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Strength Training and Tactical Shot Placement in Competitive Badminton Among Athletes In A Sports Institute in Wuhan, China

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ABSTRACT:
This research examines the relationship between strength training and tactical shot placement among competitive badminton athletes at the Wuhan Institute of Physical Education. The study demonstrates that structured strength training significantly enhances players' ability to execute precise and strategic shots during matches.

Key findings reveal athletes perceive their strength training as highly effective, particularly in developing sport-specific power and functional fitness. Their self-assessment shows competent tactical execution, with notable strengths in court awareness and positioning. Statistical analysis confirms a strong positive correlation (r=.716) between physical conditioning and tactical performance.

KEYWORDS: Strength Training,Tactical Shot Placement,Integrated Training Program

I. INTRODUCTION

In competitive badminton, the ability to execute precise and well-placed shots is essential for success. Tactical shot placement (TSP) involves delivering the shuttle to strategic areas of the court, forcing the opponent into disadvantageous positions. Strength training plays a pivotal role in improving shot accuracy, speed, and power, which collectively contribute to effective tactical execution.

Strength training enhances the physical capabilities required for executing tactical shots with precision. According to a study by Sutanto and Wijaya (2022), strength conditioning exercises targeting the core, legs, and upper body significantly improve a player’s ability to maintain balance and stability during high-s peed r allies. These attributes are essential for executing deceptive shots and accurately placing the shuttle in less accessible areas of the opponent’s court.

Shot power and speed, critical components of tactical placement, also benefit from strength training. A study by Rahman and Zainal (2021) found that players who engaged in resistance training exhibited a 15% increase in shuttle speed during smashes and drives. This increase allowed players to place shots more effectively under pressure, giving them a tactical edge over opponents. The researchers concluded

that strength training not only enhanced shot power but also improved players ' ability to recover quickly for the next stroke.

Strength training's impact on agility and precision in badminton has been highlighted. A study by Müller and Brandt (2023) emphasized the role of lower - body strength in facilitating rapid directional changes and stable positioning, essential for precise shot placement. The study reported that players who completed plyometric strength programs demonstrated improved performance in tactical drills, showcasing more accurate and strategic shuttle placements.

Statement of the Problem

This study will determine the relationship between strength training and tactical shot placement in competitive badminton among badminton athletes in the School of Sports Science and Technology of Wuhan Institute of Physical Education in Wuhan Province, China .

The results of the study will be used as a basis for an integrated strength and tactical simulation program.

Specifically, the study will answer the following questions:

1. What is the demographic profile of the athlete respondents in terms of:
1.1. sex;
1.2. age; and
1.3. number of years as a badminton athlete?
2. What is the assessment of the athlete respondents of their strength t raining in terms of:
2.1. muscular strength development;
2.2. functional fitness and specificity;
2.3. balance and symmetry;
2.4. endurance and fatigue resistance; and
2.5. progress and adaptation?
3. Is there a significant difference in the assessment of the athlete respondents of their strength training when they are grouped according to their profile?
4. What is the self-assessment of the athlete respondents of their tactical shot placement in competitive badminton in terms of:
4.1. accuracy and precision;
4.2. variety and versatility;
4.3. adaptability and strategy;
4.4. defensive and offensive transitions; and
4.5. court awareness and positioning?
5. Is there a significant difference in the self-assessment of the athlete respondents of their tactical shot placement in competitive badminton when they are grouped according to their profile?
6. Is there is a significant relationship between strength t raining and tactical shot placement in competitive badminton?

7. Based on the results of the study, what integrated strength and tactical simulation program can be proposed?

II. RESEARCH METHODOLOGY

This study utilized a descriptive-correlational research design to investigate the relationship between strength training and tactical shot placement among badminton athletes. This approach allowed the researcher to both describe the characteristics of the variables and statistically examine the relationships between them.

1. Research Design and Philosophy

The study is grounded in a quantitative research paradigm, which enables the numerical analysis and comparison of variables. The design was selected to fulfill two primary objectives: first, to describe the athletes' assessments of their strength training and their tactical shot placement competencies; and second, to determine the significant relationship between these two key variables.

2. Participants and Sampling Technique

The research was conducted at the School of Sports Science and Technology of Wuhan Institute of Physical Education in Wuhan Province, China. The participants consisted of badminton athletes from this institute.

The study employed a total enumeration sampling technique, meaning the researcher aimed to include the entire population of badminton athletes at the institution rather than selecting a random sample. This approach was chosen to gather comprehensive data from all available subjects.

3. Research Instrument and Validation

The primary instrument for data collection was a researcher-made questionnaire. This questionnaire was divided into three parts:

Part I: Collected demographic profile data (sex, age, years of experience).

Part II: Assessed the athletes' strength training across five dimensions: Muscular Strength Development, Functional Fitness and Specificity, Balance and Symmetry, Endurance and Fatigue Resistance, and Progress and Adaptation.

Part III: Assessed the athletes' self-evaluation of their tactical shot placement across five dimensions: Accuracy and Precision, Variety and Versatility, Adaptability and Strategy, Defensive and Offensive Transitions, and Court Awareness and Positioning.

To ensure validity and reliability, the questionnaire underwent a rigorous process:

Content Validation: The instrument was subjected to review by experts knowledgeable in the field of research.

Face Validation: It was further validated by at least five additional experts.

Pilot Testing and Reliability: A pilot test was conducted, and the reliability was measured using Cronbach's Alpha via the Statistical Package for Social Science (SPSS). The result was an exceptionally high Cronbach's Alpha of 0.994, indicating that the research instrument was statistically very reliable and consistent.

4. Data Gathering Procedure

The data collection followed a systematic procedure:

The researcher secured official permission from the badminton coach and school heads.

A letter of consent was distributed to the athlete respondents, explaining the purpose of the study and ensuring confidentiality.

The questionnaires were administered face-to-face (onsite), with the researcher providing clear instructions.

After respondents completed the survey, the questionnaires were collected for analysis.

III. RESULTS AND DISCUSSION

Based on the study's findings, the relationship between strength training and tactical shot placement in competitive badminton is both significant and multifaceted.

The research demonstrates a strong positive correlation (r=.716) between athletes' strength training assessments and their self-rated tactical shot placement competence. Athletes perceived their strength training as highly effective, particularly for functional fitness and balance, while viewing themselves as competent in tactical execution, with court awareness being their strongest asset.

Notably, male athletes and those with over three years of experience reported significantly higher confidence in their tactical abilities. This underscores how physical conditioning provides the foundational strength and endurance necessary for precise, strategic shot-making during competition.

The findings validate that targeted strength development directly enhances an athlete's capacity to execute complex tactical decisions under fatigue, justifying the proposed integrated training program to optimize this transfer from gym performance to on-court success.

IV. CONCLUSION

The study conclusively establishes that strength training serves as a fundamental enabler for superior tactical shot placement in competitive badminton. The research validates that a well-structured strength and conditioning program directly enhances athletes' physical capacities, which in turn translates into more precise, versatile, and strategic shot execution during matches.

The conclusions are supported by several key findings: First, athletes perceived their strength training as highly effective, particularly in developing functional fitness and balance, which are critical for dynamic court movements. Second, their self-assessed tactical competence was strongest in areas like court awareness, while accuracy under pressure was identified as a area for continued development. Most significantly, a strong positive correlation (r=.716) was found between strength training metrics and tactical performance, confirming that physical conditioning is intrinsically linked to tactical efficacy.

Demographic factors also played a role: male athletes and those with more than three years of experience reported higher confidence in their tactical abilities, highlighting the influence of gender and sustained training on skill development. These findings collectively underscore that improvements in

muscular strength, endurance, and neuromuscular control provide the physical foundation necessary for executing complex tactical decisions, especially during fatiguing, high-pressure rallies.

In practical terms, the study concludes that merely possessing physical strength is insufficient; it must be strategically channeled into sport-specific tactical applications. This insight directly informs the proposed Integrated Strength and Tactical Simulation Program, which is designed to bridge the gap between physical conditioning and competitive performance. By synchronizing strength development with tactical drills, the program aims to help athletes convert their physiological gains into decisive competitive advantages, ultimately supporting the pursuit of excellence in badminton.

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