

Design and Construction of a Test to Assess Landing Velocity and Control During Artistic Jumps in Youth Volleyball Players

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Article History <i>Received: 05-07-2026;</i> <i>Reviewed: 09-08-2026;</i> <i>Accepted: 08-09-2026;</i> <i>Published: 07-10-2026;</i>	ABSTRACT Background: This study aims to design and build a practical test to evaluate landing speed and neuromuscular control during technical jumps in volleyball among young players, to provide an accurate and objective tool to help coaches and researchers measure level of motor performance and reduce risk of injuries associated with incorrect landing. Methods: Researcher adopted descriptive approach with applied survey method, where test was applied to a sample of 63 Players from youth category, distributed across clubs in Diyala Governorate Diyala, Al-Khalis, Hibhib, Shahrban for 2026 sports season, were selected. A pilot study was also conducted on 5 players outside main research sample to ensure clarity of instructions and suitability of test items. Making necessary adjustments before actual application, data was collected and analyzed using SPSS statistical package. Results: Results showed that test is a practical and reliable tool for assessing landing speed and neuromuscular control. It also showed a disparity in performance levels among players, which confirms need for targeted training programs to enhance neuromuscular control and correct landing. Conclusions: From this standpoint, researcher concluded that test represents an effective tool for assessing technical performance and preventing injuries, and recommends implementing periodic training programs with use of test to monitor development of players and improve team's level systematically. Keywords: Design a Test; Construct a Test; Landing Velocity; Landing Control, Volleyball.
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INTRODUCTION

One of fundamental tools in sports science for accurately and objectively determining level of physical and technical performance of players is testing and measurement (Currell & Jeukendrup, 2008; Stevens & Dascombe, 2015). This helps in evaluating different abilities, enabling coaches and researchers to guide training programs and improve athletic performance. (Hassanin, 2003, 15) "Testing and measurement are fundamental pillars in sports science, as they constitute a scientific tool for determining level of physical and skill performance of players and guiding training programs in a scientific, evidence-based manner". Measurement

tests are used in various sports to determine levels of motor abilities such as speed, strength, balance, and motor control, which contributes to improving athletic performance and monitoring its development over time (de Castro Magalhães et al., 2015; Lidor et al., 2009). Designing a suitable field test is of great importance in team sports, including volleyball, as it serves as a database for each player, which coaches then use (Green et al., 2011) .

This was noted by Al-Fartousi and Al-Husseini (2020, p. 17): "Designing tests and applying measurement tools are among scientific foundations of sports research because they contribute to accurate and objective evaluation of performance, enabling coaches and researchers to use this data to develop training programs and improve physical and technical results of athletes. "Volleyball is a sport that requires repeated jumping and landing during execution of technical elements such as spike, blocking, and receiving serve. This makes landing speed and post-jump control crucial factors in performance quality and reducing risk of injury". Hassoun (2001) states that "Landing speed does not only refer to time foot touches ground". Rather, it is linked to neuromuscular system's ability to stabilize under stress and distribute force in a balanced manner, which enhances balance and reduces likelihood of joint strain or injury.

Analyzing landing quality and post-stretch control is considered one of most important aspects of measurement and biomechanical studies in modern sports training. As it indicates (Yang et al., 2026) stated that “ guided neuromuscular training can improve dynamic stability of volleyball players and reduce risk of injury during rapid landing after jumping, which reinforces importance of measuring neuromuscular control in standardized ways. quality of motor control during landing is a vital indicator not only of technical performance but also of ability to adapt to rapidly changing conditions of court”. This makes measuring this ability a primary goal for both coaches and researchers, need for reliable field tests to assess landing speed and control during technical jumps in volleyball is increasing with development of training programs and their focus on injury prevention and improving individual and team performance. This is achieved through reliance on objective, reproducible measures and statistical analysis, current research appears in a practical context that seeks to find a field assessment tool that suits requirements of sports training and actual court, and is based on foundations of scientific measurement in field of physical education and physical tests.

Ability to land quickly and control movement after technical jumps is considered a fundamental skill for young volleyball players. Because it directly affects their balance , performance quality, and reduces risk of injuries , yet coaches and researchers in local environment lack an accurate and reliable scientific measurement tool to assess these skills. This makes evaluation of technical performance subjective and limits ability of coaches to improve individual and group training. Research question: To what extent can a test designed to measure landing speed and motor control during technical jumps provide an accurate and reliable assessment of performance of young volleyball players?

This study aims to design and build a practical test to evaluate landing speed and neuromuscular control during technical jumps in volleyball among young players. Research hypothesis there is a statistically significant relationship between landing speed and degree of motor control among young volleyball players at a significance level of (0.05).

METHODS

Researcher used applied experimental method in her study. This is because it allows them to design and build a new practical test to measure landing speed and neuromuscular control in young players, and applying it to a specific sample to verify its effectiveness and reliability. test was administered to a sample of (63) youth players distributed across clubs in Diyala Governorate (Diyala, Al-Khalis, Hibhib, Shahrban) for 2026 sports season . A pilot test was also conducted on

5 players outside main research sample to ensure clarity of instructions and suitability of test items, and make necessary adjustments before actual implementation.

Design of a test for landing speed and neuromuscular control in volleyball

Test objective: To measure player's ability to land quickly and control neuromuscular maneuvers after technical jumps in volleyball.

Tools used: Volleyball court. Standard volleyball. A marker or funnel to identify landing point. Digital timer. Results registration form.

Testing procedures: player stands at starting point and performs a vertical or attacking jump. Upon landing, a score is recorded Landing time: from when feet leave ground until they are fully settled, Degree of neuromuscular control: body balance, presence of any corrective movement or loss of balance, Each player makes three attempts, and average of each variable is calculated to evaluate performance.

Evaluation criteria: Landing speed: very fast (≤ 0.5 seconds), Fast ($0.51 - 0.7$ seconds), Average ($0.71 - 1$ second), Slow ($1 >$ seconds).

Neuromuscular control: Excellent (balanced landing without any corrective movement), Good (minor corrective movement), Average (temporary loss of balance), Poor (loss of balance or fall).

Scientific Foundations of Test

Test validity: face validity of test was verified by presenting it to (5) experts in volleyball and biomechanics, experts evaluated test in terms of clarity of instructions and suitability of test items to required skills, ability to accurately measure landing speed and neuromuscular control was improved, and necessary adjustments were made to any unclear or potentially confusing clauses for players. To ensure that test appears suitable for measuring intended objective.

The test's validity was verified through content validity, which was confirmed by expert review of range of skill elements to be measured. These are vertical and offensive jump, proper landing, neuromuscular control and balance, and experts provided their observations via a detailed review form. Appropriate adjustments were made to items to ensure that all aspects of skill were fully covered, and pilot test helped to fine-tune instructions and ensure suitability of test items before application to main sample.

Table 1. Expert agreement rate on sincerity Test

Variables	Experts No.	Yes	No	Calculated Chi2 value	Schedule Chi2 value	Sig. type
Landing Velocity and Neuromuscular Control	5	4	1	7.36	3.84	Sig.

Test Reliability: Reliability is a fundamental principle in measurement. Validity and objectivity are indicators that must be present when constructing and administering tests, and test reliability means that scores obtained are accurate and error-free. So that if same measurement tool is applied to same individuals several times in same way and under same conditions, results will be identical or very similar. (Radwan, 2006, 99) points to two main justifications for importance of estimating reliability: Reliability is one of the most important conditions that must be met in measurement instruments, and because it is affected by chance factors and measurement errors, it must be estimated before using instrument in order to benefit from its results. Reliability is a necessary procedure in every research experiment, as application of test may be subject to errors and random factors that vary from one researcher to another, from one situation to another, and from one time to another, which makes its assessment necessary.

Based on this, a pilot test was conducted on a sample of (5) players outside main sample, where test was applied to players with same procedures and instructions. test was then repeated after a short period to ensure reproducibility of results , and analyses showed that test gives consistent results, confirming its stability and reliability before application to the main sample.

Objectivity: Objectivity means that test results are based on clear and specific criteria, and are not influenced by judgment or opinion of person administering test. To achieve this, researcher used test in a structured and clear manner for all players, with specific instructions and precise evaluation items. Since test demonstrated a high degree of reliability, this also enhances objectivity, as consistency of results reduces any personal influence of evaluator and ensures a fair assessment of all participants.

Table 2. Shows stability test and validity self and objectivity tests

Variables	Reliability	Validity	Objectivity	Measurement unit
Landing Velocity and Neuromuscular Control	0.91	0.95	0.96	Degree

Pilot study

Before applying the test to main sample A pilot test was conducted to ensure clarity of instructions, validity of testing procedures, and suitability of items , pilot included (5) players from outside main sample, test was administered to them on Saturday 3/1/2026.

During pilot study: Players' performance in technical jumps was monitored, and landing time and degree of neuromuscular control were measured. Any difficulty in understanding instructions or implementing items was recorded. Making necessary adjustments to test to ensure ease of application and accuracy. Results helped to confirm reliability, objectivity, and validity of test for measurement before application to main sample of 63 players.

Applying test to main sample

After completing pilot test and refining procedure, it was administered to main sample of 63 players from clubs in Diyala Governorate. To ensure each player performed accurately and comfortably, application was divided over three consecutive days: Thursday, Friday, and Saturday January 8-10, 2026. Each player was allotted sufficient time to perform three attempts. With short rest periods between each attempt to avoid fatigue and its impact on results, all data relating to landing time and degree of neuromuscular control were accurately recorded. To ensure reliability of results and their suitability for statistical analysis.

Statistical methods

The researcher used SPSS software to analyze data, calculating arithmetic means and standard deviations to determine players' performance levels, reliability, objectivity , and validity of test were verified using expert evaluations and Cronbach's alpha coefficient , and agreement among experts was analyzed. Chi -squared test was used, and a significance level of 0.05 was adopted to determine significance of results, ensuring accuracy and objectivity of analysis and drawing of reliable scientific conclusions.

RESEARCH RESULTS

Presentation of results of landing speed and neuromuscular control test

Table 3. Speed and neuromuscular control test in sample

Variable	Mean	Standard deviation	Max.	Min.	Validity Notes
Landing Velocity (sec.)	0.670	0.040	0.75	0.60	Valid and Reliable
Neuromuscular Control	3.25	0.50	4.00	2.50	Valid and Reliable

DISCUSSION

Table 3. shows that statistical indicators in landing speed and neuromuscular control test are characterized by a high degree of validity and reliability, mean landing time was (0.670) seconds with a standard deviation of (0.040), reflecting that players' results were consistent and regular, test is able to accurately measure landing performance and average score for neuromuscular control was (3.25). With a standard deviation of (0.50), this indicates that players demonstrated a good level of balance and control upon landing after jumps, maximum and minimum limits for each variable demonstrate that test is able to clearly distinguish different performance levels among players, results of current research are consistent with recent studies in this field.

De Bleecker et al. (2024) confirmed that "Kinematic analysis of landing jumps in volleyball has high stability indices, this makes measurements accurate and reliable for use in sports screening and monitoring programs". like that a review by Yang et al. (2026) indicated "Neuromuscular training promotes dynamic and static stability in athletes, this underscores importance of measuring neuromuscular control as a key element in performance evaluation and injury risk reduction". As supported by results of de Souza study (2025). Effectiveness of using modern applications such as My Jump® 2 for measuring jump height has been demonstrated, showing high accuracy and reliability, which enhances practical aspect of field tests. As for Arab level a study by Al-Fadhli (2022) demonstrated that neuromuscular activation effectively contributes to development of motor skills in volleyball players.

This underscores importance of including these variables when designing standardized tests. The researcher believes that these results and studies support fact that test is an accurate and reliable scientific tool for assessing landing speed and neuromuscular control. It can be relied upon to monitor individual and group performance. Developing targeted training programs that enhance technical performance and reduce risk of injuries.

CONCLUSIONS AND RECOMMENDATIONS

Test of landing speed and neuromuscular control showed high stability and validity. This makes it a reliable tool for assessing technical performance of young volleyball players. Test results showed a disparity in performance levels among players. This highlights need for targeted training programs to enhance neuromuscular control and improve rapid and safe landing.

It is recommended to administer test periodically to monitor development of individual and team players. Identifying strengths and weaknesses in technical performance and neuromuscular control. It is advisable to include specialized training programs aimed at improving landing speed and neuromuscular stability. To reduce risk of injuries and enhance quality of technical performance in volleyball.

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