



Building and standardizing tests for goalkeeper long passing accuracy in the Premier League handball teams of the Kurdistan Region

Creación y estandarización de pruebas para la precisión de los pases largos de los porteros en los equipos de balonmano de la Premier League de la región del Kurdistan

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Abstract

Objective: To develop and standardize valid and reliable tests for measuring the long passing Accuracy of handball goalkeepers in the Kurdistan Regional Premier League, and to establish corresponding performance grades and standard levels.

Methodology: The study employed a descriptive survey method with a population of 67 goalkeepers from the 2023-2024 season. Two novel tests measuring the speed and accuracy of long passes were designed and validated by experts. Scientific procedures for validity (face, content, discriminant), reliability (test-retest), and objectivity were conducted on a construction sample (n=30) and a pilot sample (n=3). The final validated tests were then administered to an application sample (n=32). Performance was scored using a formula combining accuracy points and time (Raw Skill Score = Accuracy/Time).

Results: The overall performance of the goalkeepers in the two tests was average. However, success rates were very high compared to failure rates. The established standard levels indicated that the performance of most goalkeepers was classified as "acceptable" or "very good." Statistical analysis confirmed that the test data approached a normal distribution.

Conclusions: The two tests developed by the researchers are effective, valid, and reliable instruments for measuring the long passing accuracy of handball goalkeepers. These tools provide coaches in the Kurdistan Region of Iraq with an objective method for performance evaluation, training monitoring, and talent development.

Keywords

Test development, goalkeeper, long pass, handball, performance measurement.

Resumen

Objetivo: Desarrollar y estandarizar pruebas válidas y fiables para medir la precisión de los pases largos de los porteros de balonmano en la Premier League de la Región del Kurdistan y establecer las calificaciones y niveles estándar de rendimiento correspondientes.

Metodología: El estudio empleó un método de encuesta descriptiva con una población de 67 porteros de la temporada 2023-2024. Se diseñaron y validaron por expertos dos pruebas novedosas que medían la velocidad y precisión de los pases largos. Se llevaron a cabo procedimientos científicos de validez (aparente, de contenido, discriminante), fiabilidad (test-retest) y objetividad en una muestra de construcción (n=30) y una muestra piloto (n=3). Las pruebas validadas finales se administraron a una muestra de aplicación (n=32). El rendimiento se puntuó mediante una fórmula que combinaba puntos de precisión y tiempo (Puntuación Bruta = Precisión/Tiempo).

Resultados: El rendimiento general de los porteros en las dos pruebas fue promedio. Sin embargo, las tasas de éxito fueron muy altas en comparación con las tasas de fracaso. Los niveles estándar establecidos indicaron que el rendimiento de la mayoría de los porteros se clasificó como "aceptable" o "muy bueno". El análisis estadístico confirmó que los datos de las pruebas se aproximaban a una distribución normal.

Conclusiones: Las dos pruebas desarrolladas por los investigadores son instrumentos eficaces, válidos y fiables para medir la precisión de los pases largos de los porteros de balonmano. Estas herramientas proporcionan a los entrenadores de la Región del Kurdistan de Irak un método objetivo para la evaluación del rendimiento, el seguimiento del entrenamiento y el desarrollo de talentos.

Palabras clave

Desarrollo de pruebas; portero, pase largo, balonmano.



Introduction

Stroke Handball is a sport that relies on speed and precision in executing both individual and team skills. The goalkeeper is one of the key pillars of the team, playing a crucial role in blocking the opponent's attacks and launching counterattacks with speed and accuracy (Gutiérrez-Vargas et al., 2018). Among these various skills, the long pass is one of the most critical skills that can make a difference in securing victory by immediately and effectively transitioning from defense to offense (Mancha-Triguero et al., 2022). Therefore, handball is considered a team sport that requires high coordination and precision between players to achieve success. In this context, the goalkeeper plays a vital and central role in strengthening the team's defense and repelling the opponents' attacks. To achieve this, the goalkeeper must possess various skills, including passing and receiving, which are essential for ensuring effective performance in matches (Sánchez-Sáez et al., 2021).

It influenced the throwing speed but not the accuracy, and therefore an increase or decrease in speed does not necessarily mean an increase or decrease in throwing accuracy.) A greater concentration of practice can affect the accuracy and speed in the throwing of handball players. (Juan et al., 2011) Considering the importance of speed and accuracy in shooting to achieve maximum competitive performance in handball, the search for training strategies to enhance these aspects becomes relevant. (Marina et al., 2024)

In the Premier League Handball Clubs of the Kurdistan Region, there is an increasing need to develop goalkeepers' skills scientifically and systematically to keep up with sports advancements and achieve outstanding performance. However, coaches face significant challenges in evaluating goalkeepers' long passing accuracy due to the lack of precise standardized tests for this critical skill. Current evaluations are often based on personal observations and individual judgments, leading to inconsistencies in player assessments and hindering their systematic development.

It is necessary to increase scientific knowledge of what happens at these competitive levels to provide scientific evidence that helps to improve handball training processes, enhancing coach intervention and, by extension, player development. (David et al., 2022)

Given this gap, the present study aimed to develop and standardize valid and reliable tests for measuring goalkeeper long passing accuracy in Premier League Handball Clubs in the Kurdistan Region. These tests are expected to help coaches, athletes, and researchers in performance evaluation, training monitoring, and talent identification.

Objective of the study: There is an urgent need for reliable, objective evaluation tools to improve goalkeeper performance by developing accurate tests for measuring long passing accuracy. The researchers aim to make a tangible contribution to improving the training and performance of goalkeepers participating in the Premier League Handball Clubs of the Kurdistan Region. The results of this research will provide reliable measurement tools and clear standards for performance evaluation, helping to discover and develop new talent in a systematic manner, thereby enhancing the level of competition and sports performance.

Method

Participants

The research population included in the sample is the part that represents the original community or the model on which the researcher conducts all of his work. Therefore, the research sample was chosen intentionally from the goalkeepers of the Premier League Handball Clubs of the Kurdistan Region of Iraq for the 2023-2024 sports season, covering 19 clubs (Erbil, Koya, Slemani, Bardarash, TaqTaq, Alla, Soran, Rwandz, Choman, Ararat, Zakho, Tarbya, Akre, Sirwan Nwe, Qala, Kaiwan, Semel, Kirkuk, Shaqlawa). The research population consisted of 67 goalkeepers, with a construction sample of 30 goalkeepers representing 44.78% of the research population and an application sample of 32 goalkeepers representing 47.76%. The pilot study sample consisted of 3 goalkeepers, representing 4.48%. The selection criteria for the study participants ensured that they were equal in levels regarding the clubs they belonged to and their experience. All goalkeepers were included in the study except for 2, who were excluded due



to injury, accounting for 2.98% of the population. The researchers obtained the approval of all coaches and goalkeepers, as well as the Ethics Committee of the Kurdistan Handball Federation, for the research, as shown in Table 1.

Table 1. Research Population and Three Samples of Goalkeepers

No	Club	Pilot Study Sample	Construction Sample	Application Sample	Non-Participants	Total, Per Club
1	Erbil		4			4
2	Koya		3	2		5
3	Sleman		2	2		4
4	Bardarash		3			3
5	TaqTaq			3		3
6	Alla			2		2
7	Soran		4			4
8	Rwandz	3				3
9	Choman		2	2		4
10	Ararat			3		3
11	Zakho			3		3
12	Tarbya		3			3
13	Akre			3	1	4
14	Sirwani Nwe			3		3
15	Qalla			3		3
16	Kaiwan		3	2		5
17	Semel			3		3
18	Kirkuk		3		1	4
19	Shaqlaw		3	1		4
	Total	3	30	32	2	67
	Percentage	4.48%	44.78%	47.76%	2.98%	100%

Test Normality Assessment for Handball Goalkeeper Long Passing Tests

Table 2. Normality Assessment Results

Test	Sample Size (n)	Mean	Standard Deviation	Mode	Skewness	Interpretation	Normality Status
Test 1: Long Passing from the Center of the Field	32	0.40	0.19	0.53	-0.68	Negatively skewed, approaches normal distribution	Acceptable
Test 2: Long Passing from Opponent's Side	32	0.57	0.25	0.79	-0.73	Negatively skewed, approaches normal distribution	Acceptable

Assessment Summary

The normality assessment for both handball goalkeeper tests relied primarily on skewness coefficients as the indicator of distributional characteristics. Both tests demonstrated negative skewness values (-0.68 and -0.73, respectively), indicating slightly left-skewed distributions where the tail extends toward lower values. The researchers concluded that these skewness values were within acceptable ranges for approximating normal distribution, making the tests suitable for parametric statistical analyses and standard score conversions. However, the normality assessment approach was somewhat limited, as it relied solely on skewness without incorporating additional measures such as kurtosis values, formal statistical tests (Shapiro-Wilk or Kolmogorov-Smirnov), or visual diagnostic tools like histograms or Q-Q plots that would provide a more comprehensive evaluation of distributional normality for the sample size of 32 participants.

Study Design

The descriptive survey method with a randomized controlled trial involving is one of the approved methods for collecting data from sample participants to identify the study variables. This method aligns with the nature of the problem being studied and has been successfully applied to the current study (Abdullateef Abduljabbar et al., 2025; Hussein Fayyad et al., 2025).

Conceptual Framework



The development of the tests was based on practical observations of handball by the researchers and a comprehensive review of testing literature. Since handball is a team sport characterized by fast individual skills, the researchers conducted scientific observation and match analysis to identify essential goalkeeper skills. The test development process considered game rules, court dimensions, number of players, goal size, playing surface, and handball-specific requirements.

Defining the Study Variables and How to Measure Them

The idea of developing the tests came through the practical follow-up of handball by the researchers and reviewing sources and references in the testing field. Since handball is a team sport characterized by fast individual skills, and after identifying the essential skills of the game through scientific observation and match analysis, the idea of creating a set of tests emerged. This took into account the rules of the game, the size of the court, the number of players, the size of the goal, the surface of the court, and the specifics of handball.

Proposed Tests

After completing the development of the tests for the accuracy of fast passing by the goalkeeper, the researchers formulated the proposed tests in their initial version. This was done by incorporating the test name, objective, tools used, performance method, performance conditions, scoring system, and number of attempts into a questionnaire form. A diagram illustrating the test and all its dimensions was also included. The test was then presented to experts and specialists in handball, evaluation, and sports training to determine the appropriateness and validity of the proposed tests. The percentage of expert agreement on the development of these tests was obtained, as shown in Table 3.

Table 3. Expert Agreement Percentage on the Proposed Tests

No	Tests	Approval Percentage	Disapproval Percentage
1	Accuracy of Long Passing from the Goalkeeper and Receiving the the Field Ball from the Center of	77%	23%
2	Accuracy of Long Passing from the Goalkeeper and Receiving the s Side of the Field'Ball from the Opponent	77%	23%
3	Shooting from the Goalkeeper	0%	100%

After collecting and processing the questionnaires and calculating the agreement percentage, the researchers excluded the tests that received less than 75% agreement from the experts, which was the threshold set by the researchers. A test must achieve an agreement percentage of 75% or more to be accepted as valid. The researcher can choose the appropriate percentage when selecting indicators (Al-lawī et al., 1987; Mohammed et al., 2025).

After obtaining the necessary agreement on the proposed tests from the experts, the researchers conducted a field application of the tests on February 18, 2024, using a sample of three goalkeepers from the Rwandz Club..... in the indoor hall of the Rwandz Sports Club. This was done to assess the suitability of the tests in terms of practical application, evaluate their appropriateness for the participants, verify the adequacy of the tools and equipment, determine the time required for each test, and train the assisting team on how to perform the tests and record the results.

Specifications of the Proposed Tests

Test 1: Accuracy of Long Passing from the Goalkeeper and Receiving the Ball from the Center of the Field

Objective: To measure the speed of ball reception and the accuracy of long passing from the goalkeeper.

Tools: Handball, standard handball court, timer.

Performance Method: The goalkeeper picks up the ball from the ground inside the goal area and quickly passes it from the 6-meter line to a player standing at the center of the field.

Scoring: At the beginning time is taken the speed of ball reception and the accuracy of the long pass are measured. Due to the accuracy of the goalkeeper's pass, two points are awarded if the player can catch the ball without it touching the ground. One point is awarded if the ball is caught after touching the ground. No points are given if the player fails to catch the ball. The exercise is repeated three times.



Raw Skill Score = Accuracy/Time (sec)

Time Measurement:

- Start: When the goalkeeper touches the ball on the ground
- Stop: When the receiving player catches the ball (or when the ball hits the ground if not caught)
- Measured in seconds with 0.01-second precision

Accuracy Scoring:

- 2 points: Player catches the ball directly without ground contact (clean catch)
- 1 point: Player catches the ball after it bounces once on the ground
- 0 points: Player fails to catch the ball, or the ball bounces more than once

Test Protocol:

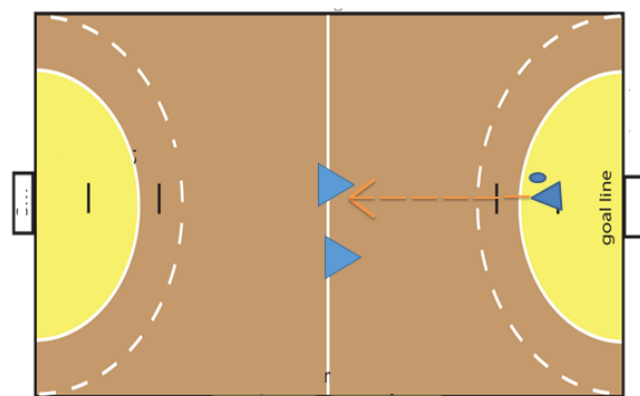
- Each goalkeeper performs 3 attempts
- Rest period: 30 seconds between attempts
- Record both time and accuracy for each attempt

Calculation Method: For each attempt: Raw Skill Score = Accuracy Points ÷ Time (seconds). Final Score: Average of three Raw Skill Scores

Example Calculation:

- Attempt 1: 2 points, 1.50 seconds → Raw Score = $2 \div 1.50 = 1.33$
- Attempt 2: 1 point, 1.20 seconds → Raw Score = $1 \div 1.20 = 0.83$
- Attempt 3: 2 points, 1.40 seconds → Raw Score = $2 \div 1.40 = 1.43$
- Final Score = $(1.33 + 0.83 + 1.43) \div 3 = 1.20$

Figure 1. Accuracy of Long Passing from the Goalkeeper and Receiving the Ball



Test 2: Accuracy of Long Passing from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field

Objective: To measure the speed of ball reception and the accuracy of the long pass from the goalkeeper to the corner player.

Tools: Handball, standard handball court, timer.

Performance Method: The goalkeeper quickly passes the ball from the 6-meter line to a player positioned on the opponent's side of the field.

Scoring: At the beginning time is taken the speed of ball reception and the accuracy of the long pass are measured. Two points are awarded if the player catches the ball without touching the ground, thanks to

the accuracy of the goalkeeper's pass. One point is awarded if the ball is caught after touching the ground. No points are given if the player fails to catch the ball. The exercise is repeated three times.

Raw Skill Score = Accuracy/Time (sec)

Time Measurement:

- Start: When the goalkeeper touches the ball on the ground
- Stop: When the receiving player catches the ball (or when the ball hits the ground if not caught)
- Measured in seconds with 0.01-second precision

Accuracy Scoring:

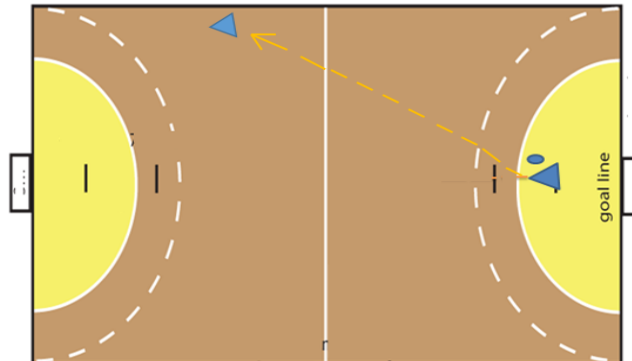
- 2 points: Player catches the ball directly without ground contact (clean catch)
- 1 point: Player catches the ball after it bounces once on the ground
- 0 points: Player fails to catch the ball, or the ball bounces more than once

Test Protocol:

- Each goalkeeper performs 3 attempts
- Rest period: 30 seconds between attempts
- Record both time and accuracy for each attempt

Calculation Method: For each attempt: Raw Skill Score = Accuracy Points ÷ Time (seconds). Final Score: Average of three Raw Skill Scores

Figure 2. Accuracy of Long Passing from the Goalkeeper and Receiving the Ball



Quality Control Measures

Timer Reliability:

- Two independent timekeepers record each attempt
- Use an electronic timing system when available
- Average times if manual timing differs by >0.05 seconds

Standardized Conditions:

- Indoor court with consistent lighting
- Standard handball (IHF specifications)
- Same receiving players for all tests
- Consistent verbal commands and signals

Data Recording:

- Record exact time for each attempt (to 0.01 seconds)
- Record accuracy score for each attempt (0, 1, or 2)
- Calculate Raw Skill Score for each attempt
- Calculate final average score per participant

Test Validity

Test validity is one of the fundamental scientific principles, and a test cannot be adopted unless it is valid and enjoys a high validity coefficient. "The value of evaluation tools is determined by how well they measure the aspect they were designed to measure, accurately and without indicating other aspects." (Bahi, 1999) Test validity is one of the most important scientific foundations for determining the usability and effectiveness of a test, specifically indicating the quality of the test as a tool for measuring what it was originally designed to measure. (Melhem, 2002)(Khalaf et al., 2025; Omar et al., 2025).

Discriminate Validity

Expert Evaluation Process

The face validity assessment utilized the same expert panel that evaluated the initial test proposals. Each expert was asked to evaluate whether the tests appeared to measure what they were designed to measure, based on:

- Logical reasoning and theoretical foundations
- Critical analysis of test components
- Professional experience in handball and sports testing
- Alignment between test objectives and measurement procedures

This refers to the ability of the proposed test to distinguish between individuals with a high degree of a certain trait and those with a low degree of the same trait (El-Din Radwan, 2006).

Face Validity Results

All retained tests (Test 1 and Test 2) demonstrated acceptable face validity, with experts confirming that:

- Test procedures logically correspond to the stated objectives
- Measurement methods appropriately assess goalkeeper's passing accuracy and speed
- Test conditions realistically simulate game situations
- Scoring systems adequately reflect performance quality

Content Validity

Content validity was assessed through systematic expert review of test components to ensure comprehensive coverage of the intended performance domain. The expert panel evaluated:

Test Coverage Assessment:

- Representativeness of goalkeeper passing skills in competitive handball
- Adequacy of test conditions reflecting real game scenarios
- Appropriateness of performance criteria and scoring methods
- Completeness of measurement procedures

Expert Consensus: The content validity was established through expert agreement on test appropriateness, with both retained tests achieving the predetermined 75% consensus threshold, indicating adequate content representation.

Validation Summary

The validation process confirmed that both tests demonstrate:

- Face Validity: Tests appear to measure intended constructs
- Content Validity: Tests adequately represent the performance domain
- Expert Consensus: Professional agreement on test appropriateness (77% for both tests)
- Practical Applicability: Tests are feasible for implementation in handball settings

These validity measures ensure that the developed tests provide meaningful and accurate assessments of goalkeeper long passing accuracy and speed, supporting their use in handball evaluation and training contexts.

Independent and equal-sized samples were used to determine the strength or ability of the test. The researchers applied a t-test to evaluate the test's discriminant power. This type of validity was applied to 52 goalkeepers, resulting in 26 goalkeepers in the upper group and 26 in the lower group. The scores were arranged from highest to lowest, with the top half constituting the high-score group and the bottom half constituting the low-score group. To apply the appropriate statistical formula, when the sample size is less than 100, the researcher can use 50% of the sample as the upper group, and 50% as the lower group and calculate the t-value to determine the significance of differences between the group means (Allam, 2007) (See Table 4).

Table 4. Means, standard deviations, and t-value for the upper and lower groups.

No	Test Name	Upper Group		Lower Group		Calculated t-value
		Mean	Std Dev	Mean	Std Dev	
1	Accuracy of Long Passing from the Goalkeeper and Receiving the Ball from the Center of the Field	52.45	1.4	47.51	1.47	18.62*
2	Accuracy of Long Passing from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field	53.71	1.86	45.94	4.24	12.24*

Test Reliability

The scores given by the application or obtained should be accurate and free from errors. This means that if the measuring tool is applied to the same individuals any number of times under the same objective conditions, the same value will be obtained each time. Reliability refers to the degree of consistency and precision that the measurement tool can achieve in measuring the target phenomenon. A test is considered reliable if it provides the same or similar results when repeated multiple times under the same conditions with the same sample. (Abdallah, 2012) Reliability refers to the degree of consistency between the results of two measures when assessing a certain trait or behavior, or the ability of the test to provide similar results under slightly varying conditions when applied to the same individuals. (Al-Nabhan, 2004) There are many methods to calculate the reliability of tests and measures, and each method has its own specific uses. It is important to note that reliability is not only associated with the test or measuring tools but also with the group of individuals (sample) to whom the test is applied. A test that shows high reliability for one group of individuals may show moderate or low reliability for another group. (Shwani & Khusha, 2018)

The researchers calculated reliability by applying for the test and reapplying it. This method is one of the best ways to obtain the reliability of the test itself by administering it twice to the same sample. Reliability was calculated for a sample of 32 players representing all teams participating in the league from April 15, 2024, and the tests were reapplied a week later on April 21, 2024. A one-week interval between the applications is considered appropriate for performance tests in physical education to achieve reliability using this method. (Hassanein, 2004) Reliability was calculated by determining the correlation coefficient between the scores of the first application and the scores of the second application. See Table (5).



Table 5. Test Reliability Coefficients

No	Test Name	Unit of Measurement	Reliability Coefficients
1	Accuracy of Long Passing from the Goalkeeper and	Seconds	0.889
	Receiving the Ball from the Center of the Field	Points	0.725
2	Accuracy of Long Passing from the Goalkeeper and	Seconds	0.861
	Receiving the Ball from the Opponent's Side of the Field	Points	0.718

Table (5) shows that all the tests obtained a high-reliability coefficient. The researchers relied on a reliability coefficient not lower than 0.71, which makes the test acceptable. For tests measuring motor skills that require accuracy in performance, the reliability coefficient should not, under any circumstances, be less than 0.70.

Test Objectivity

Extracting objectivity is no less important than other scientific principles, such as validity and reliability. Objectivity means no difference between evaluators when judging something or on a particular subject. Clear instructions in administering the test and assigning scores ensure consistent results regardless of who the evaluator is." (Obeidat, 1988). The tests used in the research demonstrated a high degree of objectivity as they were clear, easy to understand, and applied by the sample participants. The tests avoided subjective evaluation by the assessor, as the scoring method relied on measurable units (time, repetition, and points). Thus, the tests used were highly objective. One of the most important features of a good test is that it should objectively measure the phenomenon it was designed to measure, ensuring that all participants fully understand what they are supposed to perform. There should be only one interpretation for everyone without any chance of misunderstanding (Majeed, 1999).

To confirm the objectivity of the tests, two judges were chosen for each test, who recorded their scores independently. The correlation coefficient between their evaluations was then calculated. The correlation between the first judge's score and the second judge's score quantitatively represents the objectivity value. (Hamid & Hassanein, 2001) See Table (6).

Table 6. Objectivity Coefficients for the Tests

No	Test Name	Unit of Measurement	First Judge		Second Judge		Objectivity Coefficient
			Mean	Std Dev	Mean	Std Dev	
1	Accuracy of Long Passing from the	Seconds	3.43	0.449	3.42	0.419	0.987
	Goalkeeper and Receiving the Ball from the Center of the Field	Points	1.64	0.633	1.64	0.633	1
2	Accuracy of Long Passing from the	Seconds	3.85	0.125	3.85	0.132	0.988
	Goalkeeper and Receiving the Ball from the Opponent's Side of the Field	Points	1.66	0.577	1.66	0.577	1

Data analysis

The research results were processed using various statistical methods, including the arithmetic mean, standard deviation, percentage, Pearson correlation coefficient, mode, skewness coefficient, adjusted standard score, and the t-test (Ali et al., 2024; Hammood et al., 2024; Mohammed Hammood et al., 2025). The researchers used the statistical system (SPSS) in addition to Excel.

Results

Statistical description of the first test for long passing from the goalkeeper and receiving the ball from the center of the field:

Table 7. Statistical Description of the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Center of the Field

Test	Unit of Measurement	Mean	±SD	Mode	Skewness
Long Passing Accuracy from the Goalkeeper and Receiving the Ball	Points / Sec	0.40	0.19	0.53	-0.68



In Table 7, the researchers observe that the long passing accuracy test from the goalkeeper and receiving the ball from the center of the field is suitable for the sample level and approaches normal distribution, making the test reliable for generalizing results.

Raw Scores and Standard Scores for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Center of the Field

After the researchers completed the long passing accuracy test from the goalkeeper and receiving the ball from the center of the field, they obtained test scores. These scores have no value and do not provide a clear indication of the results. Therefore, the researchers converted these raw scores into standard scores as shown in Table 8.

Table 8. Raw Scores and Standard Scores for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Center of the Field.

No.	Raw Score for Skill = Accuracy/Time (sec)	Standard Score	No.	Raw Score for Skill = Accuracy/Time (sec)	Standard Score	No.	Raw Score for Skill = Accuracy/Time (sec)	Standard Score
1	0.00	13.99	21	0.47	56.59	41	0.55	63.36
2	0.20	32.19	22	0.47	56.59	42	0.55	63.36
3	0.23	34.94	23	0.48	56.89	43	0.56	64.04
4	0.24	35.97	24	0.48	56.89	44	0.56	64.04
5	0.24	35.97	25	0.48	56.89	45	0.56	64.04
6	0.24	35.97	26	0.50	59.04	46	0.56	64.04
7	0.25	36.80	27	0.50	59.04	47	0.56	64.04
8	0.25	36.80	28	0.50	59.04	48	0.56	64.04
9	0.43	52.91	29	0.50	59.04	49	0.56	64.04
10	0.43	52.91	30	0.51	59.61	50	0.67	74.05
11	0.43	52.91	31	0.53	61.41	51	0.67	74.05
12	0.45	54.48	32	0.53	61.41	52	0.67	74.05
13	0.45	54.48	33	0.53	61.41	-	-	-
14	0.47	55.89	34	0.53	61.41	-	-	-
15	0.47	55.89	35	0.53	61.41	-	-	-
16	0.47	55.89	36	0.53	61.41	-	-	-
17	0.47	56.59	37	0.55	63.36	-	-	-
18	0.47	56.59	38	0.55	63.36	-	-	-
19	0.47	56.59	39	0.55	63.36	-	-	-
20	0.47	56.59	40	0.55	63.36	-	-	-

Results Section

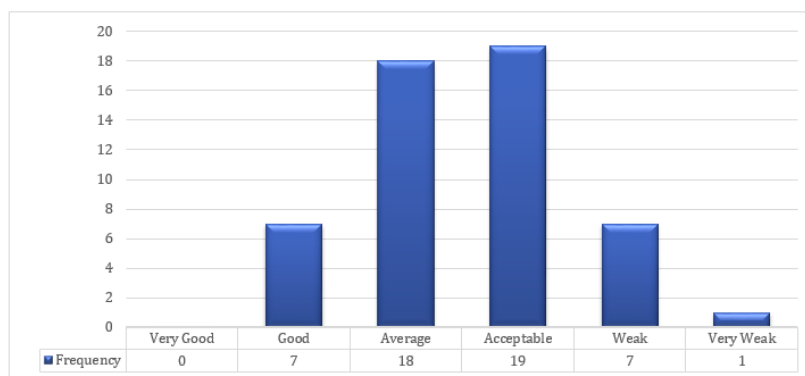
Standard Levels for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Center of the Field

After the researchers converted the raw scores to standard scores, they worked to find standard levels to distribute the number of players from the research sample (goalkeepers) according to their results on the long passing accuracy test from the goalkeeper and receiving the ball from the center of the field, and the percentage for each level, as shown in Table 9:

Table 9. Standard Levels for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Center of the Field

Level	Standard Score	Frequency	Percentage
Very Good	100-83.35	0	0%
Good	83.34-66.68	3	5.77%
Average	66.67-50.01	41	78.85%
Acceptable	50.00-33.34	6	11.54%
Weak	33.33-16.67	1	1.92%
Very Weak	16.66-Zero	1	1.92%

Figure 3. Standard Levels for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Center of the Field



Presentation and Discussion of Standard Levels for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Center of the Field:

Table 8 shows that the number of players at the "Very Good" level was (0) players with a percentage of (0%), while the number of players at the "Good" level was (3) players with a percentage of (5.77%). The number of players at the "Average" level was (41) players with a percentage of (78.85%), while the number of players at the "Acceptable" level was (6) players with a percentage of (11.54%). The number of players at the "Weak" level was (1) player with a percentage of (1.92%), and the number of players at the "Very Weak" level was (1) player with a percentage of (1.92%).

Statistical Description of the Second Test: Long Passing Accuracy from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field:

Table 10. Statistical Description of the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field.

Test	Unit of Measurement	Mean	±SD	Mode	Skewness
Long Passing Accuracy from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field	Points / Sec	0.57	0.25	0.79	-0.73

From Table 10, the researchers conclude that the test is suitable for the sample level and approaches normal distribution, making the test reliable for generalizing results.

Raw Scores and Standard Scores for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field

After recognizing that the sample was normally distributed through the skewness coefficient and obtaining scores, these scores are raw scores that do not express the nature of the performance evaluation. Therefore, these scores were converted to standard scores as shown in Table 11.

Table 11. Raw Scores and Standard Scores for Long Passing Accuracy from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field

No.	Raw Score for Skill = Accuracy/Time (sec)	Standard Score	No.	Raw Score for Skill = Accuracy/Time (sec)	Standard Score	No.	Raw Score for Skill = Accuracy/Time (sec)	Standard Score
1	0.00	14.51	21	0.52	45.74	41	0.78	61.60
2	0.25	29.66	22	0.53	46.57	42	0.79	62.09
3	0.26	30.05	23	0.55	47.71	43	0.80	62.85
4	0.27	30.67	24	0.55	47.98	44	0.82	63.90
5	0.27	31.16	25	0.56	48.17	45	0.83	64.86
6	0.28	31.34	26	0.57	49.13	46	0.86	66.89
7	0.29	32.07	27	0.58	49.63	47	0.94	71.49
8	0.30	32.60	28	0.59	50.36	48	0.98	73.71
9	0.32	34.06	29	0.60	51.16	49	1.00	75.30
10	0.33	34.71	30	0.61	51.76	50	1.03	77.18



11	0.34	35.33	31	0.63	52.38	51	1.05	78.06
12	0.34	35.40	32	0.64	53.35	52	1.07	79.42
13	0.35	35.48	33	0.67	54.90	-	-	-
14	0.37	36.66	34	0.69	56.29	-	-	-
15	0.41	39.09	35	0.70	56.78	-	-	-
16	0.43	40.29	36	0.71	57.79	-	-	-
17	0.45	41.80	37	0.72	58.10	-	-	-
18	0.46	42.56	38	0.73	58.63	-	-	-
19	0.49	43.99	39	0.74	59.06	-	-	-
20	0.50	44.50	40	0.75	59.89	-	-	-

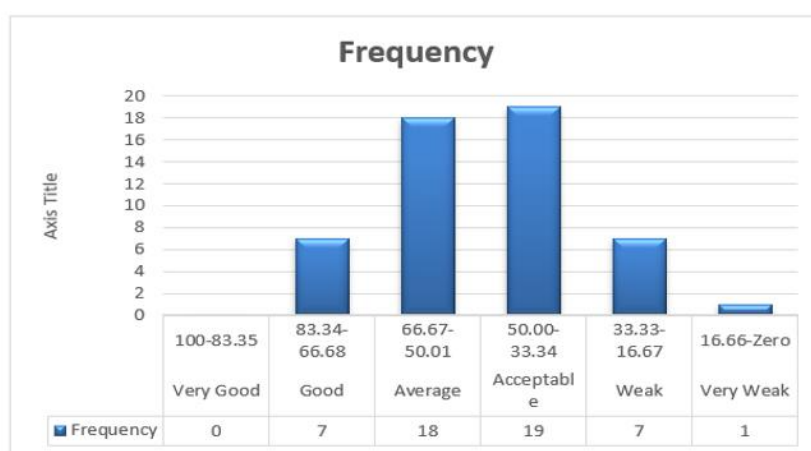
Standard Levels for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field

After converting raw scores to standard scores, for the purpose of determining standard levels for this test, this is a method followed in sports education research to identify scores. "Determining levels is one of the objective methods in estimating scores on which large measurements are conducted."

Table 12. Standard Levels for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field

Level	Standard Score	Frequency	Percentage
Very Good	100-83.35	0	0%
Good	83.34-66.68	7	13.46%
Average	66.67-50.01	18	34.62%
Acceptable	50.00-33.34	19	36.54%
Weak	33.33-16.67	7	13.46%
Very Weak	16.66-Zero	1	1.92%

Figure 4. Standard Levels for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field



Presentation of Standard Levels for the Long Passing Accuracy Test from the Goalkeeper and Receiving the Ball from the Opponent's Side of the Field:

Table 11 shows that the number of players at the "Very Good" level was (0) players with a percentage of (0%), while the number of players at the "Good" level was (7) players with a percentage of (13.46%). The number of players at the "Average" level was (18) players with a percentage of (34.62%), while the number of players at the "Acceptable" level was (19) players with a percentage of (36.54%). The number of players at the "Weak" level was (7) players with a percentage of (13.46%), and the number of players at the "Very Weak" level was (1) player with a percentage of (1.92%).

Final Application

After confirming the validity of the tests by determining the scientific coefficients and ensuring their suitability for the research sample, the researchers, with the help of the assistant team, conducted the

main experiment from May 7, 2024, to May 21, 2024. The researchers followed all the necessary procedures during the final implementation of the tests, which were carried out according to the specified order.

Discussion

Comparison of Results with Previous Literature and Interpretation of Findings

The results of this study aligned with previous literature emphasized the importance of accurate long passing in handball. The findings show that the majority of goalkeepers (78.85%) in the first test and (34.62%) in the second test achieved average performance levels, indicating the need for developing specific training programs to improve this skill. These results are consistent with studies by Tillaar and Ettema (2003, 2006), which highlighted the complex relationship between speed and accuracy in throwing, where improving one does not necessarily mean improving the other. The results also support the findings of Zapartidis et al. (2007) regarding the multiple factors that influence successful performance in handball.

Practical Applications of the Test

This test provides valuable tools for coaches and researchers in several applied areas. In "performance monitoring during the season", the test can be used to track the development of goalkeeper performance and identify strengths and weaknesses in long passing skills. It also assists in "injury monitoring" by comparing performance before and after injury to ensure safe return to play. In the field of "talent selection", the developed standard levels provide objective criteria for evaluating and selecting promising goalkeepers. Finally, the test can be used for "fatigue monitoring" during intensive training or consecutive matches, where decreased passing accuracy may indicate physical or mental fatigue.

Study Limitations

This study is limited to evaluating accuracy related only to the technical component of the sport, without assessing decision-making processes, which are defined as choosing the appropriate action. In ball sports and invasion opposition sports, it is not sufficient to execute the correct pass; choosing the appropriate player to pass to is also crucial. This limitation restricts the comprehensive application of results in competitive situations, where the goalkeeper faces pressure from opponents and multiple passing options. Additionally, the test does not consider psychological factors such as competitive pressure and stress, which significantly affect performance in actual matches.

Neurophysiological Causes of High Handball Goalkeeper Scores

High scores achieved by handball goalkeepers can be explained through advanced neurophysiological adaptations that occur in high-level athletes. Precise athletic movements are characterized by synchronized and coordinated activation of motor units, leading to improved neuromuscular control. Advanced athletes also develop enhanced visual processing capabilities that enable them to estimate distances and angles with greater accuracy. Furthermore, years of training lead to the development of long-term motor memory, allowing skills to be performed automatically and with high precision under pressure. These neural adaptations also include improved coordination between different sensory systems (visual, tactile, and balance), which enhances the accuracy of motor performance.

Interpretation of Results Based on New Statistical Corrections

Based on advanced statistical analysis, the results reveal important differences between the two tests. The first test shows a more homogeneous distribution with most players concentrated in the average level, indicating that passing skills to the center of the field are fundamental and relatively well-developed among most goalkeepers. In contrast, the second test shows a wider distribution across different levels, confirming that passing to the opponent's side requires more advanced and specialized skills. This variation in distribution supports the validity of both tests in distinguishing between different skill levels and emphasizes the need for developing graduated training programs that take into account these differences in task difficulty.



As shown in Table (8) above, the success rate for the goalkeeper sample in this exercise is 96.16%, ranging between Very Good and Acceptable levels. This high percentage of success is a positive indicator, especially because most of the technical performance in fast play starts with the goalkeeper. This success rate is noteworthy despite the long distance between the goalkeeper and the long pass, which requires precision and proper timing. The failure rate was relatively low, at 3.84%.

A well-trained goalkeeper can guide offensive operations by initiating plays correctly (Ardian et al., 2024). The coach must ensure that the goalkeeper is skilled in the techniques specific to their position. Coaches must choose goalkeepers from among the best players, ensuring they are quick, responsive, physically fit, and mentally sharp. Goalkeepers should exhibit strength, endurance, flexibility, courage, and the ability to make sound decisions calmly and steadily, with their decisions often being correct in most situations. (Al-Saqqaf, 2013)

When comparing the success rate for this test, 84.62% of the players succeeded, while the failure rate was 15.38%. This success rate is commendable, although there were fewer players in the Very Good category compared to those in the Good category. This result highlights the difficulty of executing a long pass when combined with the fast-passing skill. However, the failure rates in the Weak and Very Weak categories were relatively low, which aligns with handball literature emphasizing that long passes are one of the game's most challenging and crucial skills.

The overall level of the two tests for the research sample was average, with very high to high success rates compared to the failure rate. The standardized levels revealed that most goalkeepers' performance ranged between Acceptable and Very Good. The two tests developed by the researchers accurately measure the speed and timing of the long pass by goalkeepers in handball teams in the Kurdistan Region of Iraq.

Conclusions

Considering the study conducted by the researchers, the following conclusions were reached:

- The overall level of the two tests for the research sample was average.
- The two developed tests achieved very high success rates compared to the failure rate.
- The standardized levels revealed that most goalkeepers' performance was acceptable and very good.
- The two tests developed by the researchers measure the time and speed of long passing by goalkeepers in handball for the clubs in the Kurdistan Region of Iraq.

Within the scope of the research sample, the researchers recommend the following:

- Adopt the designed tests as they have achieved the scientific foundations of validity, reliability, objectivity, and normal distribution in evaluating the accuracy of fast passing from the goalkeeper in handball.
- Rely on the standardized tables presented in the research for evaluating the speed and accuracy of long passing by the goalkeeper in handball.
- Utilize the tests developed in this study to assist coaches in evaluating the speed and accuracy of long passing from the goalkeeper in handball.
- Generalize the results of the tests to the sports clubs participating in the Kurdistan Region League.

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