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Design and codification of the strength tolerance test for the limbs (arms and legs together) using Purple Rubber Cord for Wrestlers (17-19) Years Old

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ABSTRACT

The importance of the research is manifested by the need to design and codify a codified scientific test for the strength tolerance of the limbs using the purple rubber rope, in line with the physical and physiological characteristics of wrestlers in this age group, and the provision of a codified and objective test that measures the strength tolerance of the limbs in wrestlers aged (17-19) years using the purple rubber cord, which helps trainers and researchers to diagnose the physical level more accurately, and follow up the training development scientifically. **The problem of the research was:** the absence of a codified and specific scientific test to measure the strength tolerance of the limbs using rubber ropes in wrestlers aged (17-19) years, which is relied on in sports training, we will not be able to develop and progress at the level, and the use of modern training tools that are commensurate with the requirements of this age and provide clear standards and standard grades for such types of tests makes the diagnosis of the real level of strength endurance and the follow-up of its developmentin the first place.

Research Objectives:

1- Designing and codifying the strength endurance test for the limbs (arms and legs together) using the purple rubber rope for wrestlers aged (17-19) years

2- Finding standards and levels ofstrength endurance testing for the limbs (arms and legs together) using the purple rubber rope for wrestlers aged (17-19) years

The most important **conclusions were reached:** that the test designed by the researcher is able to reveal the level of force tolerance of the limbs (arms and legs together) of wrestlers.**It was recommended:** to adopt the test designed by the researcher as a means of detecting the level of strength tolerance of the limbs (arms and legs together) for wrestlers.

1.1 Introduction:

Tests and measurement are one of the important and basic fields in the field of mathematics, which must be accurately determined when performing them, as well as determining the nature and specificity of the performance, its instructions, calculating the results, as well as the scientific parameters of the test in terms of honesty, consistency and objectivity.

The process of designing and codifying physical tests is an essential step in the path of sports scientific research because it provides a codified measurement tool that can be relied on in evaluating players and following up on their development.

The field of sports is witnessing rapid development in the sciences of training, measurement and evaluation, as relying on field experience alone is no longer enough to judge the level of athletes or guide the training process accurately, and codified physical tests have become an essential scientific tool to detect the level of physical and functional abilities, follow up on their development, and evaluate the effectiveness of various training programs. Tests are an important tool of scientific research along with (poll, interview, and observation) of research tools, and testing is a method of evaluation measurement that relies on experimentation, and it is a systematic method of comparing the behavior of two or more individuals" (Ali, 2004: 8).

She adds (Leila Farhat, 2001) that " thetests express the responses of the individual in a situation that includes a stimulus that is organized intentionally and has specific qualities and is presented to the individual in a special way that enables the researcher to record and measure these answers accurately" (Leila, 2001: 68).

The game of wrestling is one of the competitive games that requires high levels of muscular strength and endurance, especially in the upper and lower extremities, due to the nature of the performance that depends on grabbing, pushing, pulling, and continuous control over the opponent throughout the time of the fight, and endurance of strength is one of the decisive physical abilities that directly affect the efficiency of the skillful and planning performance of the wrestler, despite the importance of this ability., requires special tests that measure strength endurance using modern and safe training tools, such as rubber bands, which are characterized by the ability to control the degree of resistance, ease of use, and reduce the risk of injury.

Hence, the importance of this research is evident from the fact that it contributes to providing a codified test that measures the strength endurance of the upper and lower extremities in an integrated manner and with a modern training tool that is commensurate with the requirements of performance in wrestling. It also gives trainers a scientific means to measure the level of wrestlers, follow up on their progress, and scientifically identify individual differences between them.

1-2 Research Problem:

Training institutions in individual games, especially wrestling, seek to improve the level of physical preparation of wrestlers in line with the requirements of modern competitive performance. The 17-19 year old class is a sensitive stage in physical and specialized construction, as the player moves from basic preparation to more complex performance levels that require a high integration between the elements of strength and endurance, but the evaluation process often relies on a test that measures maximum

strength separately or measures general endurance without reflecting the nature of the composite performance that combines the arms and legs at the same time.

Through the researcher's experience in the field of tests and measurement, he believes that the absence of a codified and specific scientific test to measure the strength tolerance of the limbs using rubber ropes in wrestlers aged (17-19) years, which is relied on in sports training, will not be able to develop and advance at the level, and the use of modern training tools that suit the requirements of this age and provide clear standards and standard grades for such tests makes the diagnosis of the real level of strength endurance and the follow-up of its development. So the need to design and standardize a test based on the purple rubber cord as a safe and effective measuring tool has emerged.

1-3 Research Objectives:

1- Designing and codifying the strength endurance test for the limbs (arms and legs together) using the purple rubber rope for wrestlers aged (17-19) years

2- Finding standards and levels ofstrength endurance testing for the limbs (arms and legs together) using the purple rubber rope for wrestlers aged (17-19) years

1-4 Research Areas:

- Human field: **Freestyle** wrestling players at the specialized school in Basra Governorate and Al-Mina Sports Club at the age of (17-19) years

- Spatial field: the wrestling halls of the Specialized School in Basra Governorate and the Mina Sports Club.

- Temporal Domain: Period from 22/11/2025 to 22/12/2025.

2- Research methodology and field procedures:

2-1 Research Methodology: The researcher used the descriptive method of surveying, which is the most appropriate method for testing and measurement research, which helps to design the required tests.

2-2 Research Population and its Sample: The research population was determined by the deliberate method, which are the wrestlers of the Specialized School in Basra Governorate and Al-Mina Sports Club aged (17-19) years , which are (60) wrestlers.

The research sample was selected as they represent the construction and exploratory experiment samples, and the research sample was selected by random method of (50) wrestlers as shown in Table (1).

Table (1)
Shows the details and proportions of the sample

<table>
<tr><th>Total</th><th>Sample Type</th><th colspan="2">Samples</th><th>t</th></tr>
<tr><td>60</td><td>Age (17-19) years</td><td colspan="2">Research Community</td><td>1</td></tr>
<tr><td>5</td><td>Age (17-19) years with training age (3-4) years</td><td rowspan="2">Honesty</td><td rowspan="2">Sample Exploratory Experiment</td><td rowspan="2">2</td></tr>
<tr><td>5</td><td>Age (17-19) years with training age (1-2) years</td></tr>
</table>

Same sample in the honesty of the test	Age (17-19) years	Stability		
5	Age (17-19) years	Excluded wrestlers		3
50	Age (17-19) years	Sample Rationing		4
83.33%		Ration Sample Percentage		

2-3 Means, devices, and tools used in gathering information:

2.3.1 Means of data collection:

1. Arab and foreign references and sources
2. Designed Test.
3. Supplement Benchmark Grades (1)

2.3.2Devices and tools used in information collection:

1- A wrestling court.
2- Wrestling equipment.
3- Self-color rubber cords
4- Measuring tape.
5. Medical scale.
6. Computer type (HB).
7-hour stop.

2-4 Steps of Designing and Legalizing the Test:

2.4.1 Test Design:

The researcher designed a test in strength tolerance for the limbs (arms and legs together) using purple type rubber cords for wrestlers aged (17-19) years, the use of this type of rubber rope came as it is the highest intensity, as (Mark Gbrario, 2002) and (Jon Galen, 2004) "There are six colors of rubber ropes, which are known as resistance ropes in use according to the intensity of the exercise, yellow is the lightest intensity, then green, then red, then blue, then black, and finally the purple rope, which is the most severe rope. Resistance is intensity" (Mark Gbrario, 2002: 6) (Jon Galen, 2004: 142) and this suits the specificity of the game and the physical abilities required in it, such as strength endurance with increasing the number of repetitions for the purpose of raising the level of endurance.

1. The test actually measures the muscular strength tolerance of the limbs (arms and legs together).
2- The purple rubber ropes are higher in intensity, which allows to raise the level of tolerance of the required force.
3. Easy test performance.
4. The test is economical in terms of its tools and performance time.
5- Suitable for the research sample and its potential.

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

2.4.2 Description of the final exam:

Test Name : Strength Endurance Test for Limbs (Arms and Legs Together) Using Purple Rubber Rope for Wrestlers Aged (17-19) Years

Objective of the test: Measuring the strength tolerance of the limbs (arms and legs together) using the purple rubber rope for wrestlers aged (17-19) years

Tools used: Purple type rubber ropes - wrestling mat - stopwatch.
How to perform the test:

- Two purple rubber ropes are fixed to a fixed point behind the lab, with the first rope for the arms and holding the ends of both hands, while the second rope is tied around the ankles or under the legs, the lab stands in the primary wrestling position, with the knees bent and the center of gravity lowered, and a slight forward tilt of the torso, while keeping the gaze forward and maintaining balance.
- The performance begins with a strong, sequential pulling motion of the arms similar to the grasping and control motion in wrestling, where the tester pulls the ropes towards the chest while bending the elbows, while performing a thrust of the legs forward against the resistance of the rope attached to the ankles, mimicking the movement of progress and pressure on the opponent. The examinee then takes a small step back with the arms gradually extended, maintaining the constant tension of the ropes.
- The performance is repeated rhythmically and continuously, emphasizing the motor coordination between the arms and legs, and the continuation of the forward pressure as is common in a wrestling match, the examinee continues to perform the exercise until he reaches the stage of fatigue and the inability to maintain the correct wrestler posture or perform the pull-and-push movement in the required technical way.
- Only the number of correct repetitions is counted as the test score, while repetitions in which the examinee loses his or her balance or impairs the performance technique are canceled.

Notes:
1. The tester must perform a warm-up before the test.
2. The laboratory has the right to conduct a number of attempts for the purpose of the experiment before the test.

Registration: Counts the number of correct repetitions to the fatigue limit.

2.4.3 Exploratory Experiment:

The exploratory experiment was conducted on 22/11/2025 on a sample of (5) players aged (17-19) years. The experiment was repeated again after only one week, i.e. on 29/11/2025, on the same sample and under the same conditions, and the purpose of the experiment was to conduct the following:
1. Knowing the suitability of the test for the research sample.
2. Know the sufficient time to take the test.
3. Knowing the difficulties that may face the researcher and the assistant staff.
4. Knowledge of the necessary tools to conduct the test.
5. Knowing the validity of the wheel.
6. Finding the scientific foundations of the test.

2.4.4 Scientific Foundations of the Test:

2.4.4.1 Validity of the test:

Through apparent honesty, the test was presented to a group of experts and specialists, as well as the differential honesty of the test, which is "the ability to show

the differences between the traits measured by the test in opposite or divergent groups" (Tesser, 2005: 116).

This is done by calculating the differences between the results of a test with the age of (17-19) years and a training age of (4-03) years, which are (5) players, and the results of a test with the age of (17-91) years and adults, and with a training age of (1-2) (5) players, as shown in Table (2).

Table (2)
Demonstrates the differential honesty of the strength endurance test of the limbs (arms and legs together)

Significance Level	SIG	Value T	Category (17-19) years old and training age (1-2) years		Category (17-19) years old and training age (3-4) years		Testing
Moral	0.00	5.824	on	Going to	on	Going to	Carrying strength for the limbs (arms and legs together)
			0.745	22.42	864,.	25.74	

2.4.4.2 Test Consistency:

Consistency means " stability, i.e., if the same test is applied to the same individual, it gives some stability in the results" (Muhammad, 1995: 100).

Therefore, the test was found to be stable by the repeat method, as the first test was conducted for the sample at the age of (17-19) years on 22/11/2025 and was repeated again on 29/11/2025 and under the same conditions in which the first test was conducted and as shown in Table (3).

Table (3)
Shows the stability of the strength endurance test of the limbs (arms and legs together) by the replay method

Level of pampering	Stability Coefficient	Second Test		First Test		Testing
Moral	0.92	on	Going to	on	Going to	Carrying strength for the limbs (arms and legs together)
		0.788	25.57	864,.	25.74	

The value of (t) at degree of freedom (3) and below the significance level of 0.05 = 0.805

2.4.4.3 Objectivity of the Test:

Since the test has a key to correct and cannot be manipulated, and the test result is easy to find by the evaluator, the test is considered objective and the results cannot be manipulated.H The test is also objective because it is constant, as Raysan, Khreibt mentions that "the higher the coefficient of stability, the higher the coefficient of objectivity, and vice versa" (Raysan, 1989: 8).

2.5 Test Application:

The test was applied to the construction sample consisting of wrestling players at the Specialized School of Wrestling in Basra Governorate and the wrestlers of Al-Mina

Sports Club aged (17-19) years, which are (50), after which the criteria and levels for the test were found as in the two tables (4) (5), and for the period from 20/12/2025 to 22/12/2025.

2-6 Statistical Methods: SPSS was used for statistical treatments.

3. Presenting, analyzing, and discussing the results:

3.1 Presentation of the results of the standard scores and standard levels of the strength endurance test for the limbs (arms and legs together)

After the researcher reached the results by applying the proposed test and to achieve the research goal of finding the standard scores for the strength endurance test of the limbs (arms and legs together) freestyle wrestling players aged (17-19) years, the raw data was obtained, where (it requires converting the raw scores to standard scores, which is a means of determining the relative state of the raw scores, and thus these scores can be changed and their results can be evaluated).

Table No. (4)

Shows the arithmetic media, standard deviations, coefficient of variance, highest and lowest score

Achieved by the sample members in the strength tolerance test of the limbs (arms and legs together)

Lowest grade	Top Grade	Divergence coefficient	Standard Error	Standard deviation	Arithmetic mean	Testing
18.897	26.72	3.384	0.784	0.773	22.87	Carrying strength for the limbs (arms and legs together)

From Table (4), we can see that the arithmetic mean of the strength endurance test for the limbs (arms and legs together) in free wrestling applied by the research sample individuals was (22.87), the standard deviation was (0.784) and the coefficient of difference was (3.384) or the highest score was (26.72) and the lowest score was (18.897).

After extracting the results from the previous table, the researcher extracted the relationship of finding the fixed number, which was later used in the development of standard tables modified by the sequential method, Appendix (1).

The arithmetic mean represents the score (50) in the table of standard scores, either the fixed value is the amount that must be added or subtracted from the arithmetic mean of the test, as the adjusted standard score is (a standard score with an average of 50 and its standard deviation is equal to zero) (Qais, Bastoisi, 1987: 276).

Through the above, the researcher believes that determining the modified standard scores that wrestlers deserve in the strength endurance test for the limbs (arms and legs together) is considered a comparison tool between the raw scores obtained by the laboratory with the corresponding adjusted standard scores (Appendix 1) to become the reference through which the performance of the wrestler can be compared with the performance of his peers in the ability that the test can evaluate, in addition to these scores obtained by the wrestlers can be compared with a standard benchmark to know the extent of the The development that the wrestlers have reached.

3.2 Presentation and discussion of levels to test the strength tolerance of the limbs (arms and legs together)

The extraction of standard grades is an important step in legalization, considering that the raw bicycles obtained by the laboratory are not used in comparison with other laboratories until they are converted into standard bicycles, considering that Criteria are "values that represent the performance of a particular community in a particular test (Muhammad Hassan, Muhammad Nasr, 200: 300)

To define the standard levels that are considered "standard levels that represent the purpose to be achieved in relation to a trait, and represent the level that an individual must reach in a particular test" (Raed, Sadiq, 2015: 363)

The researcher used the natural distribution curve (Kauss), 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, we found the levels as in Table (5).

Table (5)
Shows the standard levels and their prescribed ratios in the normal distribution curve, raw scores, sequential adjusted standard scores, number of repetitions, and percentages of each level in force tolerance for the limbs (arms and legs together)

Percentage	Repetition	Standard Scores	Raw grades	Standard levels and ratios determined for them in the natural distribution curve	Testing
Zero%	Zero	1-20	18.897-20.36	Weak	Carrying strength for the limbs (arms and legs together)
16%	8	21-40	20.437-22.1	Acceptable	
66%	33	41-60	22.177-23.64	Medium	
12%	6	61-80	23.717-25.18	Good	
6%	3	81-100	25.257 and above	Very good	

From Table (5), it is clear to us that the standard levels, raw scores, and standard scores adjusted by sequential method of the results of the strength endurance test for the limbs (arms and legs together) and through the table we note that the players were distributed at all levels except the level (weak) and the percentages were as follows:

The largest percentages were concentrated at the (average) level, which was equal to (66%) with the frequency of (33) wrestlers out of the total sample.

The second percentage was concentrated at the level of (acceptable) which is equal to (16%) with the frequency of (8) wrestlers out of the total sample, while we find that the third percentage was concentrated at the level of (good) which is equal to (12%) with the frequency of (6) wrestlers, and in the fourth percentage, it reached the level of (very good) which is equal to (6%) and with (3) repetitions.

Through this distribution, we found that the largest percentage of wrestlers obtained an average level, then the acceptable percentage, and the lowest percentage with a very good grade, and this gives an indication of poor strength endurance for the limbs (arms and legs together) and requires training and attention to it, especially for wrestlers, and for this reason (Ahmed Saeed Zahran, 2024) sees "(Dick) classified the wrestling game within the anaerobic endurance activities with a long time, which takes a performance period of 60-120 seconds, and there is a classification of endurance based on the system. Energy" (Ahmed, 2024: 80)

After the weakness was diagnosed through a test designed to bear the strength of the limbs (arms and legs together), we had to give the appropriate training to treat this weakness, and for this reason (Amer Moussa Abbas, 2011) believes that the higher the physical preparation of the wrestler, the more it positively helps to develop the level of skill (technical) performance, as the wrestler cannot master the performance. Skill of throwing catches in the absence of the necessary special physical qualities in the main muscles working in performance, and thus the coach must take into account the close connection between the process of physical numbers and skill in the training process" (Amer, 2011: 115).

In terms of rubber ropes and their role and importance, he sees (Amin Al-Khouli, Diaa Al-Din Al-Azab, 2009) "Rubber ropes are an important means of training, good and economical that is suitable for the type of training and at the same time develops the physical aspect of strength, endurance, longevity and flexibility" (Amin, Dia, 2009: 225).

4. Conclusions and Recommendations:

4.1 Conclusions:

1- The test designed by the researcher is able to detect the level of strength tolerance of the limbs (arms and legs together) of wrestlers.

2- The sample will not achieve any significant percentages in the weak level.

3- The highest percentage achieved by the sample in the test was at the intermediate level.

4. The grades and standard levels reached represent the real level of wrestling players in the specialized school and Al-Mina Sports Club in Basra Governorate.

4.2 Recommendations:

1. Adopting the test designed by the researcher as a means of detecting the level of strength endurance of the limbs (arms and legs together) for wrestlers.

2. Evaluating the players according to the grades and standard levels reached by the researcher.

3. Conducting a similar study using a purple rubber cord on other age groups.

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Appendix No. (1)
Shows the standard scores for the strength tolerance test for the limbs (arms and legs together)
In freestyle wrestling at the age of (17-19) years.

Standard Grade	Raw Grade	Standard Grade	Raw Grade	Standard Grade	Raw Grade	Standard Grade	Raw Grade
76	24.875	51	22.947	26	21.022	1	18.897
77	24.949	52	23.024	27	21.099	2	18.974
78	25.026	53	23.101	28	21.176	3	19.051
79	25.103	54	23.178	29	21.253	4	19.128
80	25.18	55	23.255	30	21.33	5	19.205
81	25.257	56	23.332	31	21.407	6	19.282
82	25.334	57	23.409	32	21.484	7	19.359
83	25.411	58	23.486	33	21.561	8	19.436
84	25.488	59	23.563	34	21.638	9	19.513

85	25.565	60	23.64	35	21.715	10	19.59
86	25.642	61	23.717	36	21.792	11	19.667
87	25.719	62	23.794	37	21.869	12	19.744
88	25.796	63	23.871	38	21.946	13	19.821
89	25.873	64	23.948	39	22.023	14	19.898
90	25.95	65	24.025	40	22.1	15	19.975
91	26.027	66	24.102	41	22.177	16	20.052
92	26.104	67	24.179	42	22.254	17	20.129
93	26.181	68	24.256	43	22.331	18	20.206
94	26.258	69	24.333	44	22.408	19	20.283
95	26.335	70	24.41	45	22.485	20	20.36
96	26.412	71	24.487	46	22.562	21	20.437
97	26.489	72	24.564	47	22.639	22	20.514
98	26.566	73	24.641	48	22.716	23	20.591
99	26.643	74	24.718	49	22.793	24	20.668
100	26.72	75	24.795	50	22.87	25	20.745