of wrist weights, muscular strength of the respondents developed with significant improvements. The result is supported by Zulueta and Sevilla (2012), that learning physical skills for ordinary games is acquired as the bones and muscles grow and develop. Similar study by Zekan (2007) as cited by Yuksel, et al. (2015), that in badminton as in other sports, many training programs have been developed to improve the fitness parameters of badminton players. Elite and junior badminton players have improved their endurance and strength by incorporating strength and endurance workouts into their training. The training intervention may attach incremental loads to either the whole body or regional limbs to practice real-competition movements with high-velocity, thus forming motor adaptation. Lin Yu and Mohamad (2022) stated that the adaptation from task-specific training may increase footwork efficiency and transfer to match situation.

Table 2. Effectiveness of shuttle cock landing accuracy in cross-court for both high and low serve before and after using wrist weights in playing badminton.

Types of Service	Mean	SD	Description
Pre-High Serve	2.67	0.48	Moderately Effective
Post-High Serve	4.5	0.51	Very Effective
Pre-Low Serve	2.9	0.71	Moderately Effective
Post-Low Serve	4.5	0.51	Very Effective

Scale	Description
4.51 – 5.00	Very Effective
3.51 – 4.50	Effective
2.51 – 3.50	Moderately Effective
1.51 – 2.50	Ineffective
1.00 – 1.50	Very Ineffective

Table 2 shows that during the pre-test, respondents showed a moderately effective score on both high serve (M= 2.67, SD= 0.48) and low serve (M=2.90, SD= 0.71); however, following the usage of wrist weights, a very effective result was seen on a high serve (M= 4.59, SD= 0.51) and low serve (M=4.50, SD= 0.51) respectively.

This can be attributed to the use of wrist weights were muscle power and control were developed. The result was also similar to Dale (2018), where the absolute strength refers to the maximum amount of force a muscle or muscle group can develop; strength endurance refers to the ability to perform a high volume of sub-maximal contractions without fatigue; and speed strength, which is better known as power. Thus, the players improved their skills with accuracy in both high and low serve with the application of weights during the training. The distribution of weight in a racket or paddle can significantly impact the accuracy and effectiveness of a high serve and a low serve. Ultimately, while weight distribution is a relevant factor, it's just one of many factors that can affect the accuracy of serves in racket sports. Additionally, regular practice and technique refinement play a crucial role in improving serve accuracy regardless of the equipment used. According to Ahmad (2014) the intensive exercise group reported improvements in all tests better than distributor exercise group. Then, different training styles appear to lead to worthwhile growths in high and low and serving accuracy test with badminton players.

Table 3. A significant difference in the level of fitness of the respondents in terms of muscular strength, flexibility, muscular endurance, and power before and after using the wrist weights in playing badminton.

As shown in Table 3, there was a significant difference in the respondent's level of fitness before and after using wrist weights while playing badminton in terms of muscular strength t(29) = -22.321, p = 0.000; flexibility: t(29) = -2.971, p =.006; muscular endurance: t(29) = -19.343, p =0.000; and power: t(29) = -14.994, p = 0.000. The results imply that weight training can enhance muscular strength, which can have a positive impact on a badminton player's performance. Increased strength can contribute to more powerful shots, better control of the racket, and improved stability during movements on the court. Strength training with weights can contribute to better overall stability and joint integrity, reducing the risk of injuries in badminton players. Strengthening the muscles around the joints, such as the knees, ankles, and shoulders, can provide better support and protection during dynamic movements and sudden

Fitness Components	t	df	Sig. (2-tailed)	Description
Pre-Strength				
Pair 1	-22.321	29	0	Sig
Post Strength				
Pre-Flexibility				
Pair 2	-2.971	29	0.006	Sig
Post Flexibility				
Pre-Endurance				
Pair 3	-19.343	29	0	Sig
Post Endurance				
Pre-Power				
Pair 4	-14.994	29	0	Sig
Post Power				

changes in direction that occur in badminton. Badminton matches can be physically demanding, requiring sustained effort over an extended period. Weight training, when combined with appropriate conditioning exercises, can improve muscular endurance. This can delay the onset of fatigue and allow players to maintain a high level of performance throughout matches or training sessions. Power is a crucial attribute in badminton, as explosive movements are often required to generate speed and force. Weight training can help develop power by improving muscular force production and increasing the rate at which force can be generated. This can result in more powerful smashes, quicker accelerations, and faster movements on the court. Playing badminton with weights, such as weighted wristbands or ankle weights, adds resistance to movements. This can make the muscles work harder, leading to increased strength and endurance. However, the added resistance can also limit the range of motion, potentially reducing flexibility.

Table 4. A significant difference in the level of shuttle cock landing accuracy in cross-court for both high and low serve before and after using the wrist weights in playing badminton.

Types of Service	t	df	Sig. (2-tailed)	Description
Pre-High Serve				
Pair 1	-21.776	29	0	sig
Post High Serve				
Pre-Low Serve				
Pair 2	-14.102	29	0	sig
Post Low Serve				

P<0.05 significant

The amount of shuttle cock landing accuracy before and after applying the wrist weights while playing badminton is significantly different, as shown in Table 4. The low serve was t(29) = -14.102, p=0.000, and the high serve t(29) = -21.776, p=0.000. Using weights as part of a training program can have implications for the high and low serve in badminton. Weight training can enhance the strength of the muscles involved in the serving motion. This increased strength can provide players with more power to execute both high and low serves. Greater upper body and core strength can contribute to a more explosive and forceful serve, allowing players to generate more speed and accuracy. Weight training can help players develop better body control and coordination, which can translate into improved serve technique. The increased strength and stability gained from weight training can assist players in executing the precise movements required for a successful serve, whether it's a high or low serve.

4. Conclusion

Based on the results of this study, the following was given:

1. The respondents demonstrate a very low level of fitness in terms of muscular strength before using the wrist weights in playing badminton, however, there is a noticeable increase in the level of muscular strength after using the wrist weights. The level of flexibility of the respondents remains low before and after the intervention. As to muscular endurance and power, the respondents had recorded a low level before the intervention, while increased to a high level after the intervention was manifested.

2. The accuracy level of shuttle cock landing in both high serve and low serve of the respondents was moderately effective before using the wrist weights, but a very effective result was seen after the intervention in both high and low serve of the respondents.

3. As to the respondents fitness improvement in terms of muscular strength, flexibility, muscular endurance, and power significantly differ before and after using the wrist weights in playing badminton. The results implied that the application of weights during training enhanced muscular strength, which has a positive impact on a badminton player's performance. Increased strength will contribute to more powerful shots, better control of the racket, and improved stability during playing badminton on the court. Strength enhancement training thru weights contributed to overall stability and joint integrity, reducing the risk of injuries in badminton players. Strengthening the muscles around the joints, such as the knees, ankles, and shoulders, has provided better support and protection during dynamic movements and sudden changes in direction in playing badminton. Enhancement training using weights combined with appropriate conditioning exercises done before the training improves muscular endurance. This can delay the onset of fatigue and allow players to maintain a high level of performance throughout the tournament matches. Physical power is a crucial attribute in playing badminton, as explosive movements are often required to generate speed and force. Introducing wrist weights during training helps develop physical power by improving muscular force. This can result in more powerful smashes, quicker accelerations, and faster movements on the court.

4. As to the accuracy level of the shuttle cock landing a significant difference was noted in both high and low service before and after using the wrist weights in playing badminton.

This can be implied that the wrist weights greatly affect the performance of the badminton players in executing the high and low shuttle cock services. Using wrist weights as part of the badminton training program will surely help for the improvement of the players' competency skills in serving the shuttle cock. Greater upper body and core strength can contribute to a more explosive and forceful serve, allowing players to generate more speed and accuracy. Using wrist weights during badminton training greatly help players develop better body control and coordination, which will be translated into more

improved service techniques. The increased strength and stability gained from weight training can assist players in executing the precise movements required for a successful serve, whether it's a high or low shuttle cock service.

5. Recommendations

Based on the conclusion, the following recommendations were made.

1. To maintain fitness and enhance the flexibility, endurance, and muscular strength of the badminton players the use of wrist weights is vital.
2. To improve the accuracy level of shuttle cock landing by the badminton players in high and low shuttle cock service, the use of wrist weights during training is needed.
3. Badminton Coaches and trainers are encouraged to utilize wrist weights during their training in playing badminton.
4. To increase the physical power of the badminton players in playing badminton, the use of wrist weights during training is essential. This can result in more powerful smashes, quicker accelerations, and faster movements on the court.

References:

Al Haliq, M. (2020). The Effect of a Training Program Using Speed-Specific Strength Exercises on Sensory-Motor Perception in Learning Stroke Forehand Smash in Badminton Material for Students of the Hashemite University. Retrieved from: *file://C:/Users/Acer/Downloads/The_Effect_of_a_Training_Program_Using_S.pdf*

Almeida, A. et al. (2016). Research Fundamentals from Concept to Output. A Guide for Researchers & Thesis Writers. Adriana Publishing Co., Inc.

Badminton Health and Safety Rules. Retrieved: May 10, 2021, from: *https://www.theukrules.co.uk/rules/sport/badminton/safety-rules.html*

Bryman and Bell (2015), Business Research Methods (https://research-methodology .net/research-methodology/ethical-considerations/)

Dale, P. (2018). Strength Training for Badminton. Retrieved March 13 from https://www.sportsrec.com/501960-how-to-improve-quickness-jumping-ability.html

David, F. (2017). Understanding and Doing Research. A Handbook for Beginners. Panorama Printing, INC.

Deshmukh, S. V. (2012). *Review of Literature*. SHODH. http://shodh.inflibnet.ac.in:8080 /jspui/bitstream/123456789/351/3/03_literature%20review.pdf

Frederick, M., et al., (2020). Validity and Reliability of Badminton Reactive Agility Tests System (Brats) to Measure Changes in Direction Speed and Reactive Agility Performance. Retrieved from: https://www.researchgate.net/publication/343255322_ validity _and_Realibility_of_Ba badminton_Reactive_Agility_Tests_System_Brats

Gates, A.I., (1935). Psychology for students of Education. The MacMillan Company.

Genc, H., & Ali, G. (2019). *Examination of the Effect of Badminton Education on Physical and Selected Performance Characteristics*. Research Gate. https://www.researchgate.net/publication/336794785_Examinationof_the_Effect_of_Badminton _Education_on_Physical_and_Selected_Performance_Characteristics

Heping, H., Chatchawan, U., Eungpinichpong, W., Hunsawong, T. (2019) Progressive decrease in leg-power performance during a fatiguing badminton field test. Published online Journal of Physical Therapy Science. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles

Lin Yu and Mohamad N.I. (2022). Development of Badminton-specific Footwork Training from

Traditional Physical Exercise to Novel Intervention Approaches. Retrieved from: https://www.researchgate.net/publication/364718535 Physical Activity and Health.

McCoy, W (2019). What Do Wrist Weights Help You Do? Retrieve on March 13, 2021, from https://www.livestrong.com/article/399894-what-do-wrist-weights-help-you-do/

Newell, L. (2019) Benefits From Ankle Weights. Retrieved March 10, 2021, from https://www.livestrong.com/article/99061-benefits-ankle-weights/

Phomsoupha, M. and Laffaye, G 2015. The Science of Badminton: Game Characteristics, Anthropometry, Physiology, Visual Fitness, and Biomechanics. Retrieved on March 2021 from: https://www.researchgate.net/publication_The_Science_of_Badminton

Tan, et al. (2021), A Review on Badminton Motion Analysis. Retrieved from: https://www.researchgate.net/publication/314667340_A_review_on_badminton_motion_analysis

Yuksel, M., Cengiz, A., Zorba, E., & Gokdemir, K. (2015). *Effects of Badminton Training on Physical Parameters of Players*. Research Gate.

Zulueta and Sevilla, (2012), Principles of Teaching and Teaching Strategies.Navotas Press. Published by National Book Store.