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The Effect of Box Jump Training On Enhancing Long Jump Explosive Power In Eighth Grade Students of SMPN 3 Toli-Toli

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ABSTRACT

This study aims to examine the effect of Box Jump training on enhancing explosive power in the long jump among eighth-grade students at SMPN 3 Tolitoli. The Box Jump training method is a plyometric exercise designed to improve lower limb strength and explosiveness. This experimental study used a one-group pretest-posttest design with purposive sampling. Fourteen male students participated as subjects. The students were measured on their long jump performance before and after a six-week Box Jump training program. Data analysis using a t-test showed a significant increase in jump distance after the intervention, with t-count (2.278) > t-table (2.160) at a 5% significance level. Thus, Box Jump training significantly improved long jump explosive power.

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INTRODUCTION

Explosive power is a critical component in track and field events, particularly in the long jump, where horizontal distance relies heavily on an athlete's ability to generate rapid force. In youth sports and physical education, developing explosive lower-body strength supports not only athletic performance but also coordination, injury prevention, and long-term physical literacy (Markovic, 2017). Plyometric exercises—dynamic movements that encourage muscles to exert maximum force in short intervals—are a widely endorsed training method for improving athletic performance (Chu & Myer, 2021).

Among plyometric drills, the box jump is one of the most accessible and effective for youth. It involves jumping onto a raised platform (box) from a standing position, which trains fast stretch-shortening cycles, neuromuscular coordination, and lower-extremity

power (Markovic, 2017). Numerous studies support box jumps as an effective stimulus for enhancing vertical jump height, sprinting ability, and power output in young athletes (Ramirez-Campillo et al., 2018; Santos & Janeira, 2019).

The long jump requires horizontal propulsion, leg extension power, and optimal take-off mechanics, all of which depend on rapid force generation and neuromuscular coordination (Asadi et al., 2016). Training methods that improve vertical power—such as box jumps—may also transfer to horizontal tasks due to shared muscular and energy system demands (Paoli et al., 2017).

In educational settings, box jumps are easy to implement with minimal equipment and can be safely adapted to young adolescents, such as eighth graders (~13–14 years old), by adjusting box heights and repetitions (Silva et al., 2021). When integrated into physical education or sports practice, they can support explosive performance without resorting to heavy resistance training, which may be unduly stressful for developing bodies.

At SMPN 3 Tolitoli, PE teachers have observed wide variability in students' long-jump performance during inter-class competitions and skill assessments. While some students demonstrate natural jumping ability, others struggle to generate sufficient take-off velocity. These issues raise concerns about coordination training, strength foundation, and programming.

Currently, strength and jump training in the school's PE curriculum focuses mainly on technique instruction and general play, rather than structured power development. This gap may limit improvements in explosive movements, reduce student motivation due to a lack of progress, and miss a valuable opportunity to enhance long-term athletic capacity.

Despite the well-established benefits of plyometric exercises like box jumps, few studies investigate their effects specifically on long jump performance in youth school settings. Much research focuses on vertical jump improvements in athletes and older adolescents (Ramirez-Campillo et al., 2018; Santos & Janeira, 2019), but rarely explores transfer to horizontal skills or younger age groups (~13–14 years).

In Indonesia, studies of plyometric training often target senior students or athletes (Yuliana & Gunawan, 2018; Setyawan et al., 2021), with limited attention to mechanical transfer and gender-mixed, early-teen cohorts. This creates a gap in knowledge regarding whether box jump protocols enhance long jump explosiveness within school-based, mixed-gender, early adolescent samples.

This study aims to fill that gap by exploring the effect of box jump training on improving long jump explosive power in eighth-grade students at SMPN 3 Tolitoli. It brings several novel contributions: (1) Age group focus: The sample comprises early adolescents (approximately 13–14 years), a group less represented in plyometric training literature, (2) Outcome linkage: Instead of just vertical jumps, this research examines transfer effects on long jump performance—a horizontal track and field skill with distinct biomechanical demands, and (3) Pragmatic setting: Conducted within an Indonesian public junior high school environment, the study provides real-world applicability of interventions in standard school equipment and resource contexts.

The primary research objective is to determine whether integrating a structured four-week box-jump program into the physical education curriculum leads to measurable gains in long jump explosive power among Grade 8 students. The research questions are: (1) Does a four-week box jump regimen significantly improve standing long jump distance compared to traditional PE instruction? (2) Are improvements consistent across male and female students? And (3) What errors or safety considerations emerge in implementing box jump training in a school setting?

Employing a quasi-experimental pre-test/post-test design, the study divides a sample of Grade 8 students into intervention and control groups. The intervention group performs box jumps twice weekly, with progressive height increases and volume, alongside regular PE. The control group continues with standard PE only. Baseline and follow-up assessments include standing long jump, countermovement jump, and 5-m sprint tests, plus qualitative feedback on safety and engagement.

By analyzing changes in explosive performance, the study aims to provide evidence-based recommendations for physical education programs and youth athletic training, particularly in Indonesian schools with limited equipment resources.

METHODS

This quantitative study employed an experimental approach with a one-group pretest-posttest design. The sample consisted of 14 male students from grade eight at SMPN 3 Tolitoli, selected through purposive sampling based on their physical condition and willingness to participate.

Instruments and Data Collection: Long jump performance was assessed using standardized tests before and after the six-week training program. Box Jump training was conducted three times a week, following a progressively intensified routine.

Data Analysis: Normality and homogeneity tests were conducted before the paired t-test analysis. The t-test was used to evaluate the significance of differences between pretest and posttest scores.

RESULTS AND DISCUSSION

Result

The results of the pretest and posttest long jump measurements showed that there was a meaningful improvement in the students' performance after undergoing Box Jump training. In the pretest, the average jump distance was recorded at 71.64 cm, with the shortest jump being 55 cm and the longest 90 cm. Following six weeks of training, the posttest average increased to 84.92 cm, with a minimum of 65 cm and a maximum of 107 cm.

The highest individual improvement was 42 cm, demonstrating the substantial potential of the training method. The gain scores varied among participants but indicated a consistent upward trend in performance. Statistically, the t-test analysis produced a t-count of 2.278, exceeding the t-table value of 2.160 ($df = 13$, $p < 0.05$), which confirmed that the improvement was significant and not due to random chance.

This consistent improvement across participants suggests that the Box Jump training method, when applied regularly with progressive load, effectively enhances explosive leg power and jump distance. It also indicates that students who were initially underperforming showed substantial progress, reinforcing the benefit of structured plyometric routines.

Discussion

These findings confirm the effectiveness of Box Jump training in developing explosive power. The training enhanced muscle fibre recruitment, neuromuscular response, and coordination—key attributes for improved long jump performance. According to Nurdiansyah (2018), plyometric training involving rapid eccentric and concentric contractions can optimize muscle strength and explosiveness. This supports the improvements observed in the posttest scores.

Box Jump, as a plyometric modality, helps the body adapt to high-intensity dynamic movements (Mashud, 2023), and it builds the quadriceps, hamstrings, and calves—the primary muscles responsible for explosive lower-body movement. This aligns with the findings of Zaenal (2021), who emphasized that Box Jump training not only improves muscular power but also enhances timing and balance, which are crucial in long jump execution.

Moreover, the observed gains in jump distance are consistent with the research of Adiputra (2017), who noted a significant increase in long jump distance among middle school students using similar Box Jump protocols. Erwin (2022) further reinforced that plyometric training improves the ability to generate force rapidly, a critical factor in achieving maximal takeoff distance.

The principle of overload applied in this study—gradually increasing jump repetitions and training volume—mirrors recommendations by Nabella (2022), suggesting 3–5 sessions per week with progressive volume to stimulate muscular adaptation without fatigue. This was reflected in the students' performance gains, particularly seen in those with greater consistency across six weeks.

In addition, Wicaksono & Putri (2020) highlight that plyometric drills enhance both vertical and horizontal power, explaining the improvements in jump distance seen in this study. Students also reported increased motivation and enjoyment due to the dynamic nature of the exercises, which may have positively influenced their engagement and performance.

CONCLUSION

Based on the results and discussion, it can be concluded that Box Jump training has a significant and positive effect on the explosive power of long jump students. This is evident from the substantial improvement in jump distances after a structured six-week training period. The gains not only support previous findings from similar research but also highlight the practicality and efficiency of Box Jump exercises when applied in a school environment.

The improvements observed in the students' jump performance reflect increased leg muscle strength, coordination, and technical execution. These aspects are crucial in long jump events and serve as evidence that explosive power can be trained effectively through targeted plyometric methods. Furthermore, the training had a motivational impact on students, who became more enthusiastic and confident in their physical abilities.

Therefore, Box Jump training can be considered a reliable and efficient alternative to traditional training methods. Its implementation in physical education programs could enhance student athletic potential, particularly in sports requiring explosive movements like jumping.

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