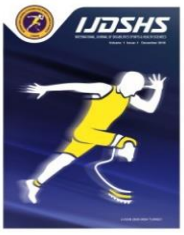

International Journal of
Disabilities Sports and Health Sciences

e-ISSN: 2645-9094

RESEARCH ARTICLE

How Precision, Strength and Flexibility Affect Badminton Skills

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Abstract
The importance of the research lies in developing flexibility exercises (positive and negative) that help improve the level of physical and skill performance, address some weak points, and develop factors that work to implement skills with a wider range of motion, accuracy, and high strength. Performing (dimensions) strokes And the forward projection) by not using the wrist and the correct movement of the striking arm. This makes the player's performance ineffective, which requires her to practice flexibility and movement flow to address this weakness. The study aims to prepare exercises using flexibility (positive and negative) and to know the effect of flexibility exercises on some physical characteristics, accuracy and power of strikes (dimensions and forward projectio)،The researchers experimental method by designing two equal groups and on a sample of (10) female players. As for the field study procedures, flexibility exercises were carried out over a period of (10) weeks and two units per week. The researchers concluded that Flexibility exercises developed some physical characteristics and the accuracy and power of strokes, the data was analyzed using the spss version 26 application. The results showed that (2) concentration has a significant impact on badminton skills ,with asignification mark of Push up test in 15 sec 2.01<0.00, Trunk flexion test from prone position2.07<0.00, Lateral step test (10 seconds1.09<0.00, Overhead defensive clear test2,17<0.00, drop shot test1.99<0.00, were more developed. Researchers recommend emphasizing the use of flexibility exercises, especially for strokes (dimensions and forward projection) and the rest of the badminton skills.

Keywords
Positive And Negative Flexibility Exercises, Dimensions And Projection

INTRODUCTION

Sports have developed significantly in recent years, and this did not come from nothing, but rather came through following modern scientific foundations and methods for scientific research, In game badminton success Achievement is largely determined by playing skills. A player's ability in a match or competition is determined by four factors: physical, technical, tactical, and mental conditions as the developed countries in this field have left no means unturned in order to advance the sporting level and obtain achievement in all individual and team sports games. Badminton is considered one of the very popular individual games in most countries of the world as it requires high physical, skill and motor abilities to participate positively. The findings provide practical implications for the training and development of badminton players, emphasizing the importance of including exercises specifically designed to improve concentration, eye coordination and agility. With a better understanding of these factorsm (Donie et al., 2023).

It has a prominent and effective role in raising the sporting level, especially in this game as it is characterized by the presence of difficult and open-ended skills to perform, so it must be emphasized. These skills require regular practice to develop effective and efficient movements (Halim et al., 2023). Good playing skills are

Received: 12 January 2024 ; **Revised** ; 25 March 2024 ; **Accepted:** 14 April 2024; **Published:** 20 May 2024

How to cite this article: Al-Selmi, A.D.H., Abdul-Hameed, S.H., Hasib, N.R. and Abdul-Salam, Z. (2024). How Precision, Strength and Flexibility Affect Badminton Skills. *Int J Disabil Sports Health Sci*;7(Special Issue 2):184-191. https://doi.org/10.33438/ijdshs.1418997

essential for a successful badminton game (Azhari et al., 2022). ‹ By developing the skill, it is possible to raise the level of the player's performance as it is a distinguished performance. Among the basic skills in the game of badminton are the striking skills (dimensions and forward projection), as these skills are considered among the difficult skills as they are open to performance and the foundation and cornerstone of the game, so they must be developed and mastered by all scientific methods and means , need understood that concentration in study this also give influence to Skills badminton . Statement this also strengthened by study (Halim et al., 2023).

As the development of each skill in any game or sport to some extent comes by raising the level of physical abilities, and one of the important elements that must be emphasized is flexibility, The ability to perform lob strokes correlated with both physical elements, namely arm muscle explosive power and waist flexibility, so badminton coaches can optimize both physical components if they want to improve their athletes' lob-hitting abilities (Khaeroni et al., 2022). Training models using mediabased methods have also proven effective in badminton training. Proven with training models media- based can become possible methods applied in training badminton during the performance of these two skills because it requires swinging in the same direction or opposite direction and rotation in all parts of the body, that help improve the level of physical and skill performance, address some weak points, and develop factors that work to implement skills with a wider range of motion, accuracy, the study of (Al-Selmi et al., 2019) showed that method internal imagery mental exercises can increase backhand serve _ short , results This showing more influence good compared to with external imagery mental ,and high strength, and this is what makes the game of badminton more developed and successful.

The problem of research

Any weakness in physical fitness and motor abilities affects the performance of skills in general, and this is what the researchers noticed while monitoring the technical level of the female players. The researchers found that the performance of the two strikes (the push and the front drop) was not effective, and this prompted the researcher to study the reason for this weakness through swinging the striking arm, whether The strike was in the same or opposite direction, and the range of motion with which he struck the ball was narrow, making his performance inaccurate or weakening its strength, making it easily returned by the opponent. Therefore, the researchers decided to study this problem to contribute to developing appropriate solutions that address the causes of this weakness when implementing what is under study through Establishing positive and negative flexibility exercises can help develop striking skills (dimensions and forward projection) and raise their overall level to reach the best results in this game.

The Research Objective

Preparing exercises (positive and negative flexibility).

Identifying the effect of (positive flexibility) exercises on the accuracy and strength of strokes (dimensions and forward projection) for badminton players.

Identifying the effect of (passive flexibility) exercises on the accuracy and strength of strokes (dimensions and forward projection) for badminton players.

Identifying which exercises have the greatest impact (positive or negative) on some physical characteristics, accuracy and strength of the distance strikes and forward projection of badminton players.

The Research Hypothesis

There are statistically significant differences for positive flexibility exercises between the pre- and post-tests on some physical characteristics, accuracy and strength of strokes (dimensions and forward projection) for female badminton players.

There are statistically significant differences for passive flexibility exercises between the pre- and post-tests on some physical characteristics, accuracy and strength of strokes (dimensions and forward projection) for female badminton players

MATERIALS AND METHODS

The most important thing that distinguishes specific scientific activity is the use of the experimental method (Jawad, 2004) and the nature of the problem concerned with the study obliges the researchers to choose the method, so the researchers used the experimental method and the design of two equal groups to suit the nature of the research and its problem.

This article complied with ethical standards and received approval by the department ethics committee, scientific affairs , university of Baghdad, college of physical education and sport sciences for women under the reference number (SA2-2024-15/1). The participant gave informed consent along with the volunteer form covering study details, risks, benefits, confidentiality, and participant rights. The study prioritized the rights and welfare of the participant in the design, procedures, and confidentiality measures, strictly adhering to the ethical principles of the Declaration of Helsinki.

The research population was chosen intentionally, namely the national badminton team players, who numbered (10) players, with a percentage of (100%). The research sample included all members of the original community, with the same percentage. They were divided into two equal groups by a random method (lottery). The first group used positive flexibility. The second is negative.

Research tools and means of collecting information

Research tools, a legal badminton court with its accessories, 10 rackets, 5 volleyball tubes, a metric tape measure, a rope 20 meters long, a colored measuring tape, means of collecting information, Arab and foreign sources, a form recording grades, testing and measurement..

Tests used

Physical tests

First: Forward support test (bending and extending the arms for 15 seconds) (Fattah,1997)

Second: Testing the trunk bending backwards from prone (Jawad, 2004)

Third: Side step test (10 seconds) (Ali Salloum Jawad, 2004)

Skill tests

First: Test the front dimensions (Shaghati, 2011)

Second: Forehand Drop Test (Shaghati, 2011).

The exploratory experiment: The researchers conducted the exploratory experiment, which is practical training for the researcher to identify the negatives and positives that he encounters while conducting the tests, on January 2, 2023, at ten in the morning, on two players from the same research sample. The aim of it was to identify the time and avoid errors, if any, and the extent of their suitability for the sample members And the understanding of the assistant staff Field study procedures.

Pretest

The pre-test for the accuracy and strength of the blows (dimensions and forward projection) was conducted for the research sample on 1/8/2023 at ten in the morning in the hall of the Al-Athuri Club. All supplies for the test and the assistant work team were prepared. How to perform the test, the number of attempts, the flow of work, and calculating grades and recording them in an evaluation form were presented and explained.

Main procedures

The researchers chose flexibility exercises (positive and negative) (Appendix 1) from the sources and references in order to reach the highest level of flexibility to give the joint and muscle the full range of correct movement and gain strength, speed, and fluidity of the motor path to reach the best performance with accuracy and strength of strikes (dimensions and forward projection). is under study, and was implemented over a period of (10) weeks, at a rate of two units per week, i.e. twenty units for the curriculum as a whole, and with a time of approximately (60) minutes per unit, as the number of repetitions of each exercise is from 3 to 6 repetitions, and the duration of stability in the exercise is from 3 to 60. second . The sample was trained by the trainer and the assistant work team.

Posttest:

The post-test was conducted after the completion of the implementation of the positive and negative flexibility exercises curriculum by the assistant work team on 3/6/5/2023 AD, at ten in the morning, on the same field and under similar conditions for the two groups, and with all special supplies prepared as in the pre-test present, analyze and discuss 3-the results:

Presentation of the results of the pre- and post-test and the percentage of development for the positive flexibility group on the accuracy and strength of strokes (dimensions and forward projection).

Table 1. 10 Week : Some positive and negative flexibility exercises

Week1	Stretch your arms*: Stand up straight, extend your arms out to the sides, and gently reach for the opposite side, holding for 15-30 seconds on each side.
Week2	Neck stretches*: Slowly tilt your head from side to side, bringing your ear toward your shoulder. Hold for a few seconds on each side.
Week3	Shoulder rolls*: Roll your shoulders forward and backward in a circular motion for 30 seconds.
Week4	Leg stretches*: Sit on the floor with your legs straight, then reach for your toes and hold for 15-30 seconds. Repeat a few times.
Week5	Calf stretches*: Stand facing a wall, place one foot behind you, and press the heel into the ground while keeping the back leg straight. Hold for 15-30 seconds and switch legs.
Week6	Back stretches*: Sit on the floor with your legs crossed and gently twist your torso to one side, holding for 15-30 seconds. Repeat on the other side.
Week7	Hip flexor stretch*: Kneel on one knee, while the other leg is bent at a 90-degree angle in front of you. Gently push your hips forward, feeling the stretch in your hip flexors. Hold for 15-30 seconds on each side.
Week8	Child's pose*: Start on your hands and knees, then sit back onto your heels, reaching your arms forward and lowering your forehead to the ground. Hold for 30 seconds.
Week9	Cat-Cow stretch*: Start on your hands and knees, arch your back upward (like a cat), then drop your belly and lift your head (like a cow). Repeat this flow for 30 seconds.
Week10	10-Quad stretch*: Stand on one leg, grab your opposite ankle, and gently pull it toward your gluteus. Hold for 15-30 seconds on each leg..

Table 2. It shows the arithmetic mean, standard deviation, and Wilcoxon values calculated for the pre- and post-tests and for the positive flexibility group

The tests	Measuring unit	**Pretest**		**Posttest**		Wilcoxon value	SIG	Level of significance
		X	SD	X	SD			
Push up test in 15sec	sec	9.8	0.73	13.8	1.20	2.09	0.00	moral
Trunk flexion test from prone position	cm	20	1.21	23.2	1.01	2.01	0.04	moral
Lateral step test 10) seconds	sec	3.7	0.32	4.4	0.44	2.91	0.04	moral
Overhead defensive clear test	degree	25.6	8	30.2	8.7	2.20	0.02	moral
drop shot test	degree	12.31	2.21	18.6	1.02	2.16	2.02	moral

Arithmetic Mean (X), Standard Deviation (SD)

Statistical analysis

The statistical analysis was carried out manually and with SPSS version 14.0 for Window of the statistics programme. The acquired data was statistically evaluated using descriptive statistics like mean, and standard deviation, p value calculation of direction Also, the descriptive statistics was used as, tables. The threshold for statistical significanc.

RESULTS

Table 3. It shows the arithmetic mean, standard deviation, and Wilcoxon values calculated for the pre- and post-tests and for the negative flexibility group

The tests	Measuring unit	**Pretest**		**Posttest**		**P V**alue	SIG	Significance level
		X	SD	X	SD			
Push up test in 15 sec	sec	9.8	0.73	13.8	1.20	2.01	0.03	moral
Trunk flexion test from prone position	cm	20	1.21	23.2	1.01	2.00	0.04	moral
Lateral step test (10 seconds	sec	3.7	0.32	4.4	0.44	2.03	0.04	moral
Overhead defensive clear test	degree	25.6	8	30.2	8.7	2.03	0.04	moral
drop shot test	degree	12.31	2.21	18.6	1.02	2.21	0.02	moral

Arithmetic Mean (X), Standard Deviation (SD)

Table 4. It shows the arithmetic mean, standard deviation, and Mann and Whitney values calculated for the pre- and post-tests and for the positive and negative flexibility group

The tests	Measuring unit	Positive flexibility		**Negative Flexibility**		Calculated **P** value	SIG	Level of significance
		X	SD	X	SD			
Push up test in 15 sec	sec	0.73	17.8	1.20	13.8	2.01	0.00	moral
Trunk flexion test from prone position	cm	1.22	25.15	1.01	23.2	2.07	0.00	moral
Lateral step test (10 seconds	sec	0.33	6.3	0.44	4.4	1.09	0.00	moral
Overhead defensive clear test	degree	2.19	41.7	8.7	30.2	2.17	0.00	moral
drop shot test	degree	1.53	18.6	1.02	18.6	1.99	0.00	moral

Arithmetic Mean (X), Standard Deviation (SD)

DISCUSSION

From Table (2.3), it is clear that there are statistically significant differences in the accuracy and strength of the dimensional and forward strikes between the pre- and post-tests, and in favor of the post-tests in positive and negative flexibility. The researchers attribute the reason for this to the nature of the exercises that were practiced during the training units, which makes it of interest to the national female team players focus on positive and negative flexibility, especially positive flexibility during training, as it is considered to have an effective role in some sports games and events, and the performance of some movements depends on it. It helps with simplicity, flow, and compatibility in motor performance. The widening of the range of motion in the joints of the body also provides the opportunity for the muscles to work in... The appropriate length of the contraction then allows the production of greater force" . Flexibility is often mentioned when we determine physical fitness. Low flexibility in an individual is considered the first influence and sign of a low level of physical fitness (Abu Al-Ala, 1997) confirms, "The tightness of the work on the joints leads to an impediment to the athlete's level of strength, speed, and coordination" Fakher (2011) believes that "flexibility increases the effective range of motion for using force in some sporting activities such as golf and tennis" . The researcher believes that the rate of development in positive flexibility is greater than negative flexibility. This

is the assistance, that is, wrong forced stretching, and this is what was confirmed by Abdullah (2005). The stretching must be done correctly so that it is not painful because pain is an indicator of the presence of something wrong, and do not over-stretch your joints because This will put effort on her ligaments, and the stretching is within your own capabilities and not compared to what others can do.

As for Table (4), it shows that there are significant, statistically significant differences between the post-tests of positive and negative flexibility, which the researchers attribute to the fact that flexibility is not an inherited trait, but rather an acquired characteristic, so it requires continuous, uninterrupted training, and this is what was confirmed by (Jage 1982): "It is advisable for the athlete to continue to practice Flexibility exercises even after obtaining the highest levels because it is an acquired characteristic rather than inherited, and when stopping training for a certain period leads to its loss" (Al-A'aidhi 2011) states, "Flexibility is considered the finest performance of various sports movements" . She indicated (Abeer',2008) "Variable resistances have a positive role in developing some physical and functional variables for badminton players" As a study by Abeer et al., (2019) showed The research results: (using the exercises and some of the dietary supplements have positive effect on improving some of the physical abilities, speed and accuracy of smash shot skill for badminton young players)." . "and a study of (Abeer et al.,2019) confirmed, Recommend the researchers: to circulate the results of the current study on the sports teams participating in the league in badminton."and a study of (Hayder et al.,2021) indicated " Transactional Theories, and Transformational Theories). where these theories considered the most popular and common in the field of leader and will be discussed by this work " The study (Mazen et al.,2021) confirmed, "The study recommended that providing the necessary technological devices and tools for work in colleges of physical education and sports" .

The study of (Mazen et al.2022) indicated The results were shown that the percentage of improvement in the skill performance of Mai Geri is 100% (7:17) "The study (Al-Hijazi, & Dakhil, 2021) indicated (it is necessary that the equipment, tools, and type of exercises be compatible with the requirements of the sample to achieve the desired goal and objective) (31:18)

The study of (Mohsin & Al-Selmi,2 022) indicated the necessity of continuing to engage in aerobic and anaerobic sports activities for women with ovarian syndrome because they have an important role in improving the functioning of functional organs, including regulating the function of building hormones".

The study of (Abeer et al., 2022) indicated that HIIT exercises has a positive effect on some physiological and physical indicators in reducing competition anxiety and it had the role to develop the offense skills for the players of Badminton ".

The study of (Nassir & Dakhil, 2022) emphasized "emphasizing the application of various training programs" . The study of (An'am et al., 2020) recommended "adopting the training curriculum on the flat hierarchical method in developing strength, as well as emphasizing the use of weight exercises in training programs" . Study also express so that you can reach maximum performance in game badminton skills very required , by Because that every athlete or player must own skills base game badminton (Al-Selmi et al., 2019). Where method internal imagery mental exercises can increase backhand serve _ short , results This showing more influence good compared to with external imagery mental (Manurung & Dimyati, 2019). Furthermore exercise strength and flexibility combined with session training skills give enhancement skills badminton, where are the results this also showing more good compared to control (Beniwal & Dhauta, 2023). Proof the strengthen that method planned practice will give good impact against enhancement skills badminton, so matter This can become points important in game .

Conclusion

Positive and negative flexibility exercises contributed to the development of some physical characteristics. Positive and negative flexibility exercises contribute to developing the accuracy and strength of dimensional and forward strikes. Positive flexibility exercises are more effective than negative flexibility exercises in terms of accuracy and strength for the accuracy and strength of dimensional and forward strikes

The recommendations

Emphasizing flexibility to develop sports performance for all individual and team sport Using flexibility exercises in training and

educational units for badminton and other games. Using all types of flexibility in all motor skills in badminton and other games.

Conflict of Interest

We confirm that all tables and figures in this article are ours and written by the researchers themselves.

Ethics Committee

This article complied with ethical standards and received approval by the department ethics committee, scientific affairs , university of Baghdad, college of physical education and sport sciences for women under the reference number (SA2-2024-15/1).

Author Contributions

Study Design, ADHA and SHA; Data Collection, ADHA, SHA, NRH, ZA; Statistical Analysis, ADHA, ZA; Data Interpretation, ADHA, SHA, NRH, ZA; Manuscript Preparation, ADHA, SHA, NRH, ZA; Literature Search, ADHA, SHA, NRH, ZA. All authors have read and agreed to the published version of the manuscript.

Facilitate the Task

This study was supported by Assyrian Sports Club/ Baghdad – Iraq.

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