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The impact of wearing compression garments on basketball players: a literature review

Dampak penggunaan compression garment pada pemain bola basket: studi literature

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ABSTRACT

In recent years, compression garments have become increasingly popular among basketball players. These garments, from compression socks to special shorts, are now part of the athlete's equipment. This study aims to examine the impact of compression garments on basketball players. This study used the Systematic Literature Review method with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and data collection criteria techniques using PICO. Articles were searched in international databases such as ScienceDirect, Elsevier, Research Gate, Taylor & Francis, and PubMed. The keywords used included "Compression Garment," "Compression," "Basketball," "Exercise," "Fatigue," and "Performance." Nine articles met the criteria for analysis. The study results showed that compression garments have various potential benefits in basketball, such as improving performance, reducing injuries, accelerating recovery, and improving blood circulation. In conclusion, although compression garments have various benefits in basketball, their effectiveness depends on the materials used and the athlete's condition.

Keywords: Compression garment; basketball; performance.

Dalam beberapa tahun terakhir, penggunaan compression garment semakin populer di kalangan pemain bola basket. Pakaian ini, mulai dari kaus kaki kompresi hingga celana pendek khusus, kini menjadi bagian dari perlengkapan atlet. Hal ini menimbulkan pertanyaan apakah penggunaan *compression garment* dapat meningkatkan performa pemain bola basket. Penelitian ini bertujuan untuk mengkaji dampak penggunaan *compression garment* pada pemain bola basket. Penelitian ini menggunakan metode *Systematic Literature Review* dengan pedoman PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*) dan teknik kriteria pengumpulan data menggunakan PICO. Artikel dicari dalam basis data internasional seperti *ScienceDirect*, *Elsevier*, *Research Gate*, *Taylor & Francis*, dan *PubMed*. Kata kunci yang digunakan meliputi "Compression Garment," "Compression," "Basketball," "Exercise," "Fatigue," dan "Performance". sebanyak 9 artikel memenuhi kriteria akan dianalisis. Hasil penelitian menunjukkan bahwa *compression garment* memiliki berbagai manfaat potensial dalam bola basket, seperti meningkatkan performa, mengurangi cedera, mempercepat pemulihan, dan meningkatkan sirkulasi darah. Kesimpulannya, meskipun *compression garment* memiliki berbagai manfaat dalam bola basket, efektivitasnya bergantung pada bahan yang digunakan dan kondisi atlet.

Kata Kunci: Pakaian kompresi; bolabasket; performa.

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INTRODUCTION

Basketball is a high-intensity sport that combines fast, explosive, and dynamic movements quickly (Abadi et al., 2024; Adii dkk., 2023). Many movements in basketball last between six seconds and one minute, varying in intensity depending on the game situation (Kristiono et al., 2024; Wu et al., 2022). A study by Figueira et al. (2021) showed that in a basketball match, a player makes an average of 105 high-intensity runs, each lasting between 2 and 6 seconds, every 21 seconds. These movements, including jumping, running, and changing direction, are essential for scoring points (Biellsa et al., 2023; Gervasi et al., 2024). This requires basketball players to have high levels of strength, endurance, speed, and recovery ability (Candra et al., 2023; Vencúrik et al., 2020).

Due to the high intensity of movement that occurs during matches or training, there is an increase in lactic acid production due to anaerobic activity that is dominant in basketball players (Gholami et al., 2022; Wijaya et al., 2024). This condition can trigger muscle fatigue, especially when the body cannot balance high energy needs with sufficient oxygen supply (Shamim, 2021; Siregar et al., 2023). The accumulation of lactic acid in the muscles can cause soreness and decreased physical performance, thus affecting the player's performance on the field (Amar et al., 2023; Obed Hamza et al., 2022). In addition, the high intensity of movement and sudden changes in direction increases the risk of injury, especially to the knee joints, ankles, and muscles (Bila et al., 2023; Li, 2024). These problems show the importance of a holistic approach in preparing basketball players to cope with the demands of high game performance.

To reduce the impact of lactic acid accumulation, muscle injury, and muscle fatigue. In the world of sports, improving athletes' physical performance and recovery is an aspect that is highly considered because it is one of the determining factors for victory (Driller & Leabeater, 2023; Trecroci et al., 2023). In recent years, the use of Compression Garments in improving athlete performance has increasingly attracted attention in sports (Hong et al., 2022; Islam et al., 2025; Yang et al., 2024).

Previous studies have shown that using compression garments during exercise can improve speed, endurance, and overall functional motor performance (Lee et al., 2023; Williams et al., 2021). Compression Garments have positive effects on reducing muscle injury, proprioception, and recovery after exercise-induced muscle fatigue in individuals who exercise regularly (Hong et al., 2022), the use of compression garments can also provide significant mechanical pressure on certain body surfaces that can play a role in improving blood circulation. This increased blood flow can help in the transport of oxygen to hard-working muscles (Agarwal & Juneja, 2023; Golgouneh & Dunne, 2024),

reduce the accumulation of lactic acid after exercise (Cullen et al., 2021; Rohrer et al., 2022), and prevent injury during exercise (Riedy et al., 2024; Xiong & Tao, 2018).

These effects are due to the ability of compression garments to help maintain stable muscle alignment, stimulate the recruitment of nerve fibers in the muscles, and reduce the propagation of vibrations that can potentially damage the muscles (Serra et al., 2024). Compression garments also support stable muscle alignment (Agarwal & Juneja, 2023), increase sensory input to the skin (Sun et al., 2021), stimulate nerve fibers in the muscles (Yang et al., 2021), and reduce the propagation of vibrations that can damage the muscles (Deng et al., 2021).

Previous studies have shown that compression garments improve athlete performance, including improving blood circulation, reducing muscle fatigue, and accelerating recovery after training or a match. However, most of these findings are still general and have not specifically evaluated the impact of using compression garments in the context of certain sports, including basketball. Basketball has unique game characteristics, such as demands on reaction speed, explosive jumps, and high physical endurance, so a more focused intervention approach for the biomechanical needs of the sport is needed.

Based on this, this study aims to more specifically examine the effectiveness of using compression garments on aspects of functional performance of basketball players, especially in terms of reducing muscle fatigue, improving performance, and muscle injuries. The purpose of writing this literature review is to summarize the findings of previous studies descriptively and to conduct a systematic search of the literature that discusses the effectiveness of compression garments in supporting the improvement of basketball athlete performance.

METHOD

This study uses a literature study method to explore and analyze information from various previous studies. The data used in this review article comes from secondary data relevant to the research topic and obtained from the most recent publications, namely within the last 10 years. The selection of sources is carried out by considering the relevance and recency of the information to suit the focus of the research being reviewed.

Search Strategy The databases used in the search in this study are ScienceDirect, Elsevier, Research Gate, Taylor & Francis, and PubMed, which are known as websites that provide access to scientific and health databases. The strategy for searching articles in this study includes variations of keywords such as "Compression Garment," "Compression," "Basketball," "Exercise," "Fatigue," AND "Performance." The search in this study follows the guidelines outlined in

the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2021). PRISMA is a reporting method to avoid fundamental errors in systematic reviews and meta-analysis reports (Haddaway et al., 2022). Article selection follows the PRISMA stages: (1) defining topics and criteria, (2) determining information sources, (3) selecting relevant literature, (4) collecting articles, and (5) analyzing articles.

Selection Criteria

This study selected questions, keywords, and search strategies using the PICO format (population, intervention, comparison, and outcomes). The analysis was done by dividing the research results into groups, as shown in the table below. The journal search method used the PICO format to find questions and keywords. The analysis was carried out by grouping the research results. The goal is to collect information on how using compression garments improves the performance of basketball athletes.

Table 1. Article search keywords

PICO	Explanation
Population	"Basketball"/ "female/male basketball player"
Intervention	"Compression garment"
Comparison	-
Outcome	"Exercise"/" Fatigue"/" Performance"
Explanation:	
P	= Population/Patient
I	= Intervention
C	= Comparison
O	= Outcome

Procedure

Procedure Initially, 510 publications were identified by searching the ScienceDirect, Elsevier, Research Gate, Taylor & Francis, and PubMed databases. After meeting the criteria, nine articles remained. Most of the articles were discarded because they did not discuss the impact of compression garments on basketball player performance. All articles were summarized from their sources and analyzed through Mendeley software to remove duplicates. More details are shown in Figure 1.

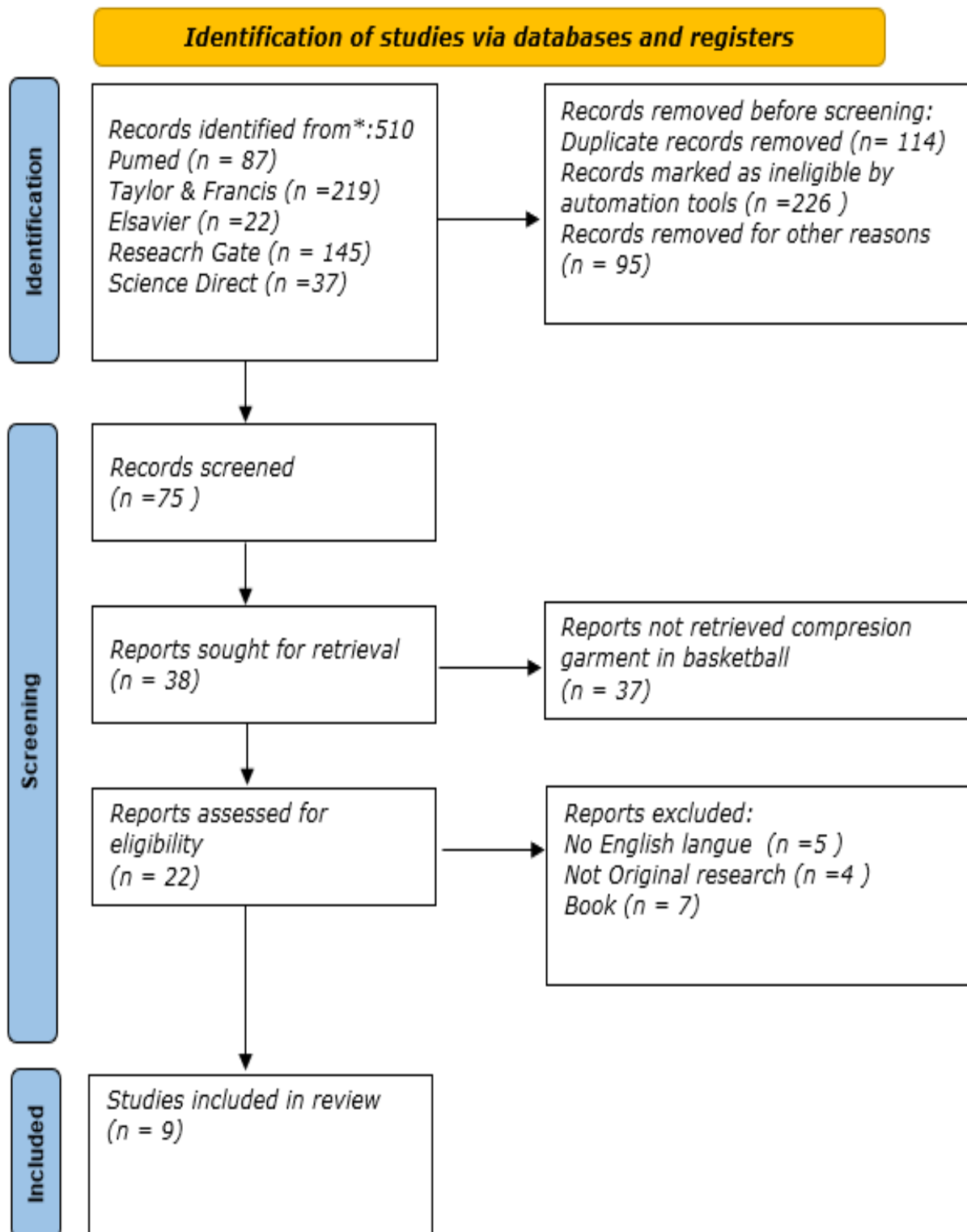


Figure 1. Article source search procedure

RESULTS AND DISCUSSION

Result

Table 2. Research findings

Author and Year	Research Findings
Üster et al., (2024)	Lower-body compression tights did not significantly impact performance in young basketball players in the Running-Based Anaerobic Sprint Test.
Debolt et al., (2024)	Compression tights were ineffective in preventing fatigue or improving initial balance, but they could improve balance control impaired by fatigue.
8 O'Riordan et al., (2023)	Compression tights were most effective in increasing venous return and muscle blood flow in the lower limbs at rest, followed by compression shorts and socks. This increase in blood flow was also accompanied by increased muscle oxygenation.
Driller et al., (2021)	Compression tights slightly improved lower-body stair-climbing strength and 6-meter sprint times in basketball training. However, compression tights did not benefit other aspects of performance or help maintain performance in trained basketball athletes.
7 Wong et al., (2020)	Using upper-body or full-body compression tights improved free throw accuracy in basketball by 4.2% and 5.9%, respectively, compared to no compression tights.
Atkins et al., (2020)	Overnight compression garments can reduce perceived muscle fatigue and soreness but have little effect on performance in basketball athletes.
3 Ballmann et al., (2019)	Lower body compression (LBC) garments can improve anaerobic exercise performance in collegiate basketball players, particularly regarding mean power output, anaerobic capacity, and physical performance.
3 Yan et al., (2018)	The use of compression garments influences upper-body muscle fatigue in basketball players, particularly in the biceps and brachioradialis. Moderate compression pressures reduce muscle fatigue during exercise, particularly in the middle to late stages, while too high or too low pressures can accelerate fatigue.
Zamporri & Aguinaldo, (2018)	Compression garments have the effect of altering movement patterns associated with the risk of knee injury.

Discussion

Overall, basketball players' use of compression garments has produced varying results depending on the purpose of use. While not constantly

significantly improving performance, compression garments have the potential to aid recovery, reduce muscle fatigue, and improve specific aspects such as blood flow, balance control, and shooting accuracy.

What is common across these studies is that they all focused on basketball athletes, specifically in the context of training or competition. In addition, all of these studies assessed the effects of compression garments on physical performance, muscle fatigue, or recovery, and most used experimental quantitative methods to test their effects. The findings suggest that compression garments do not have a universal effect but are beneficial in specific aspects, such as muscle recovery and reduced fatigue. The positive effects are also more pronounced in certain conditions, such as improving shooting accuracy or speeding up sprint times in training.

The striking differences between these studies can be seen in the focus on compressed body parts. Some studies, such as those by Üster et al. (2024) and O’Riordan et al. (2023), focus on the lower body, while Yan et al. (2018) examine the upper body. The purposes of using compression garments also vary. Some studies examine the effects of compression on direct performance, such as improving sprinting or accuracy, while others focus more on recovery and reducing muscle fatigue. The results of these studies vary widely, with some stating that compression is not effective at all (Üster et al., 2024; Debolt et al., 2024), and others stating that compression is beneficial in specific contexts (Wong et al., 2020; Ballmann et al., 2019; O’Riordan et al., 2023).

Üster et al. (2024) found that lower-body compression pants had no significant effect on anaerobic sprint performance, indicating that lower-body compression is ineffective in explosive training. This is contrary to the findings of O’Riordan et al. (2023), which showed that compression increased blood flow and muscle oxygenation at rest, especially in the lower body, which had positive physiological effects. These findings suggest that compression is more effective for post-activity recovery than during physical activity. Meanwhile, Zamporri and Aguinaldo (2018) added that compression clothing can change movement patterns, especially those related to the risk of knee injury, indicating that in addition to performance benefits, compression can also be used for injury prevention, not just to improve performance.

Meanwhile, Debolt et al. (2024) stated that compression clothing is not practical in preventing fatigue or improving body balance initially. However, they can help control balance after fatigue, indicating that compression clothing is more useful in post-activity recovery than direct physical performance. Research by Driller et al. (2021) also noted slight increases in strength during stair climbing and short sprints but no significant effects on other types of physical activity, indicating that the effects of compression garments are limited to certain types of exercise.

However, more positive findings came from [Wong et al. \(2020\)](#), who found that wearing upper-body compression garments could improve free throw accuracy by up to 5.9%. This suggests that compression garments may be more effective in improving technical or psychomotor aspects, such as shot accuracy, than in improving physical performance. A study by [Ballmann et al. \(2019\)](#) also showed that lower-body compression garments could improve anaerobic capacity and average power output, indicating compression's effectiveness in anaerobic training.

On the other hand, [Yan et al. \(2018\)](#) reported that upper body compression could reduce muscle fatigue, with effectiveness depending on the compression pressure applied. This study suggests that moderation of pressure is important, as too high or too low pressure can reduce the benefits of compression. [Atkins et al. \(2020\)](#) showed that compression garments could reduce muscle fatigue and soreness when worn overnight but did not significantly improve physical performance during activity. This suggests that the benefits of compression are more focused on muscle recovery and comfort rather than on direct physical performance improvements.

Thus, although compression garments do not provide consistent results in all aspects of physique, there are certain benefits in some specific contexts, whether improving technique, muscle recovery, or injury prevention.

Implication

Based on the study's results, using compression clothing in basketball can support recovery and reduce athlete fatigue. It can be used as one of the supporting strategies in physical training and post-match recovery programs.

However, the use of compression clothing as a tool to improve direct performance (such as shooting accuracy or sprint speed) needs to be considered carefully because its effectiveness is highly dependent on the specific context, such as the type of training, activity intensity, and physical characteristics of individual athletes.

Thus, coaches and sports practitioners need to choose the type of clothing, pressure level, and the right time of use according to the needs of athletes so that the maximum benefits of this technology can be achieved optimally, both in training and competition.

Research Recommendations

Based on the existing findings, it is recommended that further research involve a broader and more diverse sample, both in terms of age, gender, and athlete ability level, to determine whether the benefits of compression clothing are universal or only apply to specific groups. In addition, research with a long-term design needs to be conducted to evaluate the cumulative effects of using

compression clothing on performance and recovery processes. Testing various types of materials and levels of compression clothing pressure is also important to find the most optimal combination in basketball. In addition, the psychological aspect of athletes' perception of comfort and confidence when using compression clothing deserves further research. Finally, in-depth research on the most effective time of use, such as during matches, after training, or at night, can provide practical insights into maximizing the use of compression clothing.

CONCLUSION

Compression garments have a variety of potential benefits in basketball, and their effectiveness depends on the material used, the pressure, and the athlete's condition. Compression garments are more consistent in providing positive results for recovery and fatigue reduction. However, for direct performance enhancement, the benefits tend to be more situation-specific, such as supporting free throw accuracy or speeding up sprint times in training. The combination of garment type, proper pressure, and clear goals are key to optimally utilizing compression garments in basketball games or training.

Suggestion

Based on the findings of this study, it is recommended that coaches and sports teams consider integrating compression garments into basketball athletes' training and recovery programs, especially to reduce fatigue and accelerate post-match muscle recovery. The right compression garment can provide more comfort for athletes and support a more effective recovery process. Compression garment providers are also advised to continue to innovate in developing products with materials and pressure levels that align with the needs of athletes in basketball, as well as adjusting the design of compression garments to the physical characteristics of different athletes. Athletes are advised to try various compression garments and assess their effectiveness in training and matches to find the type and level of pressure that best suits their needs. In addition, athletes should combine compression garments with a good training pattern and optimal recovery techniques. For researchers and academics, it is recommended to continue studying compression garments with a focus on the duration of use, the psychological impacts caused, and the comparison of the effects between compression garments and other recovery methods in improving athlete performance.

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