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THE EFFECT OF A REHABILITATION PROGRAM BASED ON THE (ASI) MODEL ON REDUCING NEUROMUSCULAR ASYMMETRY IN SELECTED PHYSICAL ABILITIES AMONG ATHLETES WITH LOWER LIMB INJURIES

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Abstract
This study aims to identify the effect of a rehabilitation program based on the Ayres Sensory Integration (ASI) model on reducing neuromuscular asymmetry in some physical abilities of athletes with lower limb injuries. The researcher adopted the experimental method and applied the program to a single experimental sample consisting of nine athletes suffering from moderate lower limb injuries. The rehabilitation program focused on increasing training loads on the weaker limb. The results showed statistically significant differences between the pre- and post-tests in favor of the post-test in the variables of strength, balance, reaction speed, and agility. It was concluded that the rehabilitation program based on the ASI model effectively contributed to reducing neuromuscular asymmetry and improving the functional efficiency of the injured limb. The study recommends adopting this model in sports rehabilitation programs, with emphasis on training the weaker limb to a safe and effective return of athletes to sports activity.
Keywords: Rehabilitation program, ASI model, neuromuscular symmetry, lower limb injuries

1-1 Introduction to the research and its importance:

Sports injuries are among the most prominent problems facing athletes at all levels, due to their direct impact on physical fitness and skill performance, as well as their psychological and social repercussions. Lower limb injuries are particularly common, given the pivotal role these limbs play in most sports activities, especially those requiring...sudden movementJumping, rapid changes in direction, and balance. These injuries, if not treated in a comprehensive scientific manner, often lead to long-term functional imbalances, the most important of which is neuromuscular asymmetry between the two sides, which increases the likelihood of recurrence of the injury and limits the athlete's return to his previous level.thatNeuromuscular asymmetry, or functional, motor, or neurological differences between limbs—whether in strength, control, or reaction time—is a serious indicator of incomplete rehabilitation. Practical experience in the sports field shows that many athletes return to training or competition despite these persistent asymmetry, exposing them to recurrent injuries and negatively impacting their athletic performance. This highlights the need for rehabilitation programs that not only restore general mobility but also specifically target the restoration of neuromuscular balance and symmetry between injured and uninjured limbs.soSports rehabilitation programs have witnessed remarkable development in recent years, with the focus shifting from traditional methods to modern models that integrate neurological, muscular, and motor aspects. The (ASI is a contemporary model that seeks to address functional imbalances by improving neuromuscular integration, enhancing motor control, and progressively increasing training loads to suit the athlete's condition. This model is distinguished by its ability to target individual differences among athletes and systematically reduce functional asymmetry based on scientific principles. Furthermore, focusing solely on the physical aspects of rehabilitation may not fully

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achieve the desired results, as the psychological factor plays a crucial role in the success of rehabilitation programs. Injured athletes often suffer from anxiety, fear of recurrence, and low self-confidence—factors that can negatively impact their response to rehabilitation exercises. This underscores the importance of designing comprehensive rehabilitation programs that consider the psychological dimension alongside the physical one, thereby contributing to improved motivation, enhanced self-confidence, and support for neuromuscular adaptation. Based on the above, the importance of this research lies in highlighting the impact of a rehabilitation program according to the (ASI) in reducing neuromuscular asymmetry of certain physical abilities in athletes with lower limb injuries.We striveThis aims to provide a practical scientific framework that can be utilized in rehabilitation centers and contribute to the development of rehabilitation methods, ensuring the athlete's safe and effective return to sports activity. This is achieved by clarifying the role of modern rehabilitation models in addressing neuromuscular disorders, reducing the recurrence of injuries, and improving the overall physical fitness of athletes.

1-2Research problem

Despite significant progress in sports rehabilitation, practical experience indicates that many athletes with lower limb injuries return to training or competition before achieving a suitable level of neuromuscular symmetry between the injured and uninjured limbs.Through the researcher's work, her continuous interest, and her diligent observationNote:Traditional rehabilitation programs mostly focus on restoring the general functional capacity of the affected limb, while neglecting to address the subtle neurological and muscular differences between the limbs, which leads to the continuation of the functional asymmetry.Hence, the research problem emerged, asNeuromuscular asymmetry is one of the most prominent factors contributing to poor physical performance and high rates of recurrent injury.andIt negatively affects some basic physical abilities such as strength, balance, and reaction time. Furthermore, neglecting this aspect can render the rehabilitation process ineffective in the long run and limit the athlete's ability to make a safe and stable return to athletic activity. Despite the importance of modern rehabilitation models based on neuromuscular integration, such as the (ASIHowever, their use in lower limb injury rehabilitation programs remains limited, and studies examining the impact of these models on reducing neuromuscular asymmetry in certain physical abilities among injured athletes are still few, especially in the Arab environment.AqiyahHence, the research problem is defined.

1-3Research objectives

1- Getting to knowtheA rehabilitation program based on the model (ASI)andNeuromuscular asymmetry in certain physical abilities among athletes with lower limb injuries,
2- Identifying the impact of a rehabilitation program according to the (ASI) in reducing neuromuscular asymmetry of certain physical abilities in athletes with lower limb injuries,

1-4Research hypotheses

1- There are statistically significant differences between the pre- and post-measurements in the level of neuromuscular asymmetry of some physical abilities in athletes with lower limb injuries, in favor of the post-measurement.

1-5 Research areas:

1-5-1Human domain: (9)Lower limb injury among young athletes
1-5-2 aFor the spatial domain:Baghdad–Sports Medicine Hospital
1-5-3Time frame: the period from2/9/2025 Until 2/11/2025.

2- The methodology ofresearchand its tools

2-1:Methodology Search

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The research adopted the experimental method as the most suitable for measuring the effect of preventive rehabilitation exercises, by applying the program to an experimental group of injured athletes.This approach is based on (controlling all the key variables that may affect the results, while isolating one independent variable that the researcher deliberately intervenes in, with the aim of determining its direct effect on the dependent variable or variables and measuring the magnitude of this effect with objective accuracy.)(Abdul Hamid and Kazem, 2001, page 105).

2-2 Research community And I appointed him:

The research population was deliberately selected and consisted of injured athletes.With a moderate injurylower limbs,(Knee, thigh, and ankle)Those who have made initial recoveryandThe sample consisted ofresearchfrom(9)From the athletesThose who have recovered andThose with moderate injuries inlower limbs,The patients at the Sports Medicine Hospital in Baghdad

2-3 Data Collection Methods: Research Tools and Equipment Used:

2-3-1 Data Collection Methods:

1- Arabic and foreign sources and references.
2- Tests and Measurements
3- Observation and experimentation.

2-3-2 Equipment and tools used:

1. Electronic calculator.
2. Signposts
3. conjunctival device
4. Barriers of varying heights
5. Jumping boxes
6. heavy weights
7. Electronic timers.

2-4 Search procedures:

2-4-1 Tests used in the research:

The researcher identified the following physical ability tests for athletes in the rehabilitation phase:

1- Ability to respond quickly: Nelson test (Kharibit, 1989, page 188)

The purpose of the test: to measure the speed of motor response of the legs.

Tools used: StopwatchandAdhesive tapeandmeasuring tape

Test specifications: Two side lines are drawn, spaced apart6.4 mThe test subject stands on the center line, which is 1 meter long. The trainer stands in front of him and raises his hand holding the timer. When one direction is indicated, he runs in the direction specified by the trainer, and so on for both directions.

Recording: The time taken from the signal until the subject fully crosses the side line is recorded. Ten attempts are given to each subject in both directions, with a 20-second rest period between each attempt. The best attempt is recorded.

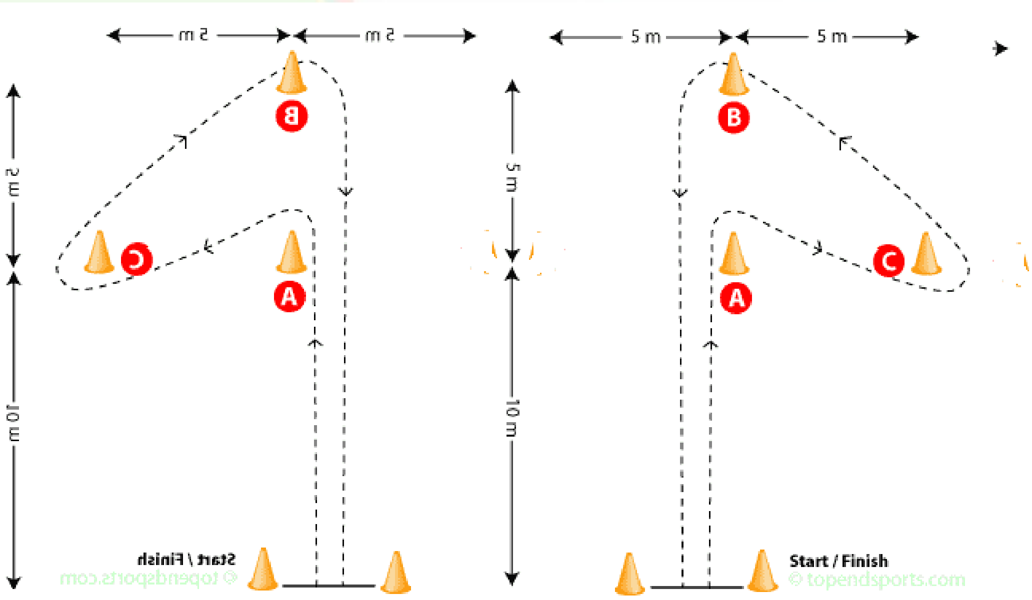
2-**Explosive strength test of the lateral muscles(theJump to the sidesFrom stabilityAverage**(Turk, 2016, page 8)

Test purpose: To measure the muscular strength of the legs in jumping to the right and left sidesAR.

Tools needed: A suitable space with a width of (3.5) m and a length of (3.5) m - a measuring tape - a colored piece of chalk.

Performance description: The subject stands behind the starting line with the feet slightly apart and parallel, so that the side of the right or left foot touches the starting line from the outside. The subject begins by swinging

the arms while bending the knees and leaning slightly to the side, then jumps to the right as far as possible by extending the knees and pushing off laterally with the feet while swinging the arms, once to the right and once to the left.
Scoring: Measurement is taken from the starting line to the last part of the body that touches the ground towards that line.
- The laboratory measures the right side, then calculates the left side, and the two attempts are repeated, and the best attempt of the two attempts is counted for each side.
3- Static balance test: Balance from standing on one leg (Kharibit, 1989, pages 134-135).
The purpose of the test: to measure an individual's ability to balance.
Tools used: Stopwatch.
Performance specifications: The test subject stands on one of his preferred feet and places the other leg on the inside knee of the stable foot with the hands to the sides. Upon hearing the start signal, the test subject raises the heel of the stable foot to stand on the tips of his toes instead of the whole foot, and remains there for as long as possible. The test subject is given three attempts and the best one is counted.
Recording: Laboratory balance time is an indicator of an individual's ability to balance.
4-Agility test. (topendsports.com, 2008)
Test name: Arrowhead test to measure agility and speed of movement
The purpose of the test: to measure agility.
Equipment: (8) cones, a stopwatch, a whistle, and a legal football.
Performance specificationsThe cones are placed 1 meter apart. The distance between the starting point and point (A) is 10 meters, between points (A) and (B) is 5 meters, and between point (A) and point (C) is 5 meters. The test is conducted in two parts (once to the right and once to the left). Upon hearing the whistle, the test-taker runs from the starting point until they cross the finish line, as shown.
Performance requirements: The cones must not be touched during the performance, and the running path must be followed.
Recording: The time taken by the tester is calculated from the start of the referee's signal until he crosses the finish line. Each tester is given one attempt, once without a ball and once with a ball, and the recording is done separately.



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Appearance (1) YExplaintestagility

5- Measuring the level of neuromuscular asymmetry in the lower extremities (Talab and Najm, 2025, page 517)

Asymmetry Index ((ASI) – Asymmetry Index

Asymmetry Index (ASI is a scale used to determine the difference in performance between the limbs (such as the legs or arms) in motor and functional tests. It is widely used in sports medicine, rehabilitation, and physiotherapy to assess muscular and neurological differences between the right and left sides of the body.

The formula for calculating the indexASI:

It is calculatedASI using the following equation:

$$100 \times \left(\frac{\text{Strongest (weaker) X} - (-X)}{\text{Strongest}}\right) = ASI$$

where :

× Strongest = Most efficient performance

× Weaker = Performance of the least efficient party

Interpretation of values

- Asymmetry Index (ASI) = 0% perfect symmetry between the two sides
- Asymmetry Index (ASI) ≤ 10 Significant asymmetry warrants attention
- Asymmetry Index (ASI ≤ 15% indicates an increased risk of inequality needing to be addressed through training programs.

2-5 Exploratory Experiment:

On the day ofTuesdayApproved 2/9/2025 The researcher conducted a pilot study on3 injured athletesTo apply specific tests, the aim of the experiment Understanding how the tests are conducted by the support team (*)The efficiency and validity of the tests.

2–6Pre-tests:

The researcher conducted pre-tests on Sunday, September 7, 2025, on (9) athletes with lower limb injuries.Registered in the sports medicine departmentThey are recovering and are in the rehabilitation phase with the help of the support team.

2-6-1 Sample homogeneity

To ensurehomogeneityThe sample inSearch variablesStarting from a single starting lineFor the research sampleExtractedMean, median, standard deviation, and skewness coefficient betweenSearch variablesasIn the table (1)

Table (1It explains the detailshomogeneitySample

no	Test	unit of measurement	Middle	The mediator	deviation	Torsion coefficient
1	The strong party	poison	168.33	168	6.576	0.574

*-The support team.
1- Haider Nawar Hussein. PhD in Physical Education
2- Ali Abdel-Azim Hamza. PhD in Physical Education.

2	**The weaker party's strength**	poison	147.88	146	5.182	0.033
3	**Fast response from the strong party**	Tha	2.325	2.34	0.040	0.447
4	**Speed of response of the weaker party**	Tha	2.468	2.470	0.028	1.298
5	**Strong side balance**	Tha	7.888	8	0.781	0.944
6	**Weak side balance**	Tha	6.111	6	0.927	0.944
7	**Agility, strong limb**	Tha	11.224	11.22	0.068	0.228
8	**Agility, the weaker side**	Tha	11.413	11.41	0.058	0.088

2-7 Main experience.

- It began Researcher Implementing the rehabilitation program according to the model (ASI) From the daySunday Coincidence 14/9/ 2025 until the day ofThursdayCoincidence 30/10/2025For 7 weeks he was onAccording to the sensory-neurointegration model (ASI – Ayres Sensory Integration) taking into account a set of scientific criteria that ensure the effectiveness and safety of the rehabilitation intervention. These criteria are as follows:
  - Number of training units for the program The rehabilitation program was implemented for a period of (7) weeks, at a rate of(3))Rehabilitation units weekly To be the total number of qualifying units (21Rehabilitation unit
- Pre-testing is used to identify differences between weak men and strong men.
- Types of rehabilitation units Each rehabilitation unit comprised three main parts. Introductory part (warm-up) Dynamic stretching exercisesandLight neuromuscular activation exercisestheDuration (10–15) minutesandMain part Sensory integration exercises include functional strength exercises for the lower limbs.andNeuromuscular control and coordination exercises lasting (30–40) minutesandThe concluding part (calming down) Static stretching exercisesandRelaxation and nervous system regulation exercisestoDuration (5–10) minutes
  - Training volumes were determined according to the scientific principles of sports rehabilitation; number of repetitions: (8–15) repetitions per exerciseandNumber of groups: (2–4) groupsandRest periods: (30–60) seconds between setsandPerformance intensity It starts from (40–50%) of maximum capacity It gradually reaches (70–80%) depending on the stage of rehabilitation
  - Several training methods were adopted to serve the program's objectives, most notably: Low to medium intensity repetitive methodandTraining using body weight and assistive devices (Balance balls, wobble boards, resistance rubber)

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- The work focuses onAchieving a balance between the injured and uninjured parties The program is geared towards reducing functional differences, strength, and neural control between the lower limbs.Through a difference that emphasizes exercises between the weak leg and the strong leg
- Program suitabilityRehabilitationRegarding the health condition of the injured The program is applied to athletes with mild to moderate lower limb injuries, after the acute phase of the injury has ended, and with the approval of the specialist physician.
- Taking individual differences into accountsoDesignedintensityExercises should be tailored to the severity of the injury, the level of neuromuscular asymmetry, and the patient's age.
- Gradation in intensity and size The program begins with low-intensity loads, with a gradual and systematic increase in the intensity and volume of exercises in accordance with the principles of training and rehabilitation load.And the difference in intensity of exercises between the weak leg and the strong leg
- Focus on sensory-motor integration Adopting exercises that stimulate the sensory systems (vestibular, proprioception, tactile) and linking them to the functional motor performance of the lower limbs.
- The exercises should be performed within the limits of acceptable pain, with continuous monitoring of the physiological and motor response of the patients.in order toSafety and prevention of relapse

2–8Post-tests:

The researcher conducted the post-tests on the sample on Sunday, November 2, 2025, using the same procedures as the pre-tests.

2-9Statistical methods

The data were processed to achieve the research objectives and hypotheses using statistical methods.AThe researcher usedStatistical portfolioSPSS andforStatistical laws

3- Presenting and discussing the results:

3-1 DisplayResults of arithmetic means and standard deviationsLevel of neuromuscular asymmetry in the lower extremities in pre-tests:

It was carried outComparisons betweena descriptionLevel of neuromuscular asymmetry in the lower extremitiesIn pre-tests

Table (2) a descriptionLevel of neuromuscular asymmetry in the lower extremities

Variables	Units of measurement	The strong party		the weaker party		Level of asymmetry
		arithmetic mean	**standard deviation**	**arithmetic mean**	**standard deviation**	
power	poison	168.33	6.576	147.88	5.182	**12.1%**
speed of response	Tha	2.325	0.040	2.468	0.028	**5.7%**
Balance	Tha	7.888	0.781	6.1 11	0.927	**22.4%**

fitness	poison	11.224	0.068	11.413	0.058	**1.6%**

3-2an offerResults of arithmetic means and standard deviationslevel non symmetry Nervous muscular in Parties lowerIn post-tests:

It was carried outComparisons betweena descriptionLevel of neuromuscular asymmetry in the lower extremitiesIn post-tests

Table (3) a descriptionLevel of neuromuscular asymmetry in the lower extremities

Variables	Units of measurement	The strong party		the weaker party		Level of asymmetry
		arithmetic mean	standard deviation	arithmetic mean	standard deviation	
power	poison	178.11	2.666	164.11	3.913	**7.8%**
speed of response	Tha	2.287	0.044	**2.391**	**0.030**	**4.3%**
Balance	Tha	8.555	0.527	**7.55**	**0.536**	**11.6%**
fitness	poison	11.207	0.063	**11.366**	**0.051**	**1.3%**

3-3an offerresultsDifferences Between the results of the pre-test and post-test BLevel of neuromuscular asymmetry in the lower extremities:

Table (3)It shows the values of the arithmetic mean, standard deviation, and value (T) Calculated and tabulated statistical analysis between the two measurementsThe first andAl-Abdi

iables	al		er me		F	A F	t) The accountant	Error evel	Significance
power	1208	03347	0784	02693	04237	02582	4.923	.001	moral
speed of response	0581	01261	0432	01439	01484	00379	11,744	000	moral
Balance	2275	06077	1142	07881	11332	08016	4.241	003	moral
fitness	0166	.00186	0140	.00228	00257	.00143	5.379	.001	moral

3-4discussionresultsDifferences Between the results of the pre-test and post-test BLevel of neuromuscular asymmetry in the lower extremities:

Table () shows the values of the arithmetic mean and standard deviation, and the value of (The calculated t-value and error level between the pre- and post-tests of neuromuscular asymmetry in certain physical abilities among the experimental group, which underwent rehabilitation according to the ASI model, were used. In the strength variable, the results showed statistically significant differences between the pre- and post-tests. The mean neuromuscular asymmetry decreased from 0.1208 in the pre-test to 0.0784 in the post-test, with a calculated t-value of 4.923 at a significance level of 0.001, which is significant. The researcher attributes this improvement to the effectiveness of the rehabilitation exercises based on the ASI model, which were designed to focus more on the weaker lower limb compared to the healthy one. A larger portion of the rehabilitation training load was directed towards the affected leg, particularly in functional strength and neuromuscular control exercises. This uneven distribution of loads contributed to stimulating the weaker muscles and increasing their neuromuscular efficiency, thus reducing functional differences between the lower limbs. With a gradual increase in intensity, this helped to restore balance in muscle force production and improve the recruitment of motor units in the weaker limb, without overloading it in a way that could aggravate the injury. As Hrysomallis confirmed, targeted unilateral training contributes to improved functional strength and balance, and reduces compensatory dependence on the unaffected limb. [Hrysomallis, 2011, p. 64])

The results showed a significant improvement in the response speed variable, as the level of neuromuscular asymmetry decreased from (0.0581) in the pre-test to (0.0432) in the post-test, with a value of (The calculated t-value (T) was 11.744 at a significance level of 0.000, which is a highly statistically significant value. This improvement is explained by the fact that the ASI model exercises rely on linking sensory inputs (visual, vestibular, and proprioceptive) with rapid motor responses, which contributes to accelerating nerve signal transmission and improving the efficiency of the central nervous system in processing motor stimuli. Furthermore, the repetition of directed motor performance leads to improved reaction time and reduced neural variability between the two sides. These results are consistent with what Schmidt & Lee (2019) stated: that structured sensorimotor training leads to improved motor response speed and reduced neural processing time, especially in athletes after injuries. [Schmidt & Lee, 2019, p. 178]

The results in the table showed significant differences in the balance variable, with the mean score for neuromuscular asymmetry decreasing from 0.2275 in the pre-test to 0.1142 in the post-test, and a t-value of 4.241 at a significance level of 0.003. This improvement is attributed to the rehabilitation program's reliance on static and dynamic balance exercises, which stimulated the vestibular system and proprioceptors, thus improving postural control and reducing compensatory dependence on the uninjured limb. This also helped reprogram the neural responses responsible for maintaining balance. This aligns with Ayres' (2005) finding that sensory integration is a crucial foundation for improving balance and postural control, especially in individuals with neuromuscular dysfunction resulting from injury.(Ayres, 2005, p. 102)

The results showed statistically significant differences in the agility variable, with the neuromuscular asymmetry level decreasing from 0.0166 in the pre-test to 0.0140 in the post-test, with a t-value of 5.379 at a significance level of 0.001. This is attributed to the rehabilitation program's focus on multidirectional movements and rapid directional changes, integrating balance, strength, and reaction speed. This approach contributed to improved neuromuscular coordination and reduced motor differences between the lower limbs. Furthermore, strength training improved motor control during rapid movements. The results were logical.

4- Conclusions and Recommendations:

4-1Conclusions

1. The adoption of rehabilitation exercises based on the neurosensory integration model (ASI has contributed effectively to reducing neuromuscular asymmetry between the lower limbs in athletes with lower limb injuries.

2. The adoption of rehabilitation exercises based on the neurosensory integration model (ASI) has contributed effectively to reducing neuromuscular asymmetry between the lower limbs in terms of muscle strength levels in athletes with lower limb injuries.
3. The adoption of rehabilitation exercises based on the neurosensory integration model (ASI has effectively contributed to reducing neuromuscular asymmetry between the lower limbs in terms of response speed level, in athletes with lower limb injuries.
4. The adoption of rehabilitation exercises based on the neurosensory integration model (ASI has effectively contributed to reducing neuromuscular asymmetry between the lower limbs at the level of motor balance, in athletes with lower limb injuries.
5. The adoption of rehabilitation exercises based on the neurosensory integration model (ASI) has contributed effectively to reducing neuromuscular asymmetry between the lower limbs in terms of motor agility, in athletes with lower limb injuries.

4-2 Recommendations:

1. Adopting a model (ASI) is included in sports rehabilitation programs, due to its positive impact on reducing neuromuscular asymmetry and improving functional physical abilities.
2. It is necessary to focus on training the weaker lower limb to a higher degree when designing rehabilitation programs, taking into account the gradual increase in loads according to the patient's condition.
3. Using sensory-motor and functional balance exercises as an essential part of rehabilitation programs after lower limb injuries.
4. Conducting future studies that examine the application of the rehabilitation program on larger samples, or on different types of sports injuries, to verify its effectiveness on a wider scale.
5. The results of this study should be used to develop rehabilitation programs specifically for athletes, which will contribute to accelerating the return to sports activity and reducing the likelihood of recurrence of injury.

the reviewer

1. Jaber Abdel Hamid and Ahmed Khairy Kazem. (2001). Research Methods in Education and Psychology, 8th ed. Cairo: Dar Al Nahda.
2. Duaa Habib Talab and Waleed Khaled Najm. (2025). The reality of neuromuscular asymmetry in the lower extremities of elite basketball players according to the (*ASI)*.Journal of Physical Education Sciences - University of BabylonVol (18), Issue (4).
3. Risan Khribat. (1989). Encyclopedia of Measurements and Tests in Physical Education. Vol. 2. Baghdad: Higher Education Press.
4. Munir Abdul Sahib Turk. (2016). The effect of back and lateral rebound jump training on developing explosive power of the posterior and lateral working muscles in goalkeepers. Journal of the College of Physical Education - University of Baghdad - Issue 2.
5. *.topendsports.com*(2008). Retrieved fromwww.topendsports.com/testing/images/arrowhead-agility.gif
6. AJ Ayres. (2005). Sensory Integration and the Child. Los Angeles, CA: Western Psychological Services.
7. C Chrysomallis. (2011). Balance ability and athletic performance. Sports Medicine, 41(3), 221–232.
8. R. A. Schmidt, and T. D. Lee. (2019). Motor Learning and Performance (6th ed.). . Champaign, IL: Human Kinetics.