Effect plyometric training increase speed and agility on tennis player: Literature Review

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Abstract

Background and purpose. The purpose of this study was to identify plyometric training for increasing speed and agility in tennis players.

Material and Methods. The method used is a literature search. Data is pulled from various platforms such as Google Scholar, Scopus and Pubmed. Search Criteria 1) tennis player 2) plyometric training program 3) comparison of control group or other plyometric training group interventions with single-group trials 4) examiners must demonstrate at least one demonstrated tennis ability or physical condition. I have. 5) Non-randomized pilot studies and studies with randomized controlled designs. Search data that has been done with the keywords "plyometric" AND "training" AND "speed" OR "agility" AND "tennis". Several articles were found from Google Scholar with 487 data articles, Scopus 15 data articles and PubMed 7 data articles. The total number of articles is 507 article data, then changed again according to the discussion and topic to 12 article data. From the data of the 12 articles included in the exclusion there were four articles because these articles were not "open access".

Results. The results show that there are eight studies examining plyometric training for speed and agility in tennis players. In summary, plyometric training can enhance speed and agility factors in tennis athletes.

Conclusion. Therefore that plyometric training method can increase speed and agility in tennis athletes with a low risk of injury and high feasibility.

Keywords: plyometric training, speed, agility, tennis
Анотація
Багус Дві Хендраван, Ахмад Насрулло, Вікторія Шуба. Ефект пліометричного тренування підвищує швидкість і спритність тенісиста: огляд літератури
Мета. Метою цього дослідження було визначення пліометричних тренувань для підвищення швидкості та спритності у тенісистів.
Матеріал і методи. Використовуються результати досліджень, які встановлюють співвідношення між пліометричним тренуванням і показниками швидкості та спритності у тенісистів.
Результати. Результати показують, що пліометричне тренування може підвищити швидкість та спритність у тенісистів.
Висновок. Тому, цей метод може бути рекомендований для тренувань тенісистів.
Ключові слова: пліометричне тренування, швидкість, спритність, теніс

Annotazione
Bagus Dwi Hendrawan, Achmad Nasruullo, Viktoria Shuba. Влияние плиометрической тренировки на увеличение скорости и ловкости теннисиста: обзор литературы
Цель. Целью данного исследования было определить плиометрическую тренировку для увеличения скорости и ловкости у теннисистов.
Материалы и методы. Используемый метод представляет собой поиск литературы. Данные берутся с различных платформ, таких как Google Scholar, Scopus и Pubmed. Критерии поиска 1) теннисист 2) плиометрическая тренировочная программа 3) сравнение контрольной группы или других плиометрических тренировочных групповых вмешательств с одногрупповыми испытаниями 4) экзаменаторы должны продемонстрировать хотя бы одно продемонстрированное умение играть в теннис или физическое состояние. У меня есть. 5) Нерандомизированные пилотные исследования и исследования с рандомизированным контролируемым дизайном. Поиск данных по ключевым словам «плиометрический» И «тренировка» И «скорость» ИЛИ «джилити» И «теннис». Несколько статей были найдены в Google Scholar с 487 статьями данных, 15 статьями данных Scopus и 7 статьями данных PubMed. Общее количество статей составляет 507 данных статьи, затем снова изменяется в соответствии с обсуждением и темой до 12 данных статьи. Из данных 12 статей, включенных в исключение, было четыре статьи, поскольку эти статьи не были в «открытом доступе».
Результаты. Результаты показывают, что существует восемь исследований, изучающих плиометрические тренировки для развития скорости и ловкости у теннисистов. Таким образом, плиометрическая тренировка может повысить показатели скорости и ловкости у теннисистов.
Вывод. Таким образом, этот метод плиометрической тренировки может повысить скорость и ловкость у теннисистов с низким риском травм и высокой выполнимостью.
Ключевые слова: плиометрическая тренировка, скорость, ловкость, теннис
Introduction

The development of the game of tennis has increased and evolved over time. Improving and developing the game of tennis, starting with the most basic and ending with technique. One of these increases is based on the physical state properties of speed, strength, speed, and power. Tennis player's technical ability is the dominant factor [1], the most important thing for a tennis player is physical condition, including speed, agility and power compounded with midddling to high intensity aerobic and anaerobic training [2, 3]. The increase was influenced by training method. An easy-to-learn method that increases strength, and power, agility, and speed with a low risk of injury if use plyometric training method [4].

Plyometric training (PT) is a high-intensity training method that enables the development of extremely high levels of strength by enabling the athlete's musculature to produce high levels of strength in a short amount of time [5]. PT involves the action of the muscular stretch-shortening cycle (SSC), in which power is produced during the concentric phase after energy is conserved and muscle spindles are triggered during the eccentric loading phase [5]. This training method technique has been shown to be highly successful in enhancing jump ability, agility, strength, speed, and balance throughout the training season [6–10].

The creation of an ideal physical therapy program necessitates control settings for the following variables: training volume (sets, reps, and loading), intensity, recovery time between sessions, and repetitions between sets [5–7]. A varied acute training regimen, the stimulation of the body's metabolic cells, and the usage of recovery interval cluster sets during physical therapy sessions [11, 12] to better manage fatigue during training sessions. In contrast to the distribution of sets with simple rest intervals, this group has a high number of sets with shorter rest intervals between reps or between sets, but the training period is the same. Less repetitions per set due to set group configurations might result in more powerful muscles with each repetition [13]. Facts on the ground, compared to simple set configurations, group set configurations allow for greater highest explosive power outputs such as barbell velocity and barbell displacement [12, 14]. As compared to simple sets, this improvement has been linked to the critical role that short breaks between groups play in promoting metabolic recovery, which leads to enhanced kinematics and kinetics in the final repetitions of sets.

Muscular power and strength are thought to be crucial for good sports proceeds, as well as for enforcement daily charge [15, 16]. Many previous studies have focused on developing maximal strength performance because neuromuscular qualities appear to favor most other domains of a person's capabilities. Although there are many different training techniques, weight training [17, 18], Resistance training techniques using explosive and ballistic elements [19], electrostimulation training [19, 20] and vibration training [21] have been utilized successfully for Strong data suggests that PT is useful for boosting ballistic strength and maximum strength in addition to enhancing strength performance [22–26].

PT refers to physical activities intended to improve neuromuscular performance [6]. Exercises used to train the lower body by applying spring training. PT is basic above all-movement sports because it involves jump, leap, and hopping (ie, like a high jump, throwing, or kicking) [27, 28]. Depends on the objectives of the training program, PT are implemented in a variety of workout formats. The most common workouts jump/hop. These exercises can be performed separately or in combination as part of a fitness regimen. Plyometric exercises can be done at different intensities, ranging from low to high. Plyometrics contains a variety of jumping/hopping exercises for the lower body [29–32]. Various types of plyometric exercises are characterized by a SSC action which begins towards very express pulling the brawn, followed by a very express shortening of the brawn [29, 31–34]. Various studies have shown that PT training increases strength, total number of power, and physical exercise performance [35–39]. Moreover, maximal strength growth has been linked to better coordination and the capacity of an individual to swiftly raise muscular tension, according to study on PT [26]. Various studies have also determined [35, 40–45] PT significantly improves maximum while strength compared another drill techniques. Yet, several writers have also shown that employing combination training is preferred to using only a single variety exercise for the best strength increases [22, 23, 28]. Yet it's still unclear what makes a training program more effective at hitting its goals. So, the aim in the study is to evaluate various PT forms utilizing a review of the literature.
Materials and methods

The full series of data gathering procedures for these ones systematic review were applied using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) technique in [46]. SCOPUS, PubMed, and Google Scholar were used in this study’s data search systems from the start of the search until March 28, 2023. The Boolean operations "AND" and "OR" are used to provide a systematic explanation of the topic. Choosing keywords and creating a search strategy.

1. Healthy tennis players of any gender, age, or level of training were required for the systematic literature review.
2. Experiments with tennis players or PT athletes who need to be quick and agile.

Follow the search terms "plyometric" AND "training" AND "speed" OR "agility" AND "tennis" to get study data. There are 487 articles from Google Scholar, 15 articles from Scopus, and 7 papers from PubMed, according to data sources. 509 study papers in total are still removed because they include literature reviews or meta-analyses, correlations, surveys, or cohort studies. Eight study articles cleared the topic of discussion after being trimmed down in accordance with the criteria: (1) Plyometric Two studies employing the experimental study methodology were published on training, speed, agility, and tennis athletes (3) Accessible online or for download are articles. There were 12 papers that underwent filtering, and eight international publications from different journals with Scopus indexing remained. Data details can be seen in fig. 1.

![Fig. 1 Literature Review Search Method](image-url)
Result

The findings of this study are presented in table 1, which also includes the article's title, author, publication year, methodology, journal, conclusions, and findings.

Discussion

This study examines how tennis athletes' speed and agility are affected by PT. The speed possessed by tennis athletes will provide an advantage in preparing themselves more quickly before hitting the ball [55]. The faster the athlete moves, it provides an opportunity to think and determine the next step in making decisions before hitting the ball. Tennis athletes who have good speed are able to position themselves in a stable position in carrying out tennis technique movements. Following the increase in speed performance, due to increased neuromuscular activity coming from the trained muscles, PT may be appropriate [56]. Induction adaptations obtained from plyometric exercises on the lower body, increases in agonist muscle nerve impulses and muscle-tendon stiffness, for example, can improve SSC performance [57]. Stronger propulsive forces arise as the concentric action phase follows the quick movement of the eccentric muscle, boosting the efficiency of the SSC in the lower leg muscles [57, 58]. This is a crucial prerequisite for tennis athletes to improve their sprinting abilities. On a back test, two 12 m sprints, however, PT had no impact, according to one research. [48]. Observations made in research [48] only one leg as an object of observation. In addition, the study [53] concluded that the effect of PT did not have a significant increase in both the 20 m sprint and the 30 m sprint. Footstep frequency and lower limb muscle coordination are strongly associated with this finding [59].

Tennis players basically have to have basic requirements to support the game such as the ability to move quickly by being able to change direction anywhere (sideways, forward and backward) [50]. Some of the literature has been analyzed using meta-analysis [60, 61], what research is relevant to this investigation.

Research conducted by Fernandez-Fernandez [54] found that there was a positive effect given to the pretest and posttest on sprint speed and agility when a PT program was carried out. However, it has a negative effect on the structure of the tennis game which requires endurance which causes a decrease in agility in tennis athletes. The studies that have been identified show that PT is an effective and time-saving method of increasing agility and speed. PT training aids in speed training by reducing ground contact in response to or triggering muscle power output and efficient movement [57, 62]. The training approach through the PT method can increase the eccentric strength of the legs, which gives the athlete the opportunity to better switch movements between deceleration and acceleration [63]. In addition, PT includes vigorous movement in changing directions in all directions by helping to improve the ability to change directions quickly and efficiently [64]. Findings obtained from various studies show that PT can improve aspects of speed and agility in tennis athletes efficiently and save time.

Conclusion

The explanation above shows the conclusion that PT method can increase speed and agility in tennis athletes with a low risk of injury and high feasibility.

Conflict of Interest

The authors hereby declare that they don’t have any financial and personal conflict of interest.

<table>
<thead>
<tr>
<th>No</th>
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<td>There is an increase in lower body plyometric activities employing resistance bands, particularly horizontal and vertical leaps, but there is no discernible impact on young tennis players' speed, agility, acceleration, speed changing directions, and reactive agility.</td>
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<td>2</td>
<td>Konstantinos Salonikidis And Andreas Zafeiridis [48]</td>
<td>2008</td>
<td>Experiment</td>
<td>Journal of Strength and Conditioning Research</td>
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<td>3</td>
<td>Elena Pardos-Mainer, Oscar Ustero-Pérez, Oliver Gonzalo-Skok [49]</td>
<td>2017</td>
<td>Experiment</td>
<td>Revista Internacional de Ciencias del Deporte</td>
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<td>Madan Singh Rathore [50]</td>
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<td>Indian Journal Of Physical Education, Sports Medicine &amp; Exercise Science</td>
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<td>5</td>
<td>Rinkle Hotwani, Bodhisattva Dass, Samiksha Shedge, Aashi Bhatnagar [51]</td>
<td>2021</td>
<td>Experiment</td>
<td>Annals of the Romanian Society for Cell Biology</td>
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<td>Lakshmikanth, Jibi Paul, Bernard Ebenezer, Ramanathan [52]</td>
<td>2018</td>
<td>Experiment</td>
<td>International Journal of Medical and Exercise Science</td>
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<td>7</td>
<td>Jaime Fernandez-Fernandez, David Sanz-Rivas, Mark S. Kovacs, And Manuel Moya [53]</td>
<td>2015</td>
<td>Experiment</td>
<td>Journal of Strength and Conditioning Research</td>
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The result of this study is that PT programmed with Neuromuscular Training has a positive increasing effect on both pretest and posttest measurements (jumping, sprinting, upper body strength and agility changing running direction).

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