

Design and Standardization of a Test to Measure Arm Motor Speed using a Bulgarian Bag 'Among 18–20 Years Old' Weighing Between 65 and 86 kg

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ORIGINAL STUDY

Design and Standardization of a Test to Measure Arm Motor Speed using a Bulgarian Bag 'Among 18–20 Years Old' Weighing Between 65 and 86 kg

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Abstract

The importance of this research lies in understanding the reality of arm kinetic velocity and how to develop it for the better by measuring it and determining its level during the training period. This is achieved by establishing criteria and levels that help coaches and players determine its true level. The research problem was: Kinetic velocity is an important physical requirement in wrestling, especially for the arms, in performing quick and varied movements that help the wrestler perform the required grip on the opponent. This enables the desired accomplishment to be achieved after being tested and measured using a scientific method consistent with the actual reality of the game. Design and standardization of a test to measure the kinetic velocity of the arms using the Bulgarian bag for ages (18–20) years and weighing between 65 and 86 kg. Finding levels and standards to evaluate the kinetic velocity of the arms using the Bulgarian bag for ages (18–20) years and weighing between 65 and 86 kg. The researcher used the descriptive approach with a survey method. The research community was freestyle wrestling players in the specialized school in Basra Governorate, aged (18–20) years and weighing between 65 and 86 kg. After designing and applying the test, the most important conclusions were reached: The test designed by the researcher is able to detect the level of kinetic velocity of the arms for ages (18–20) years and weighing between 65 and 86 kg. It was recommended:- Adopting the current test as a means to detect the level of motor speed of the arms in freestyle wrestling for ages (18–20) years and weighing between 65 and 86 kg.

Keywords: Design, Standardization, Motor speed, Bulgarian bag

1. Research introduction

1.1. Introduction to the research and its importance

Countries rise and advance towards the better as a result of interest in science and knowledge and the various scientific specializations it contains, one of which complements the other, the most important of which is the science of testing and measurement, through which all work, its development and the extent of its progress are monitored. It is also possible to compare between work and individuals, and for this reason Al-Hakim (2004) sees the science of testing and measurement as an organized method for comparing the behavior of two or more people.

In the field of sports, tests and measurements are an important and basic requirement for raising the level of athletes and knowing the extent of progress, whether in training or competition, by measuring the variables required for the game, whether physical, skill-based, tactical, or psychological. For this reason Al-Mandlawi et al. (1989) see tests and measurements as one of the important means for evaluating the level that the athlete has reached, as well as showing the extent of the validity of any training program.

While Al-Sayyid Farahat (2001) believes that tests express the individual's responses in a situation that includes a deliberately organized stimulus with specific characteristics and presented to the individual in a special way that enables the researcher to record and measure these responses accurately.

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One of the sports that require continuous monitoring and measurement in order to raise and develop it to achieve accomplishment is wrestling, in which the physical aspect is very important and high-level physical variables, the development and success of which is an important gain for the player, including the kinetic velocity of the arms, which is considered a necessary physical variable in the movement of the arms with quick movements with the length of the rounds and their times and in different directions in order to achieve a correct grip on the opponent and thus achieve the desired result. For this reason [Mahmoud and Badran \(2002\)](#) see that the physical abilities, speed and strength characterized by speed, agility and muscular endurance are the most important components of physical fitness that are linked to health, increasing the functional efficiency of the body and improving physical performance. They are of great importance in sports activities that are characterized by continuity and a relatively long period of performance, such as wrestling, boxing and judo.

It is clear that the role of the physical aspect in wrestling is important, and how to improve it effectively. Hence, the importance of research is to know the reality of the motor speed of the arms and how to develop it for the better by measuring it and knowing its level during the training period after we set a standardized scale, criteria and levels that help the coach and player to know its true level.

1.2. Research problem

Motor speed is an important physical requirement in wrestling, especially for the arms, in performing quick and varied movements that help the wrestler perform the required grip on the opponent, and from this, the desired accomplishment can be achieved after it has been tested and measured in a scientific manner that matches the real reality of the game.

Through the researcher's modest experience in testing, measurement, and wrestling, as he is a coach and academic, he found it necessary to build a test that measures the level of arm motor speed for wrestling players in ideal conditions similar to racing conditions. In this way, a true measure of this physical ability can be given, as previous measures of this trait were not measured in accordance with the game's atmosphere and using its tools, such as the Bulgarian bag, which can give greater and more precise movement after being given the appropriate weight, which represents the opponent. In this way, we contribute to developing the physical requirements of wrestlers by evaluating them with standardized and modern tests, such as this designed test.

1.3. Research objectives

- Design and standardization of a test to measure arm motor speed using the Bulgarian bag for ages 18–20 and weighing between 65 and 86 kg.
- Developing levels and standards for assessing arm kinetic velocity using the Bulgarian bag for ages 18–20 and weighing between 65 and 86 kg.

1.4. Research areas

1.4.1. Human scope

Freestyle wrestling players at the specialized school in Basra Governorate, aged 18–20 years and weighing between 65 and 86 kg.

1.4.2. Spatial scope

The wrestling hall at the specialized school in Basra Governorate.

1.4.3. Time scope

From January 10, 2025 to March 6, 2025.

2. Research methodology and field procedures

2.1. Research methodology

The researcher used the descriptive approach using the survey method, which is the most appropriate approach for testing and measurement research that helps in designing the required tests.

2.2. Research community and sample

The research community was determined intentionally, consisting of wrestlers from the specialized school in Basra Governorate, aged (18–20) years and weighing between 65 and 86 kg, totaling (60) wrestlers.

The research sample was selected, representing the construction and exploratory samples. The research sample was selected randomly, consisting of (50) wrestlers, as shown in [Table 1](#).

Table 1. Shows the sample details and percentages.

NO	Samples	Sample type	Total
1	Research community	Age (18–20) years	60
2	Honesty pilot study	Age (18–20) years	5
	sample	Age (18–20) years	5
	stability	Age (18–20) years	Same sample in test validity
3	Eliminated wrestlers	Age (18–20) years	10
4	Sample of rationing	Age (18–20) years	50
	Rationing sample percentage		83.33%

2.3. Methods, devices and tools used in collecting information

2.3.1. Data collection methods

1. Arabic and foreign references and sources
2. Designed test
3. Standard scores [Appendix 1](#)

2.3.2. Devices and tools used in data collection

1. Wrestling arena
2. Wrestling equipment
3. Bulgarian bag
4. Measuring tape
5. Medical scale
6. HB computer
7. Stopwatch

2.4. Steps for test design and standardization

2.4.1. Test design

The researcher designed a proposed test to measure arm kinetic velocity using the Bulgarian bag in freestyle wrestling, according to the technical and legal requirements of the sport. After presenting the test to experts and specialists in the field and various sports sciences, the researcher evaluated it and provided their observations regarding the following:

1. The test actually measures arm kinetic velocity in freestyle wrestling.
2. The Bulgarian bag is an important tool in the test, given its very light weight, which helps measure arm kinetic velocity according to correct technical performance.
3. The test is easy to perform.
4. The test is economical in terms of its tools and time.
5. It is suitable for the research sample and its feasibility.

After collecting opinions and conducting a pilot experiment, the test was finalized.

2.4.2. Final exam description

Test Name: Arm Dynamic Speed Test in Freestyle Wrestling.

Test Objective: To measure arm dynamic speed using the Bulgarian bag in freestyle wrestling for wrestlers aged 18–20 years and weighing between 65 and 86 kg.

Equipment Used: Bulgarian bag, wrestling mat, and timer.

Test Method:

- From a standing position with a relatively large foot opening, the wrestler holds the Bulgarian bag with both hands using the middle and side grips. He



Fig. 1. Illustrates the arm speed test in freestyle wrestling.

begins to lift and lower the bag, which weighs a constant 1 kg (i.e., his normal weight). The bag is lifted to the top of the torso by extending the knees, holding it with both hands using the middle grip. Then, he holds it with the side grips while lowering the torso down by bending the knees. He then raises it again by extending the knees, then holds it again using the middle grip with both hands. He continues the lifting and lowering motion for (10) seconds as shown in Fig. 1.

- The count begins within (10) seconds from the moment the wrestler performs the exercise after the coach's whistle, until the time expires and the final whistle is heard.

- The wrestler repeats the exercise until the end of the test.

Notes:

- 1- The examinee must warm up before the test.
- 2- The examinee is entitled to perform a number of attempts for testing purposes before the test.

Recording:

The number of complete correct attempts is counted within (10) seconds.

2.4.3. Exploratory experiment

The researcher conducted the pilot experiment on January 10, 2025, on a sample of (5) players aged 18–20. The experiment was repeated just one week later, on January 17, 2025, on the same sample and under the same conditions. The purpose of the experiment was to:

1. Determine the suitability of the test for the research sample.
2. Determine the time required to conduct the test.
3. Identify any difficulties that the researcher and the supporting staff might face.
4. Identify the tools necessary to conduct the test.
5. Determine the suitability of the dummy used.
6. Establish the scientific basis for the test.

2.4.4. Scientific basis of the test

2.4.4.1. Test validity

In addition to finding the apparent validity of the test by presenting it to experts and specialists, discriminant validity was found. “One of the components of validity is the ability of the test to distinguish between different abilities” (Al-Talib & Al-Samarrai, 1988 and others) by calculating the differences between the results of the test for ages (14–16) years, numbering (5), and the results of the test for ages (18–20) years, numbering (5), as shown in Table 2.

Table 2. Shows the discriminant validity of the test.

Test	Age group (14–16) years		Age group (18–20) years		T value	Significance level
	A	S	A	S		
arm motor speed	0.679	12.743	0.874	15.42	4.84	moral

The value of (t) at a degree of freedom of (8) and a significance level of 0.05 = 2.306.

2.4.4.2. Test reliability

Reliability refers to “the degree of accuracy, precision, or consistency with which a test measures the phenomenon for which it was designed (Allawi & Radwan, 1988). Therefore, test reliability was established using the test-retest method. The first test was conducted on a sample aged 18–20 years on January 10, 2025, and was repeated again on January 17, 2025, under the same conditions as the first test, as shown in Table 3.

Table 3. Shows the reliability of the test by the test-retest method.

Test	The first test		The second test		stability coefficient	Significance level
	A	S	A	S		
arm motor speed	0.874	15.42	0.867	15.27	0.91	moral

The value of (r) at a degree of freedom of (3) and below a significance level of 0.05 = 0.805.

2.4.4.3. Test objectivity

Since the test contains a key for scoring, cannot be manipulated, and the test results are easily accessible by the evaluator, the test is considered objective and its results cannot be manipulated. The test is also considered objective because it is reliable. Majeed (1989) states, The higher the reliability coefficient, the higher the objectivity coefficient, and vice versa.

2.5. Test application

The test was applied to a sample consisting of wrestling players at the Specialized Wrestling School in Basra Governorate, aged (18–20) years, totaling (50). Test criteria and levels were then established, as shown in Tables 4 and 5, for the period from March 4, 2025 to March 6, 2025.

3–6 Statistical Methods: SPSS was used to extract the following statistical methods:

- Arithmetic mean
- Standard deviation
- Simple correlation coefficient
- Coefficient of variation
- Independent samples t-test.

3. Presentation, analysis, and discussion of results

3.1. Presentation of the results of the standard scores and standard levels for the arm motor speed test

After the researcher arrived at the results by applying the proposed test, and to achieve the research objective of finding standard scores for the arm motor speed test for freestyle wrestling players aged (18–20) years, the raw data was obtained. (This requires converting the raw scores to standard scores, which is a means of determining the relative status of the raw scores, and thus these scores can be changed and their results evaluated.) Therefore, the researcher calculated the standard scores according to Table 4.

From Table 4, we note that the arithmetic mean for the freestyle wrestling arm speed test, applied by the research sample, was (15.57), the standard deviation was (0.822), and the coefficient of variation was (5.279). The highest score was (19.68), and the lowest was (11.552). The researcher then verified the normal distribution of the sample by extracting the standard error.

After extracting the results from the previous table, the researcher extracted the relationship to find the constant number, which was later used in developing the modified standard tables using the sequential method, Appendix 1.

The arithmetic mean represents the score (50) in the standard score table. The constant is the amount that

Table 4. Shows the arithmetic means, standard deviations, coefficient of variation, and the highest and lowest scores achieved by the sample members in the arm motor speed test.

Test	Arithmetic Mean	Standard Deviation	Standard Error	Coefficient of Variation	Highest Score	lowest score
arm motor speed	15.57	0.822	0.674	5.279	19.68	11.552

Table 5. Shows the criteria and levels and their assigned percentages in the normal distribution curve, the raw scores, the standard scores adjusted by the sequential method, the number of repetitions, and the percentages for each level in arm motor speed.

Test	Standard levels and their proportions in the normal distribution curve	Raw Scores	Standard Scores	Frequency	Percentage
Arm Speed	Weak	11.552–13.11	1–20	Zero	zero%
	Acceptable	13.192–14.75	21–40	7	14%
	Average	14.832–16.39	41–60	25	50%
	Good	16.472–18.03	61–80	15	30%
	Very Good	18.112 and above	81–100	3	6 %

should be added to or subtracted from the arithmetic mean of the test, as the modified standard score is (a standard score with an average of 50 and a standard deviation equal to zero) (Naji & Bastawisi, 1987). Based on the above, the researcher believes that determining the modified standard scores that wrestlers deserve in the arm motor speed test is considered a comparison tool between the raw scores that the tester obtains with the corresponding modified standard scores (Appendix 1) to become the reference through which the wrestler's performance can be compared with the performance of his peers in the ability that the test can evaluate. In addition, these scores that wrestlers obtain can be compared with a standard reference criterion to know the extent of development that wrestlers have reached.

3.2. Presentation and discussion of the levels for the arm motor speed test

Deriving standard scores is an important step in standardization, given that the raw scores obtained by the tester are not valid for comparison with other testers until they are converted into standard scores.

To determine the standard scores, which are considered criteria and levels that represent the desired goal or objective, as they include scores that indicate the necessary levels Hamid and Radwan (1994), the researcher used the normal (Gaussian) distribution curve, which is considered one of the most common distributions in the field of physical education.

The researcher chose to have (5) levels for the test, and when distributing the standard scores to the standard levels, the levels appeared to us as in Table 5.

From Table 5, we can see the standard levels, raw scores, and standard scores adjusted by the sequential method for the results of the arm kinetic velocity test. From the table, we note that the players were distributed across all levels except for the (weak) level. The percentages were as follows:

The largest percentages were concentrated at the (average) level, which equaled (50%) with a repetition of (25) wrestlers from the total sample.

The second percentage was concentrated at the (good) level, which equaled (30%) with a repetition of (15) wrestlers from the total sample. Meanwhile, the third percentage was concentrated at the (acceptable) level, which equaled (14%) with a repetition of (7) wrestlers. The fourth percentage was the (very good) level, which equaled (6%) with a repetition of (3). The researcher believes that the reason the majority of the sample was concentrated at the intermediate level is due to a lack of attention to this important and fundamental motor skill in wrestling, which helps wrestlers overcome their opponents through speed of movement for the grapple and the technical performance of the required wrestling moves. Raja (2008), believes that wrestling skills are “a set of methods and instructions containing movement forms, and each of these technical forms contains special elements called technical elements, such as body position, leg position, foot movement, and others. As a result of continuous training, we find a partial difference between wrestlers in the performance of these technical elements and the performance of grapples, despite the fact that the motor requirement is the same.

This was confirmed by Petrol (1977), who stated that a good wrestler is one whose performance is characterized by high speed. In most fights, we find that the speed of the opponent's offensive and defensive performance lays the foundation for a quick and effective response.

While the physical aspect is important and essential in performing the required movements, and for this reason Hassan (2011), believes that “the higher the wrestler's special physical preparation, the more it helps in a positive way in developing the level of skillful (technical) performance. The wrestler cannot master the skillful performance of throwing grips in the event that the special physical qualities necessary in the main muscles working in the performance are not available. Therefore, the coach must take into account the close connection between the process of physical and skillful preparation in the training process.

4. Conclusions and recommendations

4.1. Conclusions

In light of the research results and the statistical processing of the data obtained, the researcher reached the following conclusions:

- 1- The test designed by the researcher is capable of detecting the level of arm kinetic velocity in freestyle wrestling for ages 18–20 and weighing between 65 and 86 kg.
- 2- The research sample was divided into four levels, in ascending order (acceptable, average, good, very good).
- 3- The highest percentages of arm motor speed for wrestlers aged 18–20 and weighing between 65 and 86 kg were concentrated at the average level.

4.2. Recommendations

The researcher recommends the following:

- 1- Adopting the current test as a means of detecting the level of arm motor speed in freestyle wrestling for ages 18–20 and weighing between 65 and 86 kg.
- 2- Emphasizing the importance of developing the motor speed of the arms of the research sample, as their level is not ambitious and is within the average level.

Conflicts of interest

None.

We confirm that all tables and figures in this article are ours and written by the researchers themselves.

Ethical statement

This manuscript approved by Director of the Sports Talent Care Department (Samer Diaa Abdel Wahab) and Wrestling School Coach (captain Lobanon Joudeh Lafta) on (10/4/2025).

Author's contributions

The contribution of this study was done by the researcher (Jalal Abdul Zahra Kanaan) who got the main idea and work on writing and concluding also with number of experts, Haider Abdul Razzaq Kazim in Statistics, Raad Abdul Bari Turki in revision and translating.

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Data availability

The data that support the findings of this study are available on request from the corresponding author.

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Appendix No (1)

Illustrates the standard scores for the arm speed test in freestyle wrestling for ages (18–20)

Raw grade	Standard score	Raw grade	Standard score	Raw grade	Standard score	Raw grade	Standard score
11.552	1	13.602	26	15.652	51	17.702	76
11.634	2	13.684	27	15.734	52	17.784	77
11.716	3	13.766	28	15.816	53	17.866	78
11.798	4	13.848	29	15.898	54	17.948	79
11.88	5	13.93	30	15.98	55	18.03	80
11.962	6	14.012	31	16.062	56	18.112	81
12.044	7	14.094	32	16.144	57	18.194	82
12.126	8	14.176	33	16.226	58	18.276	83
12.208	9	14.258	34	16.308	59	18.358	84
12.29	10	14.34	35	16.39	60	18.44	85
12.372	11	14.422	36	16.472	61	18.522	86
12.454	12	14.504	37	16.554	62	18.604	87
12.536	13	14.586	38	16.636	63	18.686	88
12.618	14	14.668	39	16.718	64	18.768	89
12.7	15	14.75	40	16.8	65	18.85	90
12.782	16	14.832	41	16.882	66	18.932	91
12.864	17	14.914	42	16.964	67	19.014	92
12.946	18	14.996	43	17.046	68	19.096	93
13.028	19	15.078	44	17.128	69	19.178	94
13.11	20	15.16	45	17.21	70	19.26	95
13.192	21	15.242	46	17.292	71	19.352	96
13.274	22	15.324	47	17.374	72	19.434	97
13.356	23	15.406	48	17.456	73	19.516	98
13.438	24	15.488	49	17.538	74	19.598	99
13.52	25	15.57	50	17.62	75	19.68	100

تصميم وتقنين اختبار لقياس السرعة الحركية للذراعين باستخدام الحقيبة البلغارية بأعمار (18-20) سنة وبوزنة (65-86) كغم

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المستخلص

تأتي أهمية البحث معرفة واقع السرعة الحركية للذراعين وكيفية تطويرها نحو الأفضل من خلال قياسها ومعرفة مستوياتها خلال فترة التدريب بعد ان نضع لها مقياس مقنن ومعايير ومستويات تساعد المدرب واللاعب لمعرفة المستوى الحقيقية لها. وكانت مشكلة البحث: السرعة الحركية مطلب بدني مهم في المصارعة وخصوصا للذراعين في اداء حركات سريعة ومتنوعة تساعد المصارع في اداء المسكة المطلوبة للخصم ومنها يمكن تحقيق الانجاز المطلوب بعد ان يتم اختبارها وقياسها بأسلوب علمي مطابق للواقع الحقيقي للعبة. وكانت أهداف البحث تصميم وتقنين اختبار لقياس السرعة الحركية للذراعين باستخدام الحقيبة البلغارية بأعمار (18-20) سنة وبوزنة (65-86) كغم . أيجاد مستويات ومعايير لتقييم السرعة الحركية للذراعين باستخدام الحقيبة البلغارية بأعمار (18-20) سنة وبوزنة (65-86) كغم . واستخدم الباحث المنهج الوصفي بأسلوب المسح وكان مجتمع البحث لاعبي المصارعة الحرة في المدرسة التخصصية في محافظة البصرة بعمر (18-20) سنة وبوزنة (65-86) كغم ، وبعد تصميم وتطبيق الاختبار تم التوصل الى اهم الاستنتاجات : أن الاختبار الذي صممه الباحث قادر على الكشف عن مستوى السرعة الحركية للذراعين بعمر (18-20) سنة وبوزنة (65-86) كغم . وتم التوصية : -اعتماد الاختبار الحالي كوسيلة للكشف عن مستوى السرعة الحركية للذراعين بالمصارعة الحرة بعمر (18-20) سنة وبوزنة (65-86) كغم.

الكلمات المفتاحية: تقنين، تصميم، السرعة الحركية، الحقيبة البلغارية