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Dr. Fariq Faiq Qasim
College of Physical Education
and Sports Science, University
of Kirkuk, Iraq

Training program for developing the qualities of flexibility and kinetic speed and its impact on performing certain holds (throws from the back) for cadet-level freestyle wrestlers

Fariq Faiq Qasim

Abstract
The research endeavors to design a training program aimed at enhancing flexibility, kinetic speed, and specific wrestling holds (Over-the-back throws) for cadet-level freestyle wrestlers. It investigates the impact of this program on the improvement of flexibility, kinetic speed, and the execution of specific wrestling holds from over the back. The experimental method was selected as the most suitable for addressing the nature of the problem. The sample comprised 21 cadet-level wrestlers from the Shula Sports Club in Baghdad, with 2 wrestlers excluded due to injuries and 5 representing the pilot study. The remaining 14 wrestlers were randomly assigned to two equal groups (experimental and control). Preliminary tests were conducted on both research groups to assess flexibility, kinetic speed, and the performance of the studied holds.
Physical tests involved measuring spinal column flexibility, hip joint flexibility, kinetic speed, and performance in the studied wrestling holds. The experimental group underwent a specially designed training program to enhance the research variables. Following the completion of the training program, post-tests and measurements were conducted under the same conditions as the preliminary assessments. Statistical analysis, utilizing SPSS, revealed that the training program significantly influenced the study variables in favour of the experimental group when compared to the control group. The researcher recommends the inclusion of flexibility and kinetic speed exercises due to their positive effects on developing over-the-back wrestling holds for cadet-level freestyle wrestlers.

Keywords: Training program, performance improvement in wrestling holds

1. Introduction
1.1 Research Introduction and Significance
The world has witnessed tangible advancements in all sporting domains, particularly in wrestling, where significant strides have been made in elevating technical performance and achieving remarkable feats. This progress can be attributed to the substantial efforts of experts, specialists, and coaches who have laid the scientific foundations for player development. Wrestling, having secured its place in this evolution alongside other sports, demands unique training methodologies, especially following recent amendments to the international game laws regarding over-the-back throws.

The intricacies of wrestling training, particularly post-modifications in the international game laws concerning Over-the-back throws, necessitate swift execution of holds and a prompt return to the natural stance. This game demands quick performance from wrestlers in executing holds and swiftly returning to their normal state. Consequently, the sport requires the development of physical capabilities that align with its nature, enabling wrestlers to execute holds proficiently and maintain suitable speed for performing the hold, given the high physical exertion on the muscles.

Continuous evolution and the growing ambition for achieving commendable results require ongoing effort and advanced training methodologies. Given the specific requirements of wrestling, which mandate quick and elusive movements as essential elements in the game's rules, as points are scored based on these movements, wrestlers must exercise caution and precision in performing holds to impart vitality and coherence to the game's movements. Flexibility and kinetic speed training are considered modern training methods employed in wrestling training. The researcher contends that these exercises have become integral components of martial arts training, supplementing other practical approaches in wrestling

Corresponding Author:
Dr. Fariq Faiq Qasim
College of Physical Education
and Sports Science, University
of Kirkuk, Iraq

programs. Thus, the importance of this research lies in keeping abreast of contemporary scientific methods and trends in developing the game's level nationally. This is achieved by formulating a training program to enhance the flexibility and kinetic speed of wrestlers and examining its impact on improving the performance of some over-the-back throws through correct execution of the associated techniques.

1.2 Research Problem

The specificity and nature of the requirements inherent in the sport of wrestling, encompassing intricate movements and physical capabilities, coupled with direct contact between wrestlers, became evident through the researcher's experience in this field as a former international player and coach. The researcher observed that a potential cause for the diminished performance level in wrestlers could be attributed to deficiencies in flexibility and kinetic speed. The execution of Over-the-back throws demands high flexibility and speed as the wrestler opens the legs and performs a backward arch with the back. This necessitates a high level of flexibility in the hip joint, thighs, and spinal column.

The research problem lies in the noticeable performance deficiency observed in the application of Over-the-back throws by wrestlers. This is primarily due to the repetition of these maneuvers and the inherent difficulty in executing the holds correctly, despite the international game laws awarding significant technical points for their successful execution. Additionally, the frequency of injuries resulting from improper use due to fatigue during performance exacerbates the challenge.

Through the researcher's field observations and attempts to find a solution for enhancing the execution of these holds, the researcher deemed it necessary to develop a training program aimed at improving flexibility and kinetic speed. This program is designed to have a positive impact on the performance of certain Over-the-back throws, contributing to the advancement of achievement levels and technical proficiency in the sport.

1.3 Research Objectives

1. Designing a training program focused on improving the flexibility, agility, and execution of targeted throws (over-the-back throws) for cadet-level freestyle wrestlers.
2. Examining the effectiveness of the designed program in enhancing flexibility, agility, and the execution of specific throws (over-the-back throws) among cadet-level freestyle wrestlers.

1.4 Research Hypotheses

- The prepared training program is hypothesized to have a positive effect on developing flexibility, agility, and the execution of specific throws (over-the-back throws) for cadet-level freestyle wrestlers.

- Statistically significant differences in pre-test and post-test results are anticipated between the experimental and control groups in the selected research variables.
- Statistically significant differences exist in pre-test and post-test results between the experimental and control groups in the research variables.

1.5 Research Domains

- **Human Domain:** Cadet-level athletes from the Shula Sports Club.
- **Time Domain:** January 3, 2023, to April 20, 2023.
- **Spatial Domain:** Wrestling hall at the Shula Sports Club in Baghdad.

1.6 Definition of Terms

Flexibility: "The individual's ability to perform sports movements to the widest extent allowed by the joints involved in the motion" (Al-Mandaladi & Saeed, 1978, p. 63) [5].

2. Research Methodology
2.1 Research Approach

The selection of the experimental approach is primarily based on the nature of the problem to be solved. "The distinguishing feature of precise scientific activity is the use of the experimental method" (Mahjoub, 1993, p. 33) [12]. The selection of the experimental method was based on its suitability for the inherent nature of the problem, ensuring the attainment of the most precise results.

2.2 Research sample

The sample was intentionally selected from accredited wrestlers affiliated with the Central Iraqi Wrestling Federation (Cadet level) engaged in freestyle wrestling. These individuals also participate in local tournaments and belong to the Al-Shula Sports Club in Baghdad, totaling 21 players. Two wrestlers were excluded from the sample due to injuries, and an additional five wrestlers represented the exploratory survey sample. Consequently, the total number became 14 wrestlers. They were randomly divided into two equal groups, namely the experimental and control groups, each consisting of seven wrestlers.

The experimental variable introduced involved a set of exercises focusing on flexibility, motor speed, and the execution of specific throws from the back, formulated by the researcher based on expert opinions in the field of sports training and wrestling. The control group continued with their regular training regimen under the club coach's guidance. Homogeneity tests were conducted for the research sample in variables that could potentially impact the research results, including age, height, mass, and training experience, using the coefficient of variation. The homogeneity results are detailed in Table 1.

Table 1: The homogeneity of the research sample individuals.

	Variables	Mean	Arithmetic mean	standard deviation	Coefficient of Variation
1	Age	15,640	15,776	0,466	0,799
2	height	1,690	1,590	0.045	- 0.614
3	Weight	51,000	50,734	7,640	- 0.112
4	Training age	4,590	4,322	0,820	- 0.249

(*) It is evident from Table (1) that the coefficient of variation values were confined within (± 3), indicating the homogeneity of the sample.

Table 2: the equivalence of individuals in the research sample in pre-test skill assessments (holds) for the two research groups.

Skills	Tabulated t-value	Calculated T-value	Control		Experimental		measuring unit	Significance of Differences
			±A	˙s	±A	˙s		
Hold the arm with both hands	2,59	0,263	0,47	5,70	0,649	5,50	degree	random
Encircling the head and holding the arm		0.986	0,59	5,66	0,649	5,50	degree	random
Encircling the torso and holding the arm		0.432	0,54	6,14	0.571	6,11	degree	random

(*) The tabulated significance level is below the freedom degree (6) at a significance level of (0.05). Table (2) indicates that all calculated t-values are smaller than the tabulated t-value of (2.59), indicating the randomness of differences and the equivalence of sample individuals.

Table 3: illustrates the equivalence of sample individuals in the pre-test physical selections for the attributes of flexibility and motor speed.

Tests	Tabulated t-value	Calculated T-value	Control		Experimental		measruing unit	significance of Difference
			± p	˙s	± p	˙s		
Bridge (bridge or rear arch)	2,59	0.155	1,08	84,4	1,9	82,6	poison	random
Opening the legs at the alternating frontal level		0,75	4,47	167	5,09	166	poison	random
Open the legs in the mutual frontal level		1,45	5,98	164	5,85	160,6	poison	random
The kinetic speed of the wrestler with the execution of consecutive holds for a duration of (10) seconds		1,98	0.522	6,833	0,663	6,265	repetition	random

(*) The tabulated significance level below the degrees of freedom (6) at a significance level of (0.05). Table (3) reveals that all calculated t-values are smaller than the tabulated t-value of (2.59), indicating the randomness of differences and the equivalence of sample individuals.

2.3 Research Tools
In order to achieve the research objectives, the researcher utilized the following:
1) Arabic and foreign sources.
2) Physical and skill selections.
3) Worldwide web (Internet).
4) Performance assessment form for holds.
5) Acer laptop, timing earphones, medical scale for weight measurement.
6) Measuring tape.
7) Wrestling mat.
8) Various weighted dummies.

2.4 Test Selection
Standardized tests are a means through which the researcher identifies strengths and weaknesses in the physical and skill aspects of the sample individuals and the training methods used (Abdulhameed & Hassanin, 1997, p. 145) [4]. After presenting the researcher's form for determining the tests related to the flexibility, motor speed, and skills in freestyle wrestling (over-the-back throws) to a group of experts and specialists in the field of training and wrestling, the tests that received a rating of (75%) or more were adopted based on expert recommendations.

2.4.1 Physical Tests Used in the Research (Bastawesi 1999, p. 244):
1. Bridge Test (Back Bridge or Arch) to measure spinal column flexibility (cm).
2. Alternating Knee Test in the frontal plane (from a standing position) to measure hip joint flexibility (cm).
3. Alternating Frontal Leg Opening Test to measure hip joint flexibility (cm).
4. Motor Speed Test for the wrestler by performing consecutive holds for a duration of (10) seconds (repetition) (Al-Rubai, 2003, p. 46) [7].

2.4.2 Skill Tests for Holds () over-the-back throws under Study (Abdulaziz, 1988, p. 45) [2]
The researcher conducted skill tests on the research sample for the holds under study after categorizing them based on movement sections into the preparatory phase and the main phase. Each section was assigned (2 points) for the preparatory phase, (6 points) for the main phase, and (2 points) for the final phase according to wrestling experts' opinions. Based on these divisions, the performance of the researched holds was evaluated as a measure of skillful performance.

2-5 Exploratory Experiment
The researcher conducted an exploratory experiment to achieve accurate and reliable results. This exploratory experiment, "Practical Training to Assess the Positives and Negatives Encountered during the Test to minimize them in the Future" (Al-Mandlawi, 1989, p. 156) [6], involved a sample of five wrestlers. The experiment took place on Tuesday, January 10, 2023, at 4:00 PM, aiming to:
- Determine the time required to complete the tests.
- Confirm the suitability of the location for test execution and any obstacles that the researcher and the sample might encounter in the main experiment.

2.6 Scientific Foundations of the Tests
The researcher sought to adopt scientific principles in standardizing the tests, specifically focusing on their reliability, validity, and objectivity.

2.6.1 Test Reliability Coefficient
Reliability refers to the consistency of an individual's relationship with the test upon repeated administration. Statistically, it is expressed as the correlation coefficient between individuals' scores across different test administrations, indicating that test reliability means the test is reliable and can be relied upon (Rafeeq, 2021) [14].
Therefore, the researcher applied the tests on Saturday, January 14, 2023, to a sample of five wrestlers. The tests were then reapplied on Tuesday, January 24, 2023, to the same sample, with all conditions of the initial application maintained. The researcher calculated the Pearson correlation coefficient between the test scores, and the correlation value was found to be random. This confirms that all tests exhibit a high degree of reliability, as indicated in Table (4).

2.6.2 Test Validity Coefficient

Validity represents one of the fundamental conditions for assessing the appropriateness of a test. A test is considered valid if it measures what it is intended to measure and distinguishes between individuals (Majed, 2022) [13]. To ensure the validity of the tests, the researcher employed content validity. The objectives of the tests were clearly defined, presented to specialists and experts, who unanimously agreed that these tests measure the intended trait or ability. Additionally, the researcher utilized the method of self-validity, establishing a link between validity and reliability through the following equation:

$$553)\sqrt{(Coefficient\ of\ Stability)}$$

2.6.3 Objectivity Coefficient

The researcher presented the tests to a panel of experts and specialists in the fields of measurement, evaluation, and sports training. They unanimously affirmed the objectivity of the tests and their accomplishment of the intended objectives. The researcher believes that a test should fulfill its objectives concerning the competence of the evaluators in establishing the test's foundations, grading, and the objectivity of its administration. If the test is reapplied, it should yield consistent results.

Table 4: The correlation coefficients and self-validity scores for the utilized tests.

	Tests	Correlation coefficient	Self-consistency
1	Flexibility	0,88	0,86
2	Kinetic speed	0,84	0,80
3	hold skill	89, 0	83, 0

2.7 Pre-test Assessments for the Research Sample

The researcher conducted the examinations on the sample individuals at 4:00 PM on Thursday, January 26, 2023, at the wrestling hall of Al-Shula Sports Club in Baghdad. This involved both the experimental and control groups. The purpose of these assessments was to utilize them as indicators to measure the levels of flexibility, agility, and the performance of selected throws from the back under study. Understanding the starting point is crucial, as noted by Kell (2007) [11], stating, "Wrestling matches for wrestlers vary in effort and energy depending on the opponent's level and the specific match conditions" (Al-Rubai, 2003, p. 45) [7].

2-8 Training Methodology

The training methodology is the fundamental basis for the holistic development of performance (physical and skill-related) in wrestlers, ensuring optimal achievement. As Kell (2007) [11] puts it, the methodology is "the means through which theoretical sports concepts are translated into practical reality, guiding both the coach and the athlete equally" (p. 640).

After reviewing scientific sources and wrestling training methods, the researcher developed a training methodology using a periodized training approach with varying intensity. The aim was to enhance the flexibility and agility of cadet-level freestyle wrestlers, crucial for skill performance, particularly in executing throws from the back. The methodology was implemented from Sunday, January 29, 2023, until Thursday, March 30, 2023, over eight weeks, with three training units per week. The average duration of a training unit ranged from 120 to 150 minutes, divided into three segments (preparatory, main, final). The execution of the methodology primarily took place in the main section of the training unit, lasting between 35 to 45 minutes. During the specialized preparation phase, single-focused training entities were adopted, following a unified direction. The methodology was applied to the experimental group by Coach Munir Ali, under the supervision and guidance of the researcher, specifically concerning the experimental components of the methodology.

2.9 Post-Training Tests and Measurements

The post-training tests and measurements were conducted on the research sample (control and experimental groups) upon completion of both the researcher's and coach's training methodologies, on Saturday, April 1, 2023. The same methodology employed in the pre-training tests and measurements was applied.

2.10 Statistical Methods

The researcher utilized the statistical software package (SPSS) to derive results using the following equations: mean, standard deviation, t-test for related and independent samples, Pearson correlation coefficient, and percentage deviation.

3. Presentation, Analysis, and Discussion of Results

In order to assess the impact of the training methodology on the development of flexibility, motor speed, and the performance of certain throws (over-the-back throws), the central tendencies and standard deviations for individuals in both groups (experimental and control) were extracted. The first test was conducted before the commencement of the training methodology, and the second test was conducted after its completion.

3.1 Presentation, Analysis, and Discussion of Flexibility Test Results

Table 5: illustrates the central tendencies, standard deviations, and computed and tabulated t-values between the pre- and post-training tests for the flexibility attribute for the research groups (experimental and control)

Statistical features the group	Tabulated t-value	Calculated t-value	± p f	-S F	Significance of differences
Experimental	2,59	4,76	1,99	8,40	Significant
Control		2,11	2,88	0,86	random

The tabulated degree under the degree of freedom (6) and at a significance level of 0.05. Upon observing Table (5), it becomes evident that the calculated (t) value for the experimental group is greater than the calculated (t) value for the control group. Comparing the calculated (t) value for the experimental group to the tabulated and critical value (2.59) under the degree of freedom (6) and at a significance level of 0.05, it is revealed that it surpasses the tabulated value, indicating the significance of the differences. Conversely, the control group demonstrates that the calculated (t) value is smaller than the tabulated value (2.59), suggesting the randomness of the differences.

3.2 Presenting pre- and post-flexibility test results for the experimental and control groups, analyzing and discussing based on exercise type.

Table 6: The mean values, standard deviations, and the calculated and tabulated (t) values between the pre and post-flexibility choices for the experimental and control groups.

Tests	Tabulated t-value	Calculated T value	± p f	ˉS F	the group	Significance of differences
Bridge (bridge or rear arch)	2,59	6,21	3,36	9,49	Experimental	Significant random
		2,11	0.83	0,85	Control	
Alternately straighten the knees from a standing position		7,41	2,77	9,20	Experimental	Significant random
		1,54	0.83	6,29	Control	
Opening the legs in the mutual frontal level		5,88	4,18	11,8	Experimental	Significant random
		1,31	2,88	6,47	Control	

The tabulated degree under the degree of freedom (6) and at a significance level of 0.05. By observing Table (6), it is evident that all calculated (t) values for flexibility tests are greater than the tabulated and critical value (2.59) under the degree of freedom (6) and at a significance level of 0.05 for the experimental group. This indicates the significance of the differences, while conversely, the control group shows that the calculated (t) values for flexibility tests are smaller than the tabulated values (2.59), suggesting the randomness of the differences.

3.3 Presentation, analysis and Discussion of Motor Speed Test Results

Table 7: The mean values, standard deviations, differences in mean values, standard deviations, and the calculated (t) value for the two research groups (control and experimental) for the motor speed test between pre and post-test results.

The group	Calculated T value	± p f	ˉsf	Posttest		Pretest		Measuring unit	The test	Significance of differences
				± p	ˉs	± p	ˉs			
Control	4,332	0,121	0.072	0,498	6,884	0.522	6,883	Repetition	Kinetic speed	Significant
Experimental	4,505	0,490	0,760	0,400	7,043	0,663	6,265			Significant

The tabulated (t) value (2.59) under the degree of freedom (6) and at a significance level of (0.05). Through the observation of Table (7), it is evident that the calculated (t) value for the research groups (control and experimental) is greater than the tabulated (t) value of (2.59) under the degree of freedom (6) and at a significance level of (0.05). This indicates the significance of differences for the research groups, favoring the experimental group due to differences in the arithmetic means in both pre- and post-tests.

3.4 Presentation of the results of pre- and post-maneuver
skill tests for the experimental and control groups, along with analysis and discussion.

Table 8: Illustrates the values of differences in arithmetic means, their standard deviations, and the calculated and tabulated (t) values for the two research groups (experimental and control) in maneuver skill tests (over-the-back throws) between pre- and post-test results.

Skills	The group	± p f	ˉS F	Calculated T value	Significance of differences
Holding the arm with both hands	Experimental	1,48	2,39	6.95	Significant
	Control	1,39	0,71	1,89	Random
Encircling the head and holding the arm	Experimental	1,54	2,76	4,43	Significant
	Control	1,27	0,211	1,16	Random
Encircling the torso and holding the arm	Experimental	0,44	1,74	8,91	Significant
	Control	0,28	1,40	1,29	Random

The tabulated (t) value (2.59) under the degree of freedom (6) and at a significance level of (0.05). Upon observing Table (8), it is evident that the calculated (t) value for the experimental group in overhand throws from the back is greater than the tabulated (t) value of (2.59) under the degree of freedom (6) and at a significance level of (0.05), indicating the significance of differences. Meanwhile, the calculated (t) value for the control group in overhand throws from the back is smaller than the tabulated (t) value, suggesting the randomness of differences. Thus, the experimental group demonstrated greater development in the skill performance level of throws.

3.5 Discussion of Results
By examining the results of flexibility tests in the pre- and post-assessments presented in Tables (6, 5), we observe significant differences in favor of the experimental group in the post-assessments. The researcher attributes this to the effectiveness of incorporating flexibility exercises into the training program, leading to the enhancement of spinal and hip joint flexibility in wrestlers of the experimental group. Meanwhile, the results indicate the random nature of differences in the control group, underscoring the importance of utilizing flexibility exercises to improve the level of this physical attribute. This confirms the impact of the exercises used in the training program on developing flexibility in the spinal column and hip joint for the experimental group of wrestlers.

The researcher contends that these differences have led to a clear improvement in the skill performance level of holds, stating, "Flexibility aids in learning motor skills that require adopting specific positions or performing skills within a certain range of motion." Additionally, the researcher emphasizes the importance of executing these exercises correctly, considering the duration of stability and adjusting the intensity of the exercises. As mentioned, "The best methods for developing flexibility involve using minimal force with sustained performance over an extended period... to induce the necessary tissue adaptation" (Thanoon, 2007, p. 56) [15].

Furthermore, the progression in the performance of flexibility exercises yields physical and cognitive returns, characterized by "increased energy reserves, as well as cognitive returns manifested in mental calmness,

psychological balance, and enhanced attention" (Control of Body, 2013) [9].

The results of the kinetic speed test in Table (7) demonstrated significant differences in favor of the research group, particularly the experimental group, indicating the effectiveness of the training program. The tests revealed a reciprocal impact between the achieved levels of development in kinetic speed for leg and arm movements and the accurate control of these movements through the three overhand catches. This signifies the wrestler's ability to exert higher rates of rapid movements to secure the best hold on the opponent. Most specialized studies have highlighted that increased training in speed movements elicits neurological responses to the correct repetition of these movements, aligning with proper artistic performance. This contributes to efficient movement economy, eliminating unnecessary and excessive movements, providing proper fluidity in motor performance across various body parts.

"As speed exercises should be performed according to the targeted speed level in the training program to facilitate the adaptation process for motion" (Abdul-Kareem, 2003, p. 175) [1].

The skill test results for overhand throws presented in Table (8) indicated significant differences in favor of the experimental group, with randomness observed in the control group between the pre-test and post-test outcomes. The researcher attributes this to the development in flexibility and kinetic speed in the body joints, accompanied by an increase in the elasticity of muscles, tendons, and ligaments. Flexibility is recognized as a vital factor in fitness, facilitating muscle stretching before and during athletic activity, leading to enhanced skill performance (Abdulhameed & Hassanin, 1985, p. 89) [3]. "The lack of flexibility is considered one of the primary methods for technical weakness and performance". This underscores that the development and demonstration of movement coherence, beauty, and technical evolution cannot occur without the quality of flexibility. As much as joint movement is limited, the skill movements of the player are restricted, emphasizing the significant importance of developing and enhancing flexibility, particularly in the spinal column and hip joint. This is crucial as wrestling movements demand a high level of flexibility in the athlete's joints. In conclusion, the researcher has achieved the goals and hypotheses of the study, as outlined in the work of Coleman & Ray (2018, p.10) [8].

4. Conclusion and Recommendations
4.1 Conclusion
In light of the results obtained by the researcher through the field experiment and using appropriate statistical methods, the following conclusions were reached:
- The implemented training program has a positive impact on developing flexibility and motor speed for the experimental group.
- The development of flexibility and motor speed among the wrestlers in the experimental group contributes to enhancing the performance of overhand throws from the back, as evident from the post-test results.
- The results reveal that the implemented training program has aided in improving flexibility, motor speed, and the technical performance level of the researched technical skills (throwing maneuvers) for the experimental group when compared to the control group.

4.2 Recommendations
Based on the conclusions drawn by the researcher, the following recommendations are suggested:
- Incorporate flexibility and motor speed exercises within the training regimen for cadet-level wrestlers in freestyle wrestling, considering them crucial physical abilities in developing the performance of overhand throws from the back.
- Emphasize the development of technical skills specific to performing overhand throws from the back for the Cadet category, as the success in executing these maneuvers is vital for scoring high technical points in accordance with the game rules.
- Conduct similar research in different study variables, age groups, and various types of overhand throws.
- Utilize diverse training methods and techniques to enhance the physical and skill capabilities of freestyle wrestlers (Cadet category).

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