INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND ANALYSIS

ISSN(print): 2643-9840, ISSN(online): 2643-9875

Volume 08 Issue 07 July 2025

DOI: 10.47191/ijmra/v8-i07-75, Impact Factor: 8.266

Page No. 4369-4375

A Comparison of the Effects of Plyometric and Strength Training on Jump Performance and Athletic Performance: A Literature Review

Baharuddin Hasan[1], I Putu Eka Wijaya Putra[2], Muhamad Husein[3]

[1,2]Faculty of Sport Science, Cenderawasih State University

[3]Faculty of Sport and Health Center, Yogyakarta State University

ABSTRACT: This study focuses on comparing plyometric training and strength training in improving athletic performance, particularly jump performance and explosive power. Both training methods play a significant role in enhancing physical abilities, yet their relative effectiveness has not been extensively discussed in the literature. The aim of this research is to compare the effects of these two types of training on jump performance and other athletic performance metrics. The methodology used is a systematic review of various relevant studies, collecting data through article searches in Google Scholar and PubMed databases, applying strict inclusion and exclusion criteria. The results show that plyometric training is more effective in increasing explosive strength and jump height, while strength training excels in improving maximal muscle strength. However, the combination of both training methods proved to yield better results, with synergistic effects that enhance both explosive strength and overall physical endurance. In conclusion, combining plyometric and strength training can optimize athletic performance, particularly in sports that require explosive power and endurance, such as basketball and soccer.

KEYWORDS: Plyometric Training, Strength Training, Jump Performance, Athletic Performance, Comparative Effectiveness

I. INTRODUCTION

Physical performance, particularly in sports requiring explosive movements such as jumping, sprinting, and rapid changes of direction, is critical for athletic success [1]. Plyometric training, which leverages the stretch-shortening cycle (SSC) to enhance power output, and strength training, which focuses on increasing muscular force, are two of the most commonly used training methods to improve these physical capabilities [2]. Both training modalities have been shown to offer distinct benefits, yet the comparative effectiveness of plyometric and strength training on jump performance and overall athletic performance remains underexplored, particularly across various sports populations [3]. Understanding which method, or combination of methods, yields superior performance outcomes can help coaches and athletes optimize training strategies.

Plyometric training is designed to enhance the stretch-shortening cycle by combining eccentric and concentric muscle actions [2], [4]. The rapid stretch of the muscle during the eccentric phase stores elastic energy, which is subsequently used to produce powerful concentric contractions, improving explosive strength and jump height [5], [6]. On the other hand, strength training, specifically resistance training, aims to increase muscle force by promoting hypertrophy and neuromuscular adaptations through progressive overload [7]. Both training approaches have demonstrated effectiveness in improving athletic performance, but they target different aspects of muscle function. While plyometric training is particularly beneficial for improving explosive movements and reactive strength, strength training provides a solid foundation of maximum strength, which can further enhance the effects of plyometric exercises [8].

Despite a substantial body of literature examining the individual effects of plyometric and strength training on performance, few studies have directly compared the two modalities in terms of their effects on both jump performance and broader athletic performance metrics [9]. Additionally, much of the existing research has focused on a single sport or population, leaving questions about the generalizability of these findings across different athletic contexts. While certain studies suggest that plyometric training is superior in enhancing explosive power and jump height [9], [10], others indicate that strength training might be more effective in building the foundational muscle strength necessary for optimal performance in various sports [11]. This highlights the need for a comprehensive review that synthesizes the comparative effects of these two training methods across diverse athletic populations.

The rationale for this study stems from the necessity to identify training methods that most effectively enhance athletic performance. Given that plyometric and strength training have different physiological impacts, a comparative review will offer valuable insights into their unique contributions to sports performance. Coaches and practitioners in fields such as athletics, basketball, volleyball, and soccer, among others, could benefit from a deeper understanding of which training method leads to superior outcomes, particularly in jump performance and related athletic tasks. Additionally, understanding how the combination of these training methods may complement each other will be essential for developing integrated training programs that maximize overall performance.

The purpose of this study is to systematically compare the effects of plyometric and strength training on jump performance and athletic performance. Specifically, the study aims to evaluate improvements in variables such as vertical jump height, horizontal jump distance, sprinting speed, and change-of-direction ability. By synthesizing findings from various studies, this literature review will provide a clearer picture of the strengths and limitations of each training modality and explore potential synergistic effects when both methods are integrated into an athlete's training regimen. This comparative analysis will help inform both practical training applications and future research directions in sports science.

This study holds significant value for both academic researchers and practitioners in sports science and coaching. By providing a comparative analysis of plyometric and strength training, it will fill a critical gap in the literature regarding the optimal training methodologies for enhancing both jump and athletic performance. The findings from this study can help refine existing training protocols, provide evidence-based guidelines for athletic preparation, and contribute to the ongoing development of sports training science. Ultimately, the outcomes of this review will assist coaches in making more informed decisions regarding the design and implementation of training programs tailored to the needs of individual athletes and teams.

II. MATERIALS AND METHODS

Search Strategy

In the data collection process, the author accessed articles through Google Scholar and PubMed. The author then collected journal articles published in the last five years, specifically from 2021 to 2025. The author employed the PICO method in article research to obtain new findings [12].

The article search strategy in this study involved using variations of keywords such as ("Plyometric Training," "Strength Training," "Jump Performance," "Athletic Performance," "Comparative Effectiveness"). Article searches were conducted according to the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [13]. PRISMA is a reporting method designed to prevent fundamental errors in systematic reviews and meta-analysis reports [14].

Study Selection

The author collected the required articles and then performed data extraction. The author applied inclusion and exclusion criteria to ensure the data was more specific, and any articles found to be inappropriate were excluded from the extraction process [15]. With these criteria, the following exclusion criteria were applied: (a) Research reports (theses, dissertations, and books); (b) Articles published more than 5 years ago; (c) Studies not focused on plyometric training, strength training, or both in a structured training format; (d) Articles not written in Indonesian; (e) Articles without a DOI. The inclusion criteria used were: (a) Research articles published in the last 5 years (2021-2025); (b) Athletes or individuals involved in sports that require high explosive power, such as basketball, soccer, volleyball, or athletics; (c) Training that includes plyometric exercises, strength training, or both in a structured training format; (d) Articles written in English; (e) Articles with a DOI.

Procedure

In the search process, the author used the Publish or Perish application by selecting databases such as Google Scholar, PubMed, and Scopus. The author found 1,720 articles from Google Scholar and 172 articles from PubMed, resulting in a total of 1,892 articles. These articles were then processed and analyzed through several screening steps based on the inclusion and exclusion criteria.

After applying the criteria, only 8 articles remained. Most articles were excluded because they did not address the effects of plyometric training and strength training on jump performance and overall athletic performance. All selected articles were extracted from their sources and analyzed using Mendeley to remove duplicate articles.

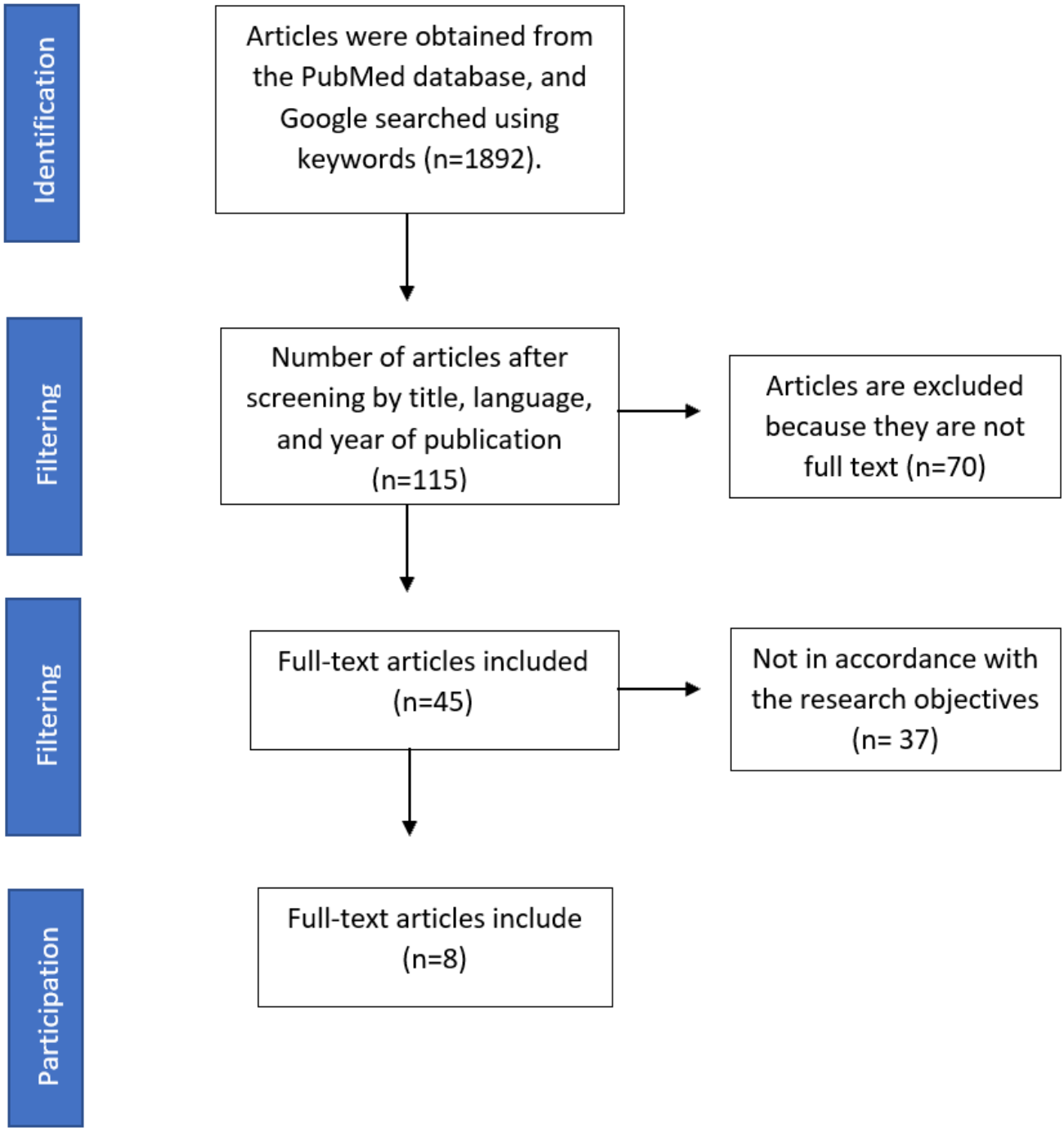

Figure 1. PRISMA research flow diagram

The databases used in the search for this study are Google Scholar and PubMed, a website that provides access to scientific and health-related databases. The search strategy in this research includes variations of keywords such as ("Plyometric Training," "Strength Training," "Jump Performance," "Athletic Performance," "Comparative Effectiveness"). The search process followed the guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [16]. PRISMA is a reporting method designed to avoid fundamental errors in systematic reviews and meta-analysis reports [14].

The data collection technique in this research involves utilizing databases from PubMed and Google Scholar, focusing on articles relevant to the study. The data used is secondary data, as the researcher did not conduct fieldwork. The procedure for searching relevant articles involved using the Google Scholar and PubMed databases. The goal of this research is to compare the effects of plyometric training and strength training on jump performance and overall athletic performance.

The research results should be systematically organized in a table that shows the comprehensive literature evaluation, indicating that 8 articles meet the research criteria.

Table 1: Summary of the article effects of plyometric training and strength training on jump performance

Author Name	Research Design	Sample	Types of Plyometric Exercises	Duration of Training	Intensity and Volume	Research Results
[17]	Randomized Controlled Trial	54 gymnasts (15.4 ± 1.2 years)	Cluster Training, Traditional Training	8 weeks	High intensity, 3 sessions/week	Cluster training more effective than traditional in improving jump performance and reactive strength.
[18]	Randomized Experimental Study	66 male youth basketball players (16.1 ± 0.8 years)	Unilateral, Bilateral, Combined Plyometric Training	8 weeks	2 sessions/week, moderate to high intensity	Unilateral plyometrics most effective in reducing asymmetries and improving performance in basketball.
[19]	Randomized Controlled Trial	56 female participants (21.1 ± 1.7 years)	Assisted, Resisted Plyometric Training	8 weeks	3 sessions/week, moderate to high intensity	Resisted plyometrics more effective than assisted plyometrics for jump height and sprint speed.
[20]	Randomized Controlled Trial	45 resistance-trained men	Plyometric vs. Weightlifting Derivatives	8 weeks	8 weeks of plyometric training with progression	Plyometric training more effective than weightlifting derivatives in improving jump height and sprint performance.
[21]	Randomized Controlled Pilot Study	20 female athletes (active girls)	Plyometric Training (Single-Leg Drop Jump)	4 weeks	2 sessions/week, moderate intensity	Plyometric training improves muscle activity patterns, jump stability, and reduces injury risk.
[22]	Randomized Controlled Trial	30 male soccer players	Plyometric, Sprint Interval Training	6 weeks	2 sessions/week, high intensity	Plyometric training improves anaerobic power, vertical jump, linear speed, and change of direction.
[23]	Single-Blind, Randomized Controlled Pilot Study	17 female soccer players	Plyometric and Eccentric Exercises	6 weeks	3 sessions/week, moderate intensity	Plyometric and eccentric exercises improve stability and functional capacity but not jump height.
[24]	Randomized Controlled Trial	17 female volleyball players	Plyometric Jump Training on Sand or Rigid Surface	8 weeks	8 weeks, varying surface intensity	Surface type impacts jump biomechanics and fitness in volleyball players, with sand surface being most effective for some variables.

III. DISCUSSION

The results of this systematic review indicate that both plyometric training and strength training have a significant impact on improving athletic performance, particularly in jump performance and explosive power. Plyometric training has been shown to be more effective in enhancing explosive strength and jump height, as it involves a stretch-shortening cycle that improves muscle elasticity and reactive strength [17]. On the other hand, strength training excels in building maximal muscle strength, which is crucial for overall athletic performance, especially in activities that require endurance and stable strength [20]. However, several studies suggest that combining both types of training can yield better results, creating a synergistic effect that improves both

explosive strength and overall physical endurance [25]. Variations in the duration, intensity, and frequency of training across different studies indicate that both methods can be applied effectively to significantly improve athletic performance, depending on the specific training objectives [24].

The discussion about these two training methods highlights that both plyometric training and strength training provide unique and complementary contributions to enhancing athletic performance. Plyometric training, which focuses on strengthening explosive power by optimizing the stretch-shortening cycle, is highly beneficial for improving agility, jump height, and explosiveness [17]. On the other hand, strength training, which emphasizes muscle strengthening through progressive loading, provides a solid foundation for maximal muscle strength, which is essential in sports that require endurance and body stability [20]. Existing evidence suggests that when these two methods are combined in an integrated training program, athletes experience significant improvements in both explosive power and endurance, which are crucial in team and individual sports that require diverse physical capabilities [25].

The implications of these findings are highly relevant for coaches, sports practitioners, and athletes focusing on improving athletic performance. Athletes who require both explosive strength and endurance, such as those in basketball, soccer, and volleyball, can benefit from combining these two training methods. Coaches are advised to design training programs that incorporate both plyometric and strength training, considering the intensity and volume tailored to the specific needs of the athletes. This research provides deeper insights into the comparative effects of these two training methods, helping coaches and researchers better understand their impact on overall athletic performance. While each method offers distinct benefits, the findings emphasize the importance of integrating both to achieve the best outcomes in developing explosive power and muscle strength. With this analysis, this study contributes valuable knowledge to the existing literature and opens opportunities for the development of more comprehensive training methodologies in the future.

The limitations of this review include variations in the training protocols used across different studies, such as differences in duration, intensity, and frequency of training, which may affect the comparison between the two methods. Additionally, most studies focused on a limited group of athletes or specific sports, which means the results may not be fully generalizable to all athlete populations. Recommendations for future research include the need for clearer standards in training protocols for both types of training to facilitate more structured and transparent comparisons. Moreover, research involving a broader population of athletes from different sports would help expand the applicability of these findings.

V. CONCLUSIONS

Based on this literature review, it can be concluded that both plyometric training and strength training have a significant contribution to improving athletic performance, particularly in enhancing jump height and explosive power. Plyometric training, which utilizes the stretch-shortening cycle to increase explosive strength, has been proven highly effective in improving vertical jump performance and muscle reactivity. Meanwhile, strength training excels in building maximal muscle strength, which is essential in various types of sports. Although both training methods show positive results individually, this study also demonstrates that combining them can provide a greater synergistic effect, supporting improvements in both explosive power and overall physical endurance. These findings provide evidence that the integration of plyometric and strength training can optimize athletic performance, especially in sports that require explosive power and endurance, such as basketball and soccer. Overall, this study opens new opportunities for designing more integrated training programs by combining both methods to maximize results for athletes at different levels and in various sports. Further research using clear training protocol standards and involving a more diverse population will make an important contribution to developing more effective and efficient evidence-based training guidelines.

ACKNOWLEDGMENT

The author would like to thank everyone involved in this research as they continue to be committed and dedicated to writing this scientific article. Their input and their invaluable time have been crucial to this research.The heading of the

REFERENCES

1) H. Nygaard Falch, H. Guldteig Rædergård, and R. van den Tillaar, “Effect of Different Physical Training Forms on Change of Direction Ability: a Systematic Review and Meta-analysis,” *Sport. Med. - Open*, vol. 5, no. 1, p. 53, Dec. 2019, doi: 10.1186/s40798-019-0223-y.
2) E. Van Roie, S. Walker, S. Van Driessche, T. Delabastita, B. Vanwanseele, and C. Delecluse, “An age-adapted plyometric exercise program improves dynamic strength, jump performance and functional capacity in older men either similarly or

more than traditional resistance training," *PLoS One*, vol. 15, no. 8, p. e0237921, Aug. 2020, doi: 10.1371/journal.pone.0237921.

3) R. Ramirez-Campillo *et al.*, "Effects of Plyometric Jump Training on Measures of Physical Fitness and Sport-Specific Performance of Water Sports Athletes: A Systematic Review with Meta-analysis," *Sport. Med. - Open*, vol. 8, no. 1, p. 108, Dec. 2022, doi: 10.1186/s40798-022-00502-2.
4) A. Fukutani, J. Misaki, and T. Isaka, "Both the elongation of attached crossbridges and residual force enhancement contribute to joint torque enhancement by the stretch-shortening cycle," *R. Soc. Open Sci.*, vol. 4, no. 2, p. 161036, Feb. 2017, doi: 10.1098/rsos.161036.
5) P. C. LaStayo, J. M. Woolf, M. D. Lewek, L. Snyder-Mackler, T. Reich, and S. L. Lindstedt, "Eccentric Muscle Contractions: Their Contribution to Injury, Prevention, Rehabilitation, and Sport," *J. Orthop. Sport. Phys. Ther.*, vol. 33, no. 10, pp. 557–571, Oct. 2003, doi: 10.2519/jospt.2003.33.10.557.
6) M. V. Rosario, G. P. Sutton, S. N. Patek, and G. S. Sawicki, "Muscle–spring dynamics in time-limited, elastic movements," *Proc. R. Soc. B Biol. Sci.*, vol. 283, no. 1838, p. 20161561, Sep. 2016, doi: 10.1098/rspb.2016.1561.
7) P. Lopez *et al.*, "Resistance Training Load Effects on Muscle Hypertrophy and Strength Gain: Systematic Review and Network Meta-analysis," *Med. Sci. Sport. Exerc.*, vol. 53, no. 6, pp. 1206–1216, Jun. 2021, doi: 10.1249/MSS.0000000000002585.
8) M. Ramírez-delaCruz, A. Bravo-Sánchez, P. Esteban-García, F. Jiménez, and J. Abián-Vicén, "Effects of Plyometric Training on Lower Body Muscle Architecture, Tendon Structure, Stiffness and Physical Performance: A Systematic Review and Meta-analysis," *Sport. Med. - Open*, vol. 8, no. 1, p. 40, Dec. 2022, doi: 10.1186/s40798-022-00431-0.
9) A. Sánchez-Sixto, A. Harrison, and P. Floría, "Effects of Plyometric vs. Combined Plyometric Training on Vertical Jump Biomechanics in Female Basketball Players," *J. Hum. Kinet.*, vol. 77, pp. 25–35, Jan. 2021, doi: 10.2478/hukin-2021-0009.
10) M. Strate, N. Stien, A. H. Saeterbakken, and V. Andersen, "The effects of assisted and resisted plyometric training on jump height and sprint performance among physically active females," *Eur. J. Sport Sci.*, vol. 22, no. 10, pp. 1569–1576, Oct. 2022, doi: 10.1080/17461391.2021.1968503.
11) S. Hasan, "Effects of plyometric vs. strength training on strength, sprint, and functional performance in soccer players: a randomized controlled trial," *Sci. Rep.*, vol. 13, no. 1, p. 4256, Mar. 2023, doi: 10.1038/s41598-023-31375-4.
12) R. L. Koretz, "JPEN Journal Club 84. Using PICO," *J. Parenter. Enter. Nutr.*, May 2024, doi: 10.1002/jpen.2639.
13) M. J. Page *et al.*, "The PRISMA 2020 statement: an updated guideline for reporting systematic reviews," *Syst. Rev.*, vol. 10, no. 1, p. 89, Dec. 2021, doi: 10.1186/s13643-021-01626-4.
14) G. Carlo Torres *et al.*, "Adherence to <scp>PRISMA</scp> 2020 reporting guidelines and scope of systematic reviews published in nursing: A cross-sectional analysis," *J. Nurs. Scholarsh.*, vol. 56, no. 4, pp. 531–541, Jul. 2024, doi: 10.1111/jnu.12969.
15) L. Puljak, N. Riva, E. Parmelli, M. González-Lorenzo, L. Moja, and D. Pieper, "Data extraction methods: an analysis of internal reporting discrepancies in single manuscripts and practical advice," *J. Clin. Epidemiol.*, vol. 117, pp. 158–164, Jan. 2020, doi: 10.1016/j.jclinepi.2019.09.003.
16) M. J. Page *et al.*, "The PRISMA 2020 statement: An updated guideline for reporting systematic reviews," *BMJ*, vol. 372, 2021, doi: 10.1136/bmj.n71.
17) D. Feng, W. Yang, and L. Li, "Countermovement jump and reactive strength index of artistic gymnasts improve more with cluster-based plyometric training than with traditional methods," pp. 1–9, 2024.
18) J. Cao, S. Xun, R. Zhang, and Z. Zhang, "Effects of Unilateral , Bilateral and Combined Plyometric Jump Training on Asymmetry of Muscular Strength and Power , and Change-of-Direction in Youth Male Basketball Players," no. December, pp. 754–766, 2024.
19) M. Strate, N. Stien, A. Hole, and V. Andersen, "The e ff ects of assisted and resisted plyometric training on jump height and sprint performance among physically active females," vol. 22, no. 10, pp. 1569–1576, 2022, doi: 10.1080/17461391.2021.1968503.
20) R. Berton, D. David, M. Lopes, M. Pinto, and V. Tricoli, "Weightlifting derivatives vs . plyometric exercises : Effects on unloaded and loaded vertical jumps and sprint performance," pp. 1–18, 2022, doi: 10.1371/journal.pone.0274962.
21) S. Ahmadabadi and H. Rjabi, "Effects of a 4 - week plyometric training on activity patterns during different phases of one - leg drop jump with focus on jump height," *Sci. Rep.*, pp. 1–9, 2023, doi: 10.1038/s41598-023-36461-1.
22) G. Yang, W. Chen, D. Qi, J. Zhang, and Z. Men, "The Effects of a 6-Week Plyometric and Sprint Interval Training Intervention on Soccer Player ' s Physical Performance," no. September, pp. 526–536, 2024.

23) G. Porrati-paladino and R. Cuesta-barriuso, “Effectiveness of Plyometric and Eccentric Exercise for Jumping and Stability in Female Soccer Players — A Single-Blind , Randomized Controlled Pilot Study,” 2021.
24) M. Ahmadi *et al.*, “Effects of Plyometric Jump Training in Sand or Rigid Surface on Jump-Related Biomechanical Variables and Physical Fitness in Female Volleyball Players,” pp. 10–20, 2021.
25) et al M. Subhan Zuhdi., “Anaisis gerak lari sprint 60 meter secara biomekanika,” *Jpenkesrek*, vol. 1, no. 2, pp. 1–3, 2013.

There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0) (https://creativecommons.org/licenses/by-nc/4.0/), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.