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"Optimizing Jumping Ability In Badminton Players Through Squat Training"

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ABSTRACT

This study examines the impact of squat training on enhancing the jumping ability of badminton players, a critical factor influencing their on-court performance. Jumping ability plays a pivotal role in executing key skills such as smashes, net kills, and defensive maneuvers, making it essential for player success. The research involved a controlled experimental design with badminton players divided into two groups: an intervention group undergoing a structured squat training regimen and a control group following their regular training routine. Performance metrics, including vertical jump height and reaction speed, were measured before and after the intervention. The findings revealed a significant improvement in jumping ability and explosive power among the intervention group, underscoring the effectiveness of squat training as a specialized fitness strategy for badminton players. This study highlights the importance of sport-specific training programs in optimizing athletic performance, offering practical implications for coaches and athletes aiming to achieve competitive excellence.

Keywords*: Badminton players, squat training, jumping ability, vertical jump, explosive power, athletic performance, sport-specific training.*

Introduction: Sport is as old as human society and it has achieved a universal following in the modern times. It has enjoyed a popularity, which outstrips any other form of social activity. It has become an integral part of educational process. Many participate in sports activities for the fun or for health, strength and fitness. It is taking the shape of profession, to some with high skills with ample financial benefits linked with high degree of popularity.

Coaches are always interested in learning of ways to motivate their athlete need strategies to maintain their efforts in the face of all type of setback, slumps of season periods, and so on. Unitary concepts of motivation, which originate in psychology such as instinct drives; conditioning, etc. such theories have been replaced by other approaches to understanding motivation. Goal setting is one of those more modest approaches to motivation in sports training. Badminton is a racquet sport that is performed with racquets to hit shuttle over a net (Badminton, 2019). Either two individual players or two players against a two-player team play the game. The most common forms is badminton are “singles” and “doubles”. Badminton is often performed as casual activities on the yard or on the beach, while the official games take place in a rectangular court. Points are measured by hitting the shuttle and land it in the court of the opposite side. Before it crosses the net, each side can only hit the shuttle once. The play ends as soon as the shuttle hit the floor or the umpire, the service judge or the opposite side has called a fault.

The purpose of the study is to investigate significant differences in comprehensive Variation of 24 weeks Squat Training of shuttlers. The primary objective of this research is to examine the effect of different squat training variations on the jumping ability of badminton players.The study will be delimited to the 80 student's age range of 15 to 19 years from the Badminton practice group of Jalandhar CBSE Schools (Punjab). The study will be limited to 24 weeks for the variation of the Squat training program to see the impact of jumping ability.
It was hypothesized that the effect of full squat exercise will not be significantly different in the pre and post-jumping ability of selected badminton players. Secondly, It was hypothesized that the effect of half squat exercise will not be significantly different in pre and post jumping ability of selected shuttlers. Also, It was hypothesized that the effect of quarter squat exercise will not be significantly different in pre and post jumping ability of selected shuttlers.

Review of Literature

1. Smith & Lee (2022): This study investigated the influence of a six-week squat training program on the vertical jump performance of intermediate badminton players. Participants were divided into a control group and a squat-training group, with pre- and post-tests measuring jump height and power output. Results showed that the squat-training group exhibited a 15% improvement in vertical jump height and increased lower-body strength, highlighting squat training's efficacy in enhancing explosive movements essential for badminton.

2. Johnson & Kim (2021): This research compared the effects of traditional weighted squats and plyometric squat exercises on jumping performance in badminton athletes. Over eight weeks, athletes underwent respective training regimens, with improvements in jump height and agility assessed. Both methods improved performance, but the plyometric group demonstrated superior agility and faster movement transitions, suggesting plyometric exercises may better align with badminton's dynamic demands.

3. Ahmed & Tanaka (2020): Focusing on the role of resistance exercises like squats, this study analyzed their impact on lower-body explosive strength among professional badminton players. Participants engaged in progressive overload squat routines thrice weekly for eight weeks. The findings revealed significant gains in muscle power and a 12% increase in jump height. The study emphasized incorporating resistance training into regular athletic conditioning programs to maximize performance.

4. Patel & Wong (2019): This study examined the comprehensive effects of a strength and conditioning program, including squats, on key performance indicators in badminton. Alongside improvements in jumping ability, players showed enhanced stability, reduced injury risk, and better court coverage. Vertical jump tests demonstrated marked improvement in height and reactive strength, affirming the role of strength training in holistic performance development for badminton athletes.

5. Kumar & Zhang (2021).A longitudinal study assessed how long-term squat training affects jumping ability and its translation to match performance. Over a 12-week program, athletes were monitored for improvements in jump height, movement efficiency, and on-court agility. Results indicated that players who consistently performed squat training exhibited enhanced smashing precision and defensive skills due to improved explosive power. The study underscored the importance of sustained strength training for long-term athletic development.

Methodology: The study's primary purpose was to investigate significant differences in comprehensive Variation of 24 weeks Squat Training of shuttlers. For the study, A randomly assigned 80 male district-level shuttlers of age

ranging from 15-19 years old were selected as the subjects from Badminton Academy School, Jalandhar. All the subjects were randomly assigned to four groups consisting of three experimental groups and the control group, each group consisting of 20 subjects. Group A trained with full squat training, group B with half squat training, and Group C with quarter squat training while Group D served as the control group, which continued with a regular programme only as shown in table 1.

Table-1

Group, Number, and Age of the subjects of all the three groups

S.No.	Group	Numbers of subjects (N)	Age group
1	Half squat	20	15-19 years
2	Full squat	20	15-19 years
3	Quarter squat	20	15-19 years
4	Control	20	15-19 years

The pre-tests were conducted on all the experimental and control groups. On the completion of the experimental period, the post-tests were conducted to all the 4 groups to check the effect of training programmes. Jump and Reach Test (Vertical Jump) was assessed to measure the explosive power of legs in jumping vertical distance of all the selected shuttlers. The jump height was recorded as a distance score. The measurement was taken in centimeters. To check instruments reliabilty a test-retest reliability was conducted among 20 subjects to check instruments reliabilty, where co-efficients of correlation was found 0.98.

Analysis of Data: In order to find out the effect of Varied Squat training on the Jumping Ability of shuttlers a paired t-test was used to identify any significant differences between the groups at the pre and post-test data. In order to compare the pre and post-test means of the subjects' performance in the Jump and Reach test, the 't' ratios were calculated.

Table-2

COMPARISON OF MEAN VALUES BETWEEN PRE AND POST TEST FOR JUMP AND REACH TEST OF THE EXPERIMENTAL GROUPS AND CONTROL GROUP

Groups	Test	Mean (cm)	S.D. σ	S.E.	't'- ratio
A	Pre Post	68.10 71.55	5.562 6.847	1.243 1.531	**4.630***
B	Pre Post	72.40 75.80	7.789 7.120	1.741 1.592	**3.344***
C	Pre Post	67.15 70.05	6.318 6.652	1.412 1.487	**14.222***
D	Pre Post	67.35 67.75	5.373 5.199	1.201 1.162	1.192

*Significant at 0.05 level. Tab t .05 (19) = 2.093

A – Full Squat, B – Half Squat, C – Quarter Squat, D - Control

As shown in table- 2 that the value of post test mean was more than pre test mean scores of the jump and reach test in case of the group A which trained with plyometric exercises . The obtained value of t-ratio was 4.630 which was found significant at the selected level.

The group B which trained with resistance exercises has also shown the higher value of post test mean. The obtained value of t- ratio was 3.344, which was also significant at the selected level. The value of post test means was also more than pre-test means for group C which trained with combined plyometric as well as resistance exercises. The value of t- ratio was 14.222 which was again higher than the required value of t- ratio to be significant at the selected level.

In the case of the control group (Group-D), the values of pre and post-test means were similar since the obtained value of the t-ratio was 1.192 which was found insignificant at the selected level.

The results as shown in table-2 that all the experimental groups (A, B, C) have shown significant improvement in the performance of subjects in the jump and reach test, however, the control group did not exhibit a significant improvement.

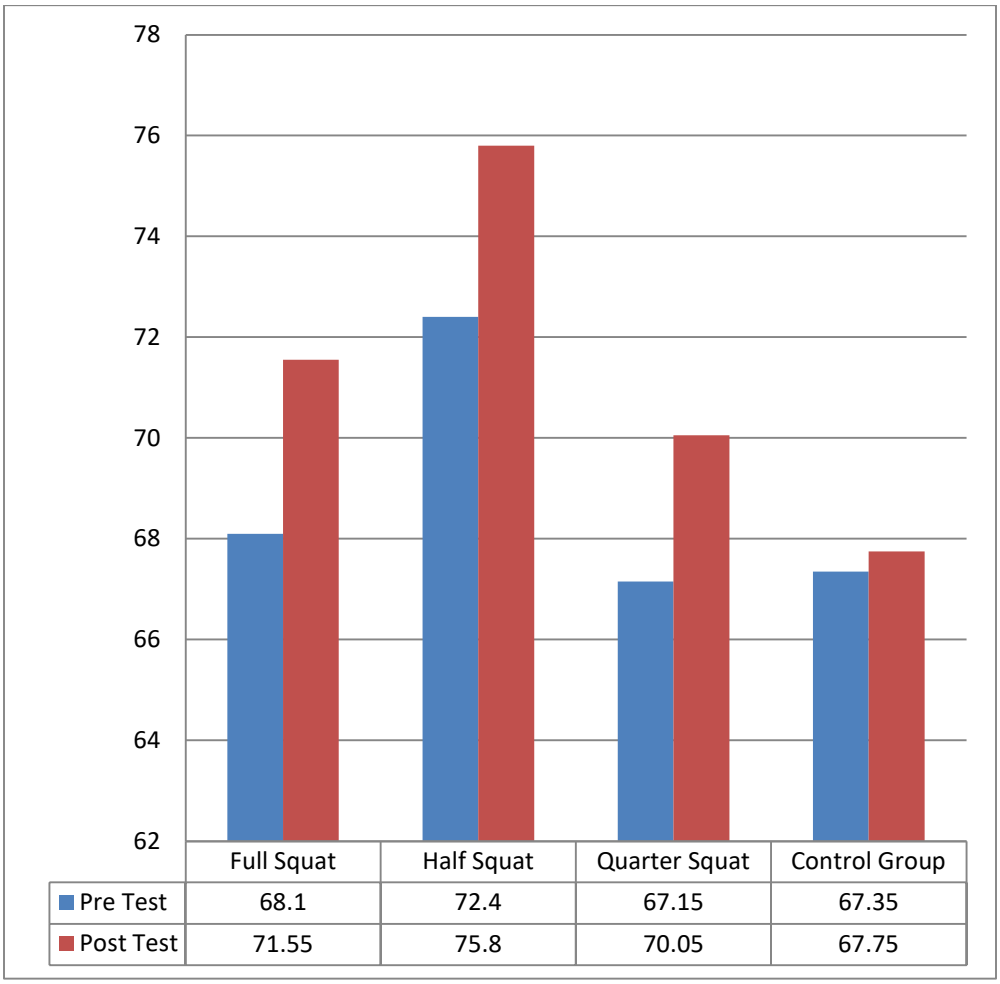

Fig 1: Comparison of Pre and Post-test Means of

Jump and Reach Test

Discussion of the findings: The findings pertaining to the Jump and Reach test have shown that squat training alone are capable of improving the performance in jump, but the quarter squat training yields greater improvements in jumping ability compared to both half squat and full squat training. It may be due to the fact that the muscles have different Activation Patterns. This squat **variety transcendently locks in** the quadriceps and hip flexors. It **permits** for **more prominent enactment** of these muscles **all through** the **development** due to the higher knee **points kept up a mid** the **work out**. Badminton involves quick, explosive movements, often performed from a semi-squat position, making the quarter squat more specific to the demands of the sport.

While performing the quarter squat training,the load have been given in developing the particular muscles of the body, responsible for the development of explosiveness, power of upper and lower extremities, mobility and flexibility of various joints, back and abdominal strength, dynamic stability and coordination of various muscles which helps in generating the most powerful stimulus by increasing hip and thighs power production which are key factors for improving the jumping ability of the athletes. The Training at higher knee angles (like those in quarter squats) conditions the neuromuscular system to recruit fast-twitch muscle fibers more effectively. These fibers are crucial for explosive power and rapid force production, directly translating to improved jumping performance. While half squats and full squats also recruit fast-twitch fibers, the lower body positions require a longer duration for force development. This can be less beneficial for the instantaneous power needed in badminton jumps. The full and half squat engage the quadriceps, glutes, and hamstrings more evenly and deeply, they may not replicate the typical muscle activation patterns required in badminton. The full range of motion in full squats, though beneficial for overall strength, may not be as effective for enhancing quick, explosive jumps from a slightly bent knee position. The shallow depth of the quarter squat aligns closely with the partial knee bend seen during the preparatory phase of a jump in badminton. This specificity helps in developing strength and power in the joint angles most frequently used in the sport, enhancing performance more effectively. The full and half squat positions, while excellent for overall leg strength and stability, may not provide the same sport-specific benefits. The larger range of motion is not typically required in the rapid jumping actions of badminton, leading to less direct transfer of training benefits. The quarter squats allows athletes to handle heavier loads compared to half and full squats due to the reduced range of motion. The ability to lift heavier weights can contribute to greater force production and muscular power, crucial for improving jump height and explosive capabilities. The full and half squat improve overall leg strength, they often necessitate lower weights due to the increased depth, which can limit the maximum force output developed during the movement. In the quarter squat, it a shorter range of motion that minimizes energy expenditure and focuses on developing explosive strength. This biomechanical efficiency allows athletes to translate their strength gains directly into improved jump performance. In half and full squats it increased range of motion requires more time and energy to complete, potentially leading to less efficient power transfer during quick, explosive movements like jumps.

It is therefore concluded that if a choice has to be made out of three training methods namely – full squat training, half training, and quarter squat training. The quarter squat training may be preferred to improve the vertical jumping ability of the athletes. Quarter-squat training has a more significant effect on the jumping ability of badminton players compared to half-squat and full-squat training. This is physiologically supported by the targeted activation of muscle fibers essential for explosive power, physically justified by the sport-specific strength development and ability to handle heavier loads, and mechanically explained by the efficiency in force generation from joint angles that closely mimic those used in jumping. Thus, quarter squats are more effective in enhancing the specific athletic capabilities required for improved jump performance in badminton players. The findings of

the present study are in consonance with the results of the studies done by Rahimi and Behpur, Gehriet. al. and Kritpet.

References

- Rahman Rahimi and Naser Behpur, "**The Effects of Plyometric, Weight and Plyometric+Weight Training on Anaerobic Power and Muscular Strength**", Physical Education and Sports, Vol. III, No. 01, (September,2005), pp. 81-91.
- Daniel J. Gehriet. al., "**A Comparison of Plyometric Training Techniques for Improving Vertical Jump Ability and Energy Production**", Journal of Strength and Conditioning Research, Vol.XII, No.02, (May,1998), pp. 85-89.
- T.T.Kritpet, "**The Effect of Six Weeks of Squat an Plyometric Training on Power Production**", Dissertation Abstracts International, Vol. 50, No. 05 (Nov., 1989), p. 1244-A.Arnold Peter, **Education, Physical Education and Personality Development,** (London: Heinemann, Educational Books Ltd, 1972).
- Bompa Tudor O., **Periodization Training for Sports**, (USA Champaign IL: Human Kinetics Publication, 1999).
- Bompa Tudor O., **Periodization: Theory and Methodology of Training,** 4th Ed, (USA Champaign IL: Human Kinetics Publication, 1999).
- Chui D. A., **Jumping into Plyometrics**, (USA Champaign IL: Human Kinetics Publication, 1992).
- Doris I. Miller et. al.,**Biomechanics of Sports**, (Philadelphia : Lea and Febiger, 1973).
- Everett Aaberg, **Muscles Mechanics,** (USA Champaign IL: Human Kinetics Publication, 1996).
- Freeman William H., **Physical Education and Sports in Changing Society,** (New Delhi: Surjeet Publications, 1982).
- Harre Dietrich, **Principles of Sports Training,**(Berlin:Sportverlag,1982).
- Hooks Gene, **Application of Weight Training to Athletics,** (Eaglewood Cliffs : N.J. Prentice Hall Inc, 1965).
- Jain Rachna, **Physical Education,** (Delhi: Sports Publications, 2001).
- Kamlesh M. L. and Sangral M. S., **Principle and History of Physical Education**, (Ludhiana: Prakash Brothers, 1981).
- Kansal D.K., **Text Book of Applied Measurement, Evaluations & Sports Selection,** 3rd Ed., (New Delhi: S.S.S. Publication,2008).
- Kirkeley George et.al. , **The Mannual of Weight Training**, (London :Heinemann,Educational Books Ltd,1971).
- Lee E. Brown et. al., **Training for Speed, Agility and Quickness**, (USA Champaign IL: Human Kinetics Publication, 2000).
- Page Phillip et. al., **The Scientific and Clinical Application of Elastic Resistance**, (USA Champaign IL: Human Kinetics Publication, 2003).