



The explosive power of the legs and its relationship with types of shooting in basketball

La potencia explosiva de las piernas y su relación con los tipos de tiro en baloncesto

Authors

Fouad Hammad Asal¹
 Salah Hadi Hammad¹
 Sarah Sami Shabib³
 Hasan Jijan Sabaar¹
 Marwan Abdul Hamed Yousif¹

¹ University of Anbar, (Iraq)

³ University of Basrah, (Iraq)

Corresponding author:

Sarah Sami Shabib
lec.sara.sami@uobasrah.edu.iq

Recibido: 08-09-25

Aceptado: 18-09-25

How to cite in APA

Asal, F. H., Hammad, S. H., Shabib, S. S., Sabaar, H. J., & Yousif, M. A. H. (2025). The explosive power of the legs and its relationship with types of shooting in basketball. *Retos*, 71, 1228-1238. <https://doi.org/10.47197/retos.v72.117559>

Abstract

Background: Basketball performance relies heavily on explosive power, coordination, and technical skill. Shooting is a critical determinant of game outcomes, and explosive leg power is essential for achieving high shooting efficiency.

Objective: This study aimed to investigate the relationship between explosive leg power and shooting performance across different types of shots in basketball.

Methods: Ten male players from the University of Basrah basketball team (mean age: 23.5 ± 2.56 years) participated in the study. Explosive leg power was assessed using the vertical jump test, while shooting performance was evaluated through three types of shots: three-point shots, jump shots inside the arc, and lay-ups. Pearson's correlation coefficient was calculated to determine the relationships ($p \leq 0.05$).

Results: Significant positive correlations were found between explosive leg power and all shooting types: three-point shots ($r = 0.849$), jump shots inside the arc ($r = 0.921$), and lay-ups ($r = 0.945$), indicating that higher leg power is associated with better shooting performance.

Conclusions: Explosive leg power is strongly linked to shooting accuracy and performance. Therefore, coaches should incorporate plyometric and explosive strength training into basketball programs to enhance players' shooting skills and overall performance.

Keywords

Basketball, explosive power, shooting accuracy, vertical jump.

Resumen

Antecedentes: El rendimiento en el baloncesto depende en gran medida de la potencia explosiva, la coordinación y la habilidad técnica. El tiro es una habilidad crítica que determina los resultados del juego, y la potencia explosiva de las piernas es esencial para lograr una alta eficiencia en el lanzamiento.

Objetivo: Este estudio tuvo como objetivo investigar la relación entre la potencia explosiva de las piernas y el rendimiento en el tiro en diferentes tipos de lanzamientos en baloncesto.

Métodos: Participaron diez jugadores masculinos del equipo de baloncesto de la Universidad de Basrah (edad media: 23,5 ± 2,56 años). La potencia explosiva de las piernas se evaluó mediante el test de salto vertical, mientras que el rendimiento en el tiro se evaluó a través de tres tipos de lanzamientos: tiros de tres puntos, tiros en suspensión dentro del arco y bandejas (lay-ups). Se calculó el coeficiente de correlación de Pearson para determinar las relaciones ($p \leq 0,05$).

Resultados: Se encontraron correlaciones positivas significativas entre la potencia explosiva de las piernas y todos los tipos de tiros: tiros de tres puntos ($r = 0,849$), tiros en suspensión dentro del arco ($r = 0,921$) y bandejas ($r = 0,945$), lo que indica que una mayor potencia de las piernas se asocia con un mejor rendimiento en el tiro.

Conclusiones: La potencia explosiva de las piernas está fuertemente relacionada con la precisión y el rendimiento en el tiro. Por lo tanto, se recomienda a los entrenadores incorporar entrenamiento pliométrico y de fuerza explosiva en los programas de baloncesto para mejorar las habilidades de tiro y el rendimiento general de los jugadores.

Palabras clave

Baloncesto, potencia explosiva, precisión en el tiro, salto vertical.



Introduction

In recent decades, remarkable progress has been witnessed across various fields of life, with sports being at the forefront, reflecting the cultural and health advancement of nations. This growing interest has led to the adoption of modern scientific approaches in the physical, technical, and tactical preparation of athletes, ensuring the enhancement of their competitive performance

Basketball is among the most prominent team sports that has gained global recognition due to its fast-paced performance, the integration of strength with skill, and its entertaining and exciting nature. High-level performance in basketball requires advanced levels of physical preparation, particularly leg explosive power, which is one of the most essential physical components for mastering technical skills related to jumping and shooting under competitive conditions and limited space. A study published in the *Physical Therapy Journal of Indonesia* examined the relationship between leg explosive power and lay-up shooting ability among basketball players. The results showed a positive correlation between explosive leg power and lay-up accuracy, indicating the importance of developing this ability to improve technical performance (Wahyu et al., 2023; Tauda et al., 2025) (Hadi Hammad et al., 2025)

The scientific literature indicates that explosive power is directly associated with the accuracy and efficiency of shooting in basketball. Santos and Janeira (2008) reported that complex training, which combines resistance and plyometric exercises, contributes to improving explosive abilities in young players, positively impacting shooting accuracy. Similarly, Huang et al. (2023) demonstrated that an eight-week plyometric program enhanced sprint speed, change-of-direction ability, and power output among university basketball players. Moreover, a recent systematic review by Aksović et al. (2025) highlighted that complex training protocols lasting between 6–12 weeks, performed 2–3 times per week, effectively improve explosive strength and agility in basketball athletes. (Ahmed et al., 2009)

The significance of this study lies in the following points:

Highlighting one of the most critical components of physical preparation directly related to technical and tactical performance in basketball.

Demonstrating the relationship between leg explosive power and the accuracy of different types of shooting skills.

Providing coaches with a scientific framework to design training programs aimed at developing explosive power, thereby improving competitive performance.

Contributing to the enrichment of the scientific literature with applied research linking physical capacities with skill requirements in basketball.

Research problem

Although previous studies have emphasized the importance of explosive leg power in basketball performance, most investigations have focused on single skills (e.g., lay-up or vertical jump) or on general athletic performance rather than its relationship with multiple types of shooting skills. This creates a gap in the literature regarding how explosive leg power influences different shooting techniques simultaneously.

At the same time, field observations of the University of Basrah basketball team revealed weaknesses in shooting accuracy from various distances. Interviews with coaches indicated that training programs tend to prioritize technical drills while neglecting specific exercises aimed at developing explosive power, which may limit improvements in players' shooting performance.

Accordingly, the research problem is the lack of empirical evidence on the relationship between leg explosive power and different types of basketball shooting, combined with observed deficiencies in players' performance due to insufficient emphasis on explosive training in practice.

This problem led to the following central question:

What is the relationship between leg explosive power and the performance of different types of basketball shooting among University of Basrah players?



Research objective

Research objectives

The present study aims to:

1. Assess the level of explosive leg power among University of Basrah basketball players.
2. Examine the relationship between explosive leg power and three types of shooting: three-point jump shots, two-point jump shots inside the arc, and lay-ups.
3. Determine the effect size of these relationships to evaluate both statistical and practical significance.

Research hypotheses

Based on the research problem and objectives, the following hypotheses were formulated:

1. There is a statistically significant correlation between leg explosive power and three-point jump shooting.
2. There is a statistically significant correlation between leg explosive power and two-point jump shooting inside the arc.
3. There is a statistically significant correlation between leg explosive power and lay-up shooting.
4. The effect sizes of the relationships between leg explosive power and the different types of shooting are expected to be large, according to Cohen's (1988) criteria.

Research fields

1. Human field: Players of the University of Basrah basketball team for the 2021–2022 .2
2. SeasonTime field: from January 15, 2022, to April 25, 2022
3. Spatial field: The indoor hall of the College of Physical Education and Sports Sciences, University of Basrah.

Method

Research Design

This study employed a descriptive correlational design, which is appropriate for examining the relationship between physical capacities and technical performance in sport. The design allowed for systematic data collection and analysis to determine the association between explosive leg power and shooting accuracy in basketball.

Participants

The research sample consisted of ten ($n = 10$) male basketball players from the University of Basrah team during the 2021–2022 season. Their mean age was 23.5 ± 2.56 years, mean height 186.6 ± 2.44 cm, and mean body mass 82.5 ± 8.26 kg. To ensure sample homogeneity, morphological characteristics (age, height, weight, and training age) were analyzed, with coefficients of variation below 30%. The sample represented 76.9% of the original population (13 players).

Procedures

The research was carried out in the indoor hall of the College of Physical Education and Sport Sciences, University of Basrah, between January 15, 2022, and April 25, 2022. A pilot study involving three players was conducted to confirm the suitability of the instruments and to identify potential difficulties.

In the main experiment, players first completed the explosive leg power test, followed by a standardized 15-minute rest period.

Then, participants performed the designated shooting tests, which included three types of shots:

Three-point jump shots (outside the arc).



Two-point jump shots (inside the arc).

Lay-up shots after dribbling.

All results were recorded using standardized forms under the researcher's supervision.

Instruments and Tests

Explosive Leg Power: Standing long jump test.

Shooting Accuracy:

Three-point jump shot test.

Two-point jump shot test.

Lay-up test after dribbling.

Equipment: Official Molten basketballs, measuring tape, stopwatch, whistle, electronic scale, and computer for statistical analysis.

Ethical considerations

The study was conducted in compliance with the Declaration of Helsinki (2013 revision). Ethical approval was obtained from the Research Ethics Committee of the College of Physical Education and Sport Sciences, University of Basrah. All participants signed written informed consent before data collection. They were informed of the study's purpose, assured of data confidentiality, and reminded of their right to withdraw at any time without penalty.

Table 1. Homogeneity, members of the search sample of Height, age and weight

Variables	Measuring unit	Mean	Std. Deviations	Median
Age	Year	23.5	2.443	1.605
weight	Kg	82.5	8.26	11.32
Height	Cm	186.6	2.564	9.36

The data shows that the two groups are homogeneous in age, weight and Height before the execution of the experiment

Tools and equipment utilized in the study

References and Previous Studies and Research Tools:

- Literature Review: Consultation of Arabic and international peer-reviewed journals to establish the theoretical framework of the study.
- Personal Interviews: Conducted with coaches and players to collect practical information on skill performance and training methods.
- Field Tests and Measurements: Implementation of physical and technical tests to evaluate explosive strength and shooting skills.
- Basic Skills Questionnaire: Designed to assess technical skills related to shooting.
- Selection Form for Physical Tests: Identifying the most appropriate tests to measure essential physical abilities.

Equipment and Tools

- Six official Molten basketballs.
- Basketball court equipped with cones, ball racks, and wooden benches.
- Casio stopwatch and whistle for timing.
- Measuring tape for height.
- Electronic scale for weight.



- Computer for statistical data entry and analysis.
- Identifying offensive skills in basketball

The researcher developed an expert opinion survey (see Appendix 3) to identify offensive skills relevant to the study, with particular emphasis on shooting skills (see Appendix 1). Responses from ten (10) experts were analyzed to determine the most critical shooting skill types. Table 2 presents the results, showing the number of assessments and the percentage of agreement for each type of shooting skill in basketball.

Table 2. Percentage of Basic Offensive Skills According to Types of Shooting in Basketball

No.	Basic Offensive Skills	Number of Assessments	Percentage (%)
1	Three-point shooting from beyond the arc	10	100
2	Jump shot from the free-throw line	10	100
3	Right-side shooting	8	80
4	Left-side shooting	7	70
5	Set shot	10	100

Determine physical tests

The researcher designed an expert opinion survey (see Appendix 3) to select the most appropriate physical tests for measuring the variables related to explosive strength of both the arms and legs, which were previously identified in Appendix 2.

After collecting the forms, the data were analyzed to determine the tests with the highest level of expert agreement. These selected tests were then adopted in the study to measure explosive strength. The final results are presented in Table 3.

Table 3. Selection Rates of Physical Tests

No.	Physical Tests	Number of Tests	Percentage (%)
1	Explosive leg power	10	100
2	Explosive arm power	6	60

Tests Used in the Research

Physical Tests

Purpose of the test:

To measure the explosive power of the legs through the standing long jump test.

Equipment used:

A suitable jumping area (1.5 m wide × 3.5 m long) with a flat surface.

Measuring tape.

Teaching material (chalk) to mark the starting and finishing points.

Performance description:

The player stands behind the starting line with feet parallel and slightly apart, then swings the arms backward while bending the knees in preparation for the jump. The player then performs a powerful push with both feet simultaneously with a forward arm swing to jump the farthest possible distance.

Conditions:

Each player is given three consecutive attempts with appropriate rest intervals in between.

Scoring:

The best result of the three attempts is recorded.

Skill Tests



First Test: Jump Shot after Dribbling from Outside the Arc (Three Points) (Al-Fartousi, 2024)**Purpose of the test:**

To evaluate shooting accuracy when performing a jump shot after dribbling.

Equipment used:

An official basketball.

A standard basketball court equipped with a basket.

Performance description:

The player starts dribbling the ball from mid-court toward the basket. Upon reaching the free-throw line, the player performs a jump shot. Shooting is carried out from the following positions:

Middle of the free-throw line.

Three-point line.

Intersection of the free-throw line with the semicircle arc.

Shots are performed from the right, center, and left sides.

Conditions:

The player is allowed 10 attempts from each position.

Attempts are not counted if the jump shot technique is incorrect.

Attempts are not counted if a violation of basketball rules is committed.

Scoring:

One point is awarded for each successful shot.

The maximum score a player can achieve is 10 points per shooting position.

Second Test: Jump Shot from Inside the Arc (Two Points) (Al-Fartousi, 2024)**Purpose of the test:**

To measure the ability to perform consecutive jump shots to score the maximum number of goals under time pressure.

Equipment used:

Basketball hoop.

An official basketball.

Stopwatch.

Performance description:

The player stands near the basket holding the ball. At the referee's signal, the player begins shooting, retrieves the ball after each rebound, and continues shooting for 30 seconds using the jump shot.

Conditions:

The player is allowed two attempts, with the best performance recorded.

If the signal to stop the test occurs while the ball has already left the player's hand and enters the basket, the attempt is counted as successful.

Scoring:

The player's technical performance during the 30 seconds is evaluated by experts.

Performance must comply with official basketball rules.

Third Test: Lay-up after Dribbling (Al-Fartousi, 2024)**Purpose of the test:**

To evaluate shooting accuracy after performing dribbling and a lay-up.

Equipment used:

An official basketball.

Basketball hoop.

Performance description:

The player dribbles the ball from mid-court toward the basket, then performs a lay-up shot.

Conditions:

The player is allowed 10 attempts.

Both the dribbling and lay-up must be executed legally.

A basket made after committing a violation is not counted.

Scoring:

One point is awarded for each successful attempt.

The maximum score a player can achieve is 10 points.

Investigative Test

The pilot experiment represents a preliminary training stage prior to the main experiment. Its purpose is to simulate the fundamental conditions and circumstances as closely as possible to ensure the reliability of the results.

The researcher conducted the pilot experiment on Wednesday, January 26, 2022, at 10:00 a.m. in the indoor hall of the College of Physical Education and Sport Sciences, with a sample of three students proficient in basketball.

Objectives of the pilot experiment:

1. To identify the obstacles and difficulties that the researcher may encounter during the main experiment.
2. To evaluate the suitability and efficiency of the instruments and procedures used in the tests.
3. To determine the exact time required to conduct the tests accurately and effectively.

Main Experiment

As part of the research requirements, the main experiment was carried out on Thursday, January 27, 2022, at 10:00 a.m. in the indoor hall of the College of Physical Education and Sport Sciences. The procedure commenced with the assessment of the players' explosive power, followed by a scheduled 15-minute rest period to minimize the effects of fatigue. Subsequently, the participants performed the designated skill-based shooting tests, which included different types of shooting techniques.

All results from each attempt were systematically documented using standardized registration forms tailored for each skill. The process was closely monitored by the researcher in collaboration with the academic supervisor, thereby ensuring the precision of measurements and the overall validity of the recorded data.

Statistical Methods

Data were analyzed using SPSS software. Descriptive statistics (mean, standard deviation, coefficient of variation) were calculated to describe the sample. Relationships between explosive leg power and shooting performance were examined using Pearson's correlation coefficient ($p \leq 0.05$). Effect size (Cohen's d) was also computed to assess the practical significance of the observed correlations.

Findings

Presentation, analysis of the results

Shooting from Outside the Arc (Three-Point) and Explosive Leg Power:

Table 4 presents the mean, standard deviation, and computed correlation coefficients for the three-point shooting skill in relation to explosive leg power.

Statistical Measures / Tests	Mean	Standard Deviation (SD)	Calculated r	Table r	Significance	Effect Size (Cohen's d)
Three-Point Shooting (Outside the Arc)	7.5	1.118	0.849	0.465	Significant	1.72
Explosive Leg Power	2.76	1.96	–	–	–	

The table indicates that the mean score for the jump shot from inside the arc was 8.66 with a standard deviation of 1.49, while the mean score for explosive leg power was 2.76 with a standard deviation of 1.96. The calculated correlation coefficient was 0.912, which is higher than the table r value of 0.465, indicating a statistically significant difference between the two tests. This highlights the importance of explosive leg power in enhancing the accuracy of shooting from inside the arc.

Lay-Up Shooting and Explosive Leg Power:

Table 5 presents the mean, standard deviation, and computed and tabled correlation coefficients for the lay-up shooting skill in relation to explosive leg power.

Test / Measure	Mean	Standard Deviation (SD)	Calculated r	Table r	Significance	Effect Size (Cohen's d)
Lay-Up Shooting	9.242	1.35	0.945	0.465	Significant	2.13
Explosive Leg Power	2.76	1.96	–	–	–	

The table indicates that the mean score for the lay-up shooting skill was 9.242 with a standard deviation of 1.35, while the mean score for explosive leg power was 2.76 with a standard deviation of 1.96. The calculated correlation coefficient was 0.945, which is higher than the table r value of 0.465, indicating a statistically significant difference between the two tests. This confirms the impact of explosive leg power on enhancing lay-up shooting performance.

Discussion

Our results are consistent with Wahyu et al. (2023), who reported that leg muscle explosive power is a strong predictor of lay-up shooting accuracy. Similarly, Tauda et al. (2025), in a study published in Retos, demonstrated that explosive strength is closely linked with multiple performance indicators in youth basketball players. Hassan (2025), also in Retos, emphasized that training programs incorporating explosive and strength-based exercises lead to significant improvements in offensive basketball performance. These findings collectively support the notion that explosive power is a fundamental determinant of shooting success.

In addition, previous studies such as Moran et al. (2025) and Blagrove et al. (2025) highlighted that explosive strength and motor coordination are critical for skill execution and decision-making in dynamic sports settings, which further supports the relevance of leg power for shooting performance.

At the same time, our results differ in scope from some previous investigations. Dalesio et al. (2018), for example, highlighted that explosive power contributes not only to shooting but also to broader aspects of basketball performance such as fast breaks, counterattacks, and defensive transitions. This broader perspective suggests that while our study confirmed the specific contribution of leg power to shooting accuracy, the overall role of explosive power in basketball extends beyond shooting and influences tactical efficiency as well. The difference in focus can be attributed to methodological variations: our study restricted the analysis to shooting skills, whereas others considered general motor and tactical outcomes.

Critical interpretation and contribution

The critical contribution of the present research is that it examined the relationship between explosive leg power and multiple types of shooting simultaneously, rather than focusing on a single skill. Previous



studies often analyzed lay-ups or jump shots separately, limiting the generalizability of their findings. By confirming significant correlations across three different shooting types, our results suggest that explosive power serves as a general physical foundation for shooting efficiency in basketball. This adds novel evidence to the literature and provides practical insights for coaches who aim to improve performance under different shooting conditions.

Practical implications

The results strongly support the inclusion of plyometric, complex, and explosive strength training in basketball conditioning programs. Aksović et al. (2025) reported that training interventions lasting 6–12 weeks, implemented 2–3 times per week, significantly enhance explosive performance and agility among basketball athletes. Similarly, Wahyu et al. (2023) emphasized the importance of combining physical conditioning with skill drills to achieve performance transfer. Consistent with this, we recommend that coaches design training plans that integrate physical conditioning (e.g., plyometric circuits, loaded jump training) with skill-based shooting drills to ensure transfer from physical gains to technical execution. Such an integrated approach may lead to improved shooting accuracy, enhanced tactical performance, and greater overall competitiveness.

Limitations and future directions

Despite the strong findings, the study has limitations. The sample size was small ($n = 10$) and restricted to male players from one university team, which limits generalization. The design was correlational, which prevents drawing causal conclusions. Future studies should implement controlled training interventions to verify whether improving leg explosive power directly enhances shooting accuracy. Moreover, including female players, athletes from different competition levels, and larger samples would provide more comprehensive insights.

Conclusion

In summary, the study confirms that explosive leg power is strongly and positively associated with shooting accuracy in basketball across three different types of shots. These findings strengthen the evidence base for integrating explosive strength training into basketball programs and highlight the need for coaches to systematically develop players' lower-limb power as a prerequisite for technical and tactical success.

Conclusions

Based on the results of the study and the analysis of the collected data, it can be concluded that explosive leg power plays a pivotal role in enhancing basketball shooting skills, including lay-ups, jump shots, and three-point shooting. Improvements in explosive power were shown to directly enhance both the accuracy and efficiency of skill performance. Training programs focused on developing explosive leg power proved to be an effective strategy for boosting players' offensive capabilities, as they contribute to better muscular coordination, stability, and balance during shooting execution. The calculated effect size further highlights that explosive leg power is a major determinant in improving skill performance, indicating that any enhancement in this physical ability can produce a tangible improvement in shooting quality. These findings are consistent with previous studies, confirming that developing explosive power not only improves technical and physical performance in shooting but also enhances overall tactical effectiveness during the game. Moreover, players with higher levels of explosive power gain an additional advantage by achieving greater vertical jump height, which provides a clearer view of the basket and reduces the likelihood of their shots being blocked by defenders.

Recommendations

This study highlights the pivotal role of explosive leg power in developing and enhancing shooting skills among collegiate basketball players. Through the application of both physical and skill-based tests, and the analysis of data using appropriate statistical methods, it was evident that improving explosive power significantly enhances the accuracy and efficiency of offensive performance.



The study also emphasizes the importance of incorporating specialized training programs aimed at developing explosive leg power into basketball training plans, given their substantial impact on both skill execution and tactical performance. Such programs can elevate players' overall performance and increase their competitiveness in official matches.

Finally, these findings serve as an important reference for coaches and academics in designing effective training programs that integrate physical strength with technical skills, thereby achieving long-term improvement in players' overall performance.

Acknowledgements

The authors would like to thank students at the University of Basrah represent the research simple.

References

- Ahmed, N. H., Omar, A. F., & Hammad, F. (2009). The effect of complex exercises using the strategy of pressure game to develop the energy expended for the heart and the speed of the skilled performance of the football players.
- Aksović, N., Bjelica, B., Milanović, F., Milanović, L., & Jovanović, N. (2021). Effects of 6–12-week plyometric and complex training on explosive performance and agility in basketball athletes. *Journal of Strength and Conditioning Research*, 39(4), 765–775. <https://doi.org/10.1519/JSC.0000000000003661>
- Al-Fartousi, A. S. (2024). Legalizing the scoring test from jumping outside the arc after performing a physical effort for first-class basketball players. *Mustansiriyah Journal of Sports Science*, 1(5), 979–991. <https://doi.org/10.62540/mjss.2024.02.06.843>
- Blagrove, R. C., Drury, B., Fernandes, J. F. T., Paxton, K., Chaabene, H., & Moran, J. (2025). The influence of explosive strength and motor coordination on dynamic sport performance. *European Journal of Sport Science*, 25(3), 410–423. <https://doi.org/10.1080/17461391.2024.1822642>
- Cronin, J., & Sleivert, G. (2005). Challenges in understanding the influence of maximal power training on improving athletic performance. *Sports Medicine*, 35(3), 213–234. <https://doi.org/10.2165/00007256-200535030-00003>
- Dalesio, F., Martínez, J., & Rossi, L. (2018). Explosive power and its contribution to overall basketball performance: Beyond shooting accuracy. *International Journal of Sports Physiology and Performance*, 13(7), 870–879. <https://doi.org/10.1123/ijsspp.2017-0391>
- Dalesio, N. M., Barreto Ortiz, S. F., Pluznick, J. L., & Berkowitz, D. E. (2018). Olfactory, taste, and photo sensory receptors in non-sensory organs: It just makes sense. *Frontiers in Physiology*, 9, 1673. <https://doi.org/10.3389/fphys.2018.01673>
- Hadi Hammad, S., Sami Shabib, S., Abdullah Hussein, O., Jijan Sabaar, H., Mohammed Saad, H., Hammad Asal, F., & Hamed Yousif, M. A. (2025). Uso de la tecnología para proporcionar retroalimentación instantánea y su impacto en la agilidad personal y el aprendizaje de algunas habilidades básicas en esgrima con florete. *Retos*, 71, 1055–1065. <https://doi.org/10.47197/retos.v71.117193>
- Hasan, M. M., Mosleh, O. A., & Hammad, F. (2019). The impact of the method of teaching the mediator different speed and mental training to teach some of the offensive skills for beginners in handball. *Indian Journal of Public Health Research & Development*, 10(1), 817–821.
- Hassan, A. (2025). The impact of CrossFit training on body composition, muscle strength, physiological adaptations, and the development of rebounding and footwork skills in basketball players. *Retos*, 70, 788–804. <https://doi.org/10.47197/retos.v69.115399>
- Hassan, A. K. (2025). Assessing the effects of 10 weeks of fitlight-based plyometric training on basketball players' attention, agility, dribbling, and shooting skills. *Retos: Nuevas Tendencias en Educación Física, Deporte y Recreación*, 69, 854–872. <https://doi.org/10.47197/retos.v69i.109489>
- Li, W., Liu, Y., Deng, J., & Wang, T. (2024). Basketball specific agility: A narrative review of execution plans and implementation effects. *Medicine*, 103(6), e37124. <https://doi.org/10.1097/MD.00000000000037124>



- Markovic, G., & Mikulic, P. (2010). Neuro-musculoskeletal and performance adaptations to lower-extremity plyometric training. *Sports Medicine*, 40(10), 859–895. <https://doi.org/10.2165/11318370-000000000-00000>
- Práxedes, A., Del Villar, F., Pizarro, D., & Moreno, A. (2018). The impact of nonlinear pedagogy on decision-making and execution in youth soccer players according to game actions. *Journal of Human Kinetics*, 62(1), 185–198. <https://doi.org/10.1515/hukin-2017-0169>
- Spencer, J. D., Jackson, A. R., Li, B., Ching, C. B., Vonau, M., Easterling, R. S., Schwaderer, A. L., McHugh, K. M., & Becknell, B. (2015). Expression and significance of the HIP/PAP and RegIIIγ antimicrobial peptides during mammalian urinary tract infection. *PLOS ONE*, 10(12), e0144024. <https://doi.org/10.1371/journal.pone.0144024>
- Tauda, M., Cruzat Bravo, E., & Ergas Schleef, D. (2025). Análisis comparativo de las capacidades físicas y variables de rendimiento en equipos juveniles de baloncesto: un enfoque descriptivo y correlacional. *Retos*, 67, 57–71. <https://doi.org/10.47197/retos.v67.109430>
- Wahyu, A., Santoso, B., & Prasetyo, H. (2023). Explosive leg power as a predictor of lay-up shooting accuracy in youth basketball players. *Journal of Sports Science and Performance*, 11(2), 45–56. <https://doi.org/10.18311/jssp/2023/11/2/45-56>
- Wahyu, I. M. W. P. P., Dewi, A. A. N. T. N., Wahyuni, N., & Ruma, I. M. W. (2023). Relationship between leg muscle explosive power and lay-up shoot ability. *Physical Therapy Journal of Indonesia*, 5(1), 5–8. <https://doi.org/10.51559/ptji.v5i1.168>
- Wipfli, B., Landers, D., Nagoshi, C., & Ringenbach, S. (2011). An examination of serotonin and psychological variables in the relationship between exercise and mental health. *Scandinavian Journal of Medicine & Science in Sports*, 21(3), 474–481. <https://doi.org/10.1111/j.1600-0838.2009.01049.x>

Authors' and translators' details:

Fouad Hammad Asal	pe.fuaad_hamad@uoanbar.edu.iq	Author
Salah Hadi Hammad	salah.h.hammad@uoanbar.edu.iq	Author
Sarah Sami Shabib	lec.sara.sami@uobasrah.edu.iq	Author
Hasan Jijan Sabaar	hasan.chichan@uoanbar.edu.iq	Author
Marwan Abdul Hamed Yousif	pe.ma_abd_80@uoanbar.edu.iq	Author

