



## The Role of Squat Training in Boosting Jumping Ability Among Badminton Players

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### ABSTRACT

This study investigates the effects of squat training on improving the jumping ability of badminton players, a crucial element that significantly impacts their performance during matches. Jumping ability is vital for executing essential techniques such as smashes, net shots, and defensive actions, making it a key determinant of player success. The research employed a controlled experimental approach, dividing badminton players into two groups: an experimental group that participated in a structured squat training program and a control group that maintained their standard training routine. Key performance indicators, including vertical jump height and reaction speed, were assessed before and after the training period. The results demonstrated notable enhancements in jumping ability and explosive power within the experimental group, highlighting the efficacy of squat training as a targeted fitness approach for badminton athletes. This research emphasizes the value of sport-specific training programs in maximizing athletic performance, providing actionable insights for coaches and players striving for competitive success.

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

### Introduction

Sports have been an integral part of human society since ancient times and have gained widespread popularity in the modern era, surpassing most other social activities. Today, sports are deeply embedded in the educational system, with many individuals engaging in them for enjoyment, health, strength, and fitness. For some, sports have evolved into a profession, offering significant financial rewards and widespread recognition, particularly for those with exceptional skills. Coaches are constantly seeking effective strategies to motivate their athletes and help them persevere through challenges such as setbacks, slumps, and seasonal fluctuations. Traditional psychological theories of motivation, such as those based on instincts,



drives, and conditioning, have been largely replaced by more nuanced approaches. One such approach is goal setting, which has become a key motivational tool in sports training. Badminton, a racquet sport, involves hitting a shuttlecock over a net using racquets (Badminton, 2019). It can be played as singles (one player per side) or doubles (two players per side). While often played casually in backyards or on beaches, official matches are conducted on a rectangular court. Points are scored by landing the shuttlecock in the opponent's court, with each side allowed only one hit before it crosses the net. The rally ends when the shuttlecock touches the ground or a fault is called by the umpire, service judge, or the opposing side. The purpose of this study is to explore the significant differences resulting from a 24-week comprehensive squat training program among badminton players. The primary objective is to analyze the impact of various squat training variations on the jumping ability of these athletes. The study is confined to 80 students aged 15 to 19 years from the badminton practice groups of CBSE schools in Jalandhar, Punjab. The research will focus on a 24-week squat training program to assess its effects on jumping ability.

The study hypothesizes that:

1. There will be no significant difference in the jumping ability of selected badminton players before and after full squat exercises.
2. There will be no significant difference in the jumping ability of selected players before and after half squat exercises.
3. There will be no significant difference in the jumping ability of selected players before and after quarter squat exercises.

## 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. *Cuest.fisioter.2025.54(4):5062-5072*



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 reliability a test-retest reliability was conducted among 20 subjects to check instruments reliability, 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. $\sigma$	S.E.	't'- ratio
A	Pre	68.10	5.562	1.243	<b>4.630*</b>
	Post	71.55	6.847	1.531	
B	Pre	72.40	7.789	1.741	<b>3.344*</b>
	Post	75.80	7.120	1.592	
C	Pre	67.15	6.318	1.412	<b>14.222*</b>
	Post	70.05	6.652	1.487	
D	Pre	67.35	5.373	1.201	1.192
	Post	67.75	5.199	1.162	

\*Significant at 0.05 level.

Tab t .05 (19) = 2.093

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

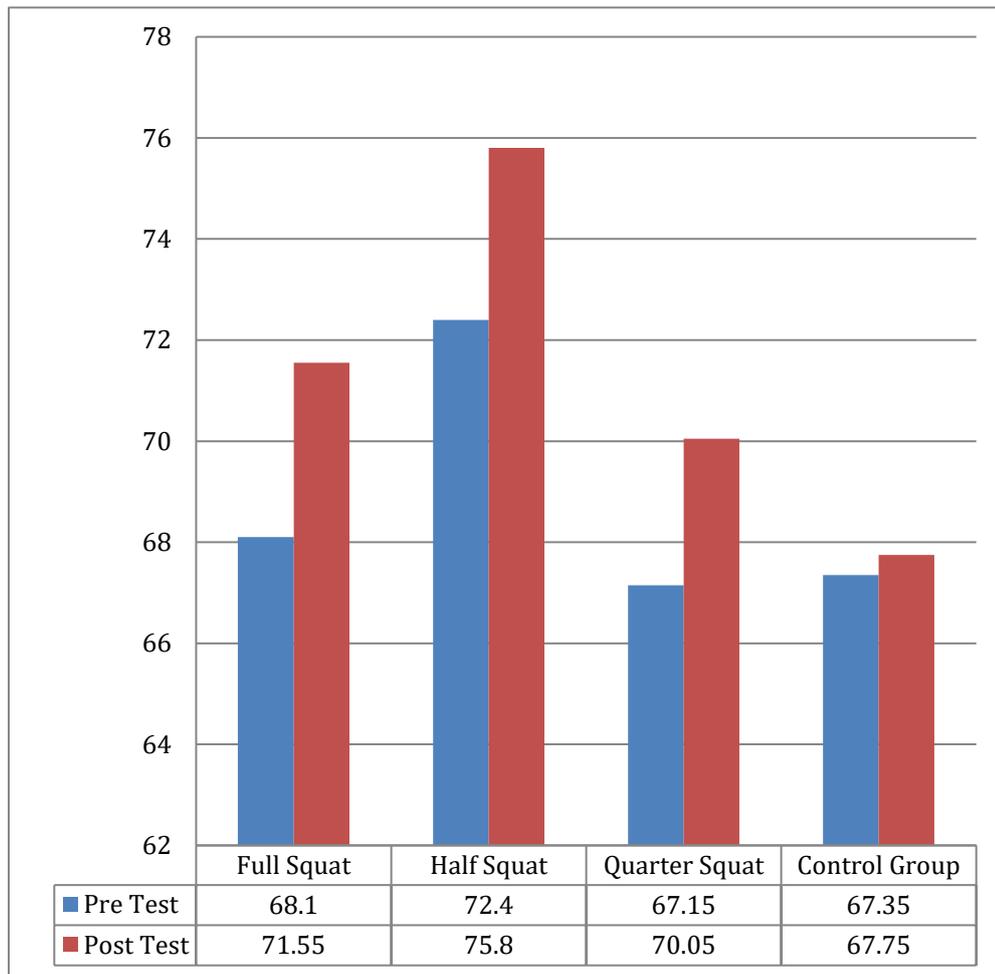
As shown in table- 2 that the value of post test mean was more than pre test mean scores of the jump and reach test in case of the group A which trained with plyometric exercises . The obtained value of t-ratio was 4.630 which was found significant at the selected level.

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 results of the Jump and Reach test indicate that while all forms of squat training can enhance jumping performance, quarter squat training leads to greater improvements in jumping ability compared to half squat and full squat training. This may be attributed to the distinct muscle activation patterns involved. Quarter squats primarily engage the quadriceps and hip flexors, allowing for greater activation of these muscles due to the higher knee angles maintained during the exercise. Since badminton requires quick, explosive movements often initiated from a semi-squat position, quarter squats align more closely with the sport's specific demands. During quarter squat training, the focus is on developing muscles responsible for explosiveness, power in the upper and lower extremities, joint mobility and flexibility, back and abdominal strength, dynamic stability, and coordination. These factors collectively contribute to generating maximum power output, particularly in the hips



and thighs, which are critical for improving jumping ability. Training at higher knee angles, as in quarter squats, conditions the neuromuscular system to recruit fast-twitch muscle fibers more effectively. These fibers are essential for explosive power and rapid force production, directly enhancing jump performance. While half squats and full squats also engage fast-twitch fibers, the deeper body positions require a longer duration for force development, which may be less beneficial for the instantaneous power needed in badminton. Full and half squats engage the quadriceps, glutes, and hamstrings more evenly and deeply, but they may not replicate the muscle activation patterns specific to badminton. Although full squats improve overall strength due to their full range of motion, they may not be as effective for enhancing quick, explosive jumps from a slightly bent knee position. In contrast, the shallow depth of quarter squats closely mimics the partial knee bend seen during the preparatory phase of a jump in badminton, making them more effective for sport-specific strength and power development.

Additionally, quarter squats allow athletes to handle heavier loads compared to half and full squats due to the reduced range of motion. The ability to lift heavier weights contributes to greater force production and muscular power, which are crucial for improving jump height and explosiveness. While full and half squats enhance overall leg strength, they often require lower weights due to the increased depth, potentially limiting maximum force output. From a biomechanical perspective, the shorter range of motion in quarter squats minimizes energy expenditure and focuses on explosive strength development. This efficiency allows athletes to translate strength gains directly into improved jump performance. In contrast, the increased range of motion in half and full squats requires more time and energy, potentially reducing the efficiency of power transfer during quick, explosive movements like jumps.

In conclusion, if a choice must be made among full squat, half squat, and quarter squat training, quarter squat training is the preferred method for improving vertical jumping ability in athletes. Quarter-squat training has a more significant impact on the jumping ability of badminton players compared to half-squat and full-squat training. This is supported physiologically by the targeted activation of fast-twitch muscle fibers, physically by the sport-specific strength development and ability to handle heavier loads, and mechanically by the efficient force generation from joint angles that closely resemble those used in jumping. Thus, quarter squats are more effective in enhancing the specific athletic capabilities required for improved jump



performance in badminton players. These findings align with previous studies conducted by Rahimi and Behpur, Gehri et al., and Kritpet.

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