

The Effect of Using High - Intensity Interval Training to Develop Some Coordination Abilities On the effectiveness of the Technical performance of wrestling players

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Theories and Applications of fighting sports

1/1 Research Introduction and problem:

Training loads placed on the player and its continuous increase, which reached a point that put him on the edge of danger, are a motivation for researchers and scientists to search for the best ways and methods that help this player in facing the continuous increase associated with modern training programs and preventing sports practicing harms. These are achieved through scientific planning for training programs and the balance between loads and rest.

Recently, high-intensity interval training has become very popular and has been increasing. This type of training involves repeated bouts of high-intensity exertion followed by various healing times. It occurs at 80% to 95% of a person's maximum heart rate estimation; it is the maximum of times the heart will beat in one minute. And recovery periods may last equally as long as periods of work. It is usually performed at a rate between 40% to 50% of a person's maximum heart rate estimation. The exercise approximately continues -alternating between work and rest-between (20 – 60) minutes. (15)

Dan Plews (2016) indicates that high - intensity interval training is a set of exercises which consists of repeated bouts of high-intensity work that are done more than Lactate threshold

Interspersed with periods of low-intensity exercise or complete rest.
(13)

Also HIIT training mission is that high-intensity interval training is an integral part of sports training programs for many years. As there are many varied sports activities that require short pushes of movement with high intensity. High-intensity interval training has become an increasingly recognized and popular training method. Incorporating this method of training will improve cardiorespiratory fitness as well as many other health benefits. (15)

A high- intensity interval training session consists of a period of warming up exercises followed by 3 to 10 high intensity exercises. Between these intense exercises, we must perform less intense exercises that are considered break periods, and it ends with a period of calm movement, such as walking for 4 minutes. The main idea of high-intensity exercise is that it is practiced with the possible maximum intensity (Until the intensity of stress reaches 95% of the highest effort a person can do). Less intense exercises that separate high-intensity exercises its intense should be 50%. The number of repetitive exercises and the length of each one depend on the exercise type, but it can be 3 exercises that only involve 20 seconds of high-intensity exercise. (17)

There are physical conditions upon which athletic achievement depends. On the basis of these conditions, the athlete can direct and control his motor activity and carry out the motor duties in a consistent and purposeful manner. These conditions are represented in the player's possession of some abilities which are

called coordination abilities, which in turn depends on the anatomical, functional and psychological conditions. These can be developed through full sports training in general or by focusing on specific abilities on it. (10)

Also, players who have adequate coordination abilities can have quick reaction, think correctly while learning motor skills, and develop their performance. Therefore, the availability of coordination abilities of all athletes has the benefit in achieving high results and distinguished performance. (1:94)

The importance of coordination abilities is particularly also evident in individual fighting sports due to the diversity of technical performance concurrent with the performance of the competitor. The coordination abilities appear linked to other factors of sport achievement, which are represented in physical abilities and technical duties. The coordination abilities are also related to each other and serve the overall motion combination from partial motions in a coherent manner. (1:583)

Wrestling sport needs coordination abilities, as it is one of the factors affecting the technical performance of wrestling players. The coordination abilities do not appear as individual abilities, but rather are always linked to other conditions of sport achievement such as the physical and technical abilities. The coordination abilities are related to each other, and this becomes apparent when it is necessary to

link the parts of one skill or two complex skills. Then we need, for example, the Kinetic linkage ability, which is one of the

components of the coordination abilities that serve the technical and tactical performance.

There are important points when training coordination abilities and they are: variety, accuracy and error correction, focus on performance, and the appropriateness of the exercises given for the age stage. As well as focusing through the units on controlling performance, good rhythm and dynamic balance in different situations, and good performance in hard skills. (16)

There is a correlation between coordination abilities and the extent of motor skills development as the coordination abilities represent a fundamental basis for the acquisition of motor skills. In this way, the mutual overlap between them indicates the extent to which the level of each of them depends on the level of the other. (8:16)

The researcher believes that the sport of wrestling requires high technical performance to implement the tactical performance required from the player. In other words, the technical performance is a method to achieve the tactical performance. Without good skillful performance, game plans cannot be implemented optimally and thus the required achievement will not be achieved. Unlike some sports such as gymnastics and swimming, in which technical performance is the main role in winning. There is no doubt that the major technical skills in wrestling have gained clear attention through the international rules of wrestling sport, and this is evident in the estimation of these skills with (4) points and may reach (5) points. This did not come from a vacuum, but rather as a result of the

degrees of difficulty in these skills and their high ability to connect between their parts, and what these skills also require from balance and changing situations during implementation in proportion to the degrees of resistance that the player faces from the competitor. And through the researcher's experience as a faculty member and wrestling coach, and also his continuous follow-up to local and international championships, his attention is attracted to the fact that our players have a state of lack of symmetry and lack of focus and control over the competitor during the technical performance of the skills under study. This is appeared through the low percentage of achieving the desired points from these skills. The researcher attributes this to a weakness in the level of coordination abilities

required for the required technical performance and the lack of interest in developing coordination abilities by trainers in targeted trainings. Therefore, the researcher tried, through this study, to find a way to develop the coordination abilities associated with technical performance, which in turn improves the effectiveness of the technical performance of the skills under study.

1/2 Research Aim:

The research aims at recognizing the effect of using high - intensity interval training to develop some coordination abilities on the effectiveness of the technical performance of wrestling players.

1/3 Research hypotheses:

1/3/1 There are statistically significant differences between the pre and post measurements of the experimental group in the

coordination abilities and the effectiveness of the technical performance in favor of the post measurement.

1/3/2 There are statistically significant differences between the pre and post measurements of the control group in the coordination abilities and the effectiveness of the technical performance in favor of the post measurement.

1/3/3 There are statistically significant differences between the two dimensional measures of the control and experimental groups in the coordination abilities and the effectiveness of the technical performance in favor of the post measurement of the experimental group.

1/4 Search procedures:

1/4/1 Research Methodology:

The researcher used the experimental method through the design (pre- measurement - post-measurement) for two groups, one of them experimental and the other controlling, for its suitability to the nature of the research.

1/4/2 Research Sample:

The basic research sample was deliberately chosen from the wrestling players at the “Mansheya Youth Center” in Benha, whose number is (16) players. They were distributed into two groups (experimental - controlling), each group consisted of (8) players. Number of (6) players were selected as an exploratory sample of wrestling players in the “Muslim Youth Association” to conduct the exploratory study. Thus, the total sample of the research

becomes (22) players.

1/4/2/1 Research Sample Homogeneity:

The researcher has calculated the homogeneity of the overall research sample (basic, exploratory), which numbered (22) players. This is to ensure that it falls below the equinox curve in the variables (growth-coordination abilities – technical performance effectiveness) subjected to study, as shown in Table (1).

Table (1)

Description of the research sample in the variables (growth - coordination abilities - technical) Subjected to study

N=22

Variables		Mean	SD (±)	Mdn	Skew	
Growth variables	Age	16.230	0.926	16	0.210	
	Height	167.692	8.807	170	-0.345	
	weight	76.153	14.882	75	0.833	
	Training experience	4.692	0.751	5	0.610	
variables of co-ordination abilities	Kinetic linkage ability	6.538	1.050	6	0.135	
	Motor response ability	1.775	0.378	1.5	0.392	
	Suitable Effort Exert ability	distance	5.769	1.423	6	-0.342
		Time	7.461	0.967	7	0.127
		Legs strength	18	3.894	19	0.580
		Back strength	17.230	3.854	17	0.174
		Right grip strength	11	2.581	10	0.411
	lift grip strength	11.846	2.609	10	0.164	
Changing positions	5.230	0.725	5	-0.394		

	adaption ability					
	Maintain balance ability	Kinetic balance	3.006	0.645	3	0.295
		Static balance	21.153	4.259	21	-0.263
	Evaluation position ability		1.923	0.862	2	0.163
variables of technical abilities	Reverse waist lift		2.730	0.170	2.8	-0.808
	High waist turnover		2.807	0.111	2.8	-0.173

It is evident from Table (1) that the value of the skew was limited to (± 3) for the growth variables and the variables of coordination and technical abilities, which indicates the homogeneity of the sample in the variables subjected to study.

1/4/2/2 Research Sample Equivalence:

The researcher has calculated the equivalence between the two research groups (experimental-controlling) in the basic used variables subjected to study, as shown in Table (2).

Table (2)

The significance of the differences between the experimental group and thecontrolling group in the variables subjected to study

N1=N2=8

Variables		experimental		controlling		difference between two averages	T value
		Mean	SD (\pm)	Mean	SD (\pm)		
Growth variables	Age	16.375	0.992	16	0.7071	0.375	0.811
	Height	166.25	8.926	163.12	9.980	3.125	1.102
	Weight	77.5	17.320	68.75	8.926	8.75	1.498
	Training experience	4.625	0.695	4.875	0.780	-0.25	1.083
variables of co-ordination	Kinetic linkage ability	6.25	1.035	6	0.925	0.25	0.569
	Motor response ability	1.76	0.353	1.775	0.319	-0.015	0.082

abilities	Suitable Effort Exert	distance	5.625	1.812	5.5	1.618	0.125	0.165
		Time	7.25	1.035	7	0.755	0.25	0.594

	ability	Legs strength	19.25	3.918	19	3.779	0.25	0.064
		Back strength	18.125	3.313	18.5	3.070	-0.375	0.436
		Right grip strength	11.75	2.121	12	1.851	0.25	0.275
		lift grip strength	12.125	2.587	12.375	2.875	-0.25	0
	Changing positions adaption ability		5.125	0.640	5.375	0.517	-0.25	1.000
	Maintain balance ability	Kinetic balance	3.01	0.475	3.135	0.526	-0.125	0.541
		Static balance	20.5	3.927	20.875	4.015	-0.375	0.192
	Evaluation position ability		1.875	0.834	2	0.925	-0.125	0.280
variables of technical abilities	Reverse waist lift		2.575	0.205	2.687	0.195	-0.112	1.331
	High waist turnover		2.675	0.103	2.75	0.092	-0.075	1.643

The tabular (T) value at the significance level (0.05) = 1.761

It is evident from Table (2) that there are no statistically significant differences at a level of significance (0.05) in the research variables (growth – coordination abilities - effectiveness of technical performance) between the experimental and controlling groups subjected to study, which indicates the Equivalence of the two research groups.

1/4/3 Tools and methods of Data collection:

The researcher reviewed specialized scientific references, websites, and reference studies in order to identify the tools, sets and tests suitable for the research, and they are as follows:

1/4/3/1 Tools and Sets:

The researcher used the following sets and tools to assist him in implementing the proposed training program, and conducting research tests:

- A (Ristameter) set: for measuring (height and weight).
- Measure Tape (to measure distance).
- Sandbags.
- whistle.
- Reaction speed set for wrestlers.
- Technical performance effectiveness evaluation form.
- A video camera.
- Stopwatch to measure time.
- Dynamometer set (grip - back and legs).
- Mat.

1/4/3/2 Tests used in the research 1/4/3/2/1 Co-ordination abilities tests:

Based on the researcher's personal interviews and analysis of scientific references and previous studies- (1), (3), (4), (5), (6), (9), (10), (11), (14) - to identify the coordination abilities and special tests that measure each of them, Personal interviews, analysis of scientific references, and previous studies reached the following coordination abilities (Kinetic linkage ability- respond ability- Physical effort ability- The ability to adapt to changing situations- The ability to maintain dynamic and static balance- The ability to evaluate the situation). Despite the difference in the importance order of these elements, the researcher then determined tests for

these coordination abilities as follows:

- Kinetic linkage ability test.
- respond ability test.
- Physical effort ability test.
- The ability to adapt to changing situations test.
- The ability to maintain dynamic and static balance test.
- The ability to evaluate the situation test.

1/4/3/2/2 Technical Tests:

- A form for evaluating the effectiveness of the technical performance for the skillssubjected to study, and they are represented in:

- Reverse waist lifting skill.
- High waist turnover.

1/4/4 Exploratory Study:

1/4/4/1 First Exploratory Study:

- Guiding the assistants on how to apply the tests and record the results.
- Ensuring the safety of the used tools and sets, as well as the places for carryingout tests and measurements.
- Applying of a training unit template to ensure the correctness of the programdesign procedures.
- Determining the chronological order for performing the tests and used measurements.

1/4/4/2 Second Exploratory Study:

The researcher conducted this study to find the scientific

parameters for the test (in the period from 9/1/2020 to 8/9/2020) on a sample of (6) players from the same research community. With the addition of (6) players from outside the total sample with more training experience and technical levels in order to calculate validity.

1/4/4/2/1 Tests Validity:

Table (3)

Differences significance between the distinctive and non- distinctive groups in the variables of co-ordination and technical abilities subjected to study

$N_1=N_2=6$

Variables		Distinctive group		non-distinctive group		difference between two averages	T value	
		Mean	SD (\pm)	Mean	SD (\pm)			
variables of co-ordination abilities	Kinetic linkage ability	4.666	0.516	5.666	0.816	1.000	2.683	
	Motor response ability	1.216	0.098	1.65	0.242	0.434	2.683	
	Suitable Effort Exert ability	distance	3.5	0.547	5.166	1.602	1.666	1.979
		Time	5	0.632	6.833	0.752	1.833	4.000
		Legs strength	12.333	6.742	20.666	3.669	8.333	2.009
		Back strength	13.833	2.483	18.166	2.639	4.333	2.157
		Right grip strength	9.166	0.752	12.166	2.136	3.000	2.501
		lift grip strength	9.166	0.408	12.333	3.011	3.167	1.959
	Changing positions adaption ability	4	0.632	5.833	1.329	1.833	2.449	
	Maintain balance ability	Kinetic balance	4.5	0.547	3	0.547	1.5	4.354
Static balance		25.5	3.937	19.333	3.829	6.167	2.544	

	Evaluation positionability	3.166	0.408	2	0.894	1.166	2.449
variables of technical abilities	Reverse waist lift	2.95	0.054	2.716	0.183	0.234	3.346
	High waist turnover	2.966	0.081	2.766	0.103	0.2	3.086

(T) Value at significance level (0.05) = 1.94

It is evident from Table (3) that there are statistically significant differences between the distinctive and non- distinctive groups in the variables of co- ordination and technical abilities subjected to study at a significance level of 0.05. As the calculated value of T test is greater than the value of T test in the table, which indicates the validity of the previous tests.

Table (4)
Reliability for the variables of co-ordination and technical abilities
subjected to study **N=6**

Variables		Test		Re-Test		Difference between two averages	R value	
		Mean	SD (±)	Mean	SD (±)			
variables of co-ordination abilities	Kinetic linkage ability		5.666	0.816	5.5	1.048	0.166	0.934
	Motor response ability		1.65	0.242	1.6	0.178	0.05	0.874
	Suitable Effort Exert ability	distance	5.166	1.602	5.333	1.366	-0.167	0.974
		Time	6.833	0.752	6.666	0.516	0.167	0.857
		Legs strength	20.666	3.669	20.833	3.060	-0.167	0.973
		Back strength	18.166	2.639	18.666	3.614	-0.5	0.971
		Right grip strength	12.166	2.136	12.666	1.861	-0.5	0.821
		lift grip strength	12.333	3.011	12.666	2.804	-0.333	0.963
	Changing positions adaption ability		5.833	1.329	5.666	0.816	0.167	0.860
	Maintain balance ability	Kinetic balance	3	0.547	3.096	0.596	-0.096	0.917
Static balance		19.333	3.829	19.833	4.119	-0.5	0.955	

	Evaluation positionability	2	0.894	2.166	0.752	-0.166	0.891
variables of technical abilities	Reverse waist lift	2.716	0.183	2.75	0.151	-0.034	0.898
	High waist turnover	2.766	0.103	2.75	0.137	0.016	0.842

(R) Value at the level of significance 0.05 = 0.462

It is evident from Table (4) that there is a significant correlation between the pre and post- test in the variables of the co-ordination and technical abilities subjected to study. As the correlation coefficient ranges between (0.821, 0.974). The calculated value of (R) was greater than its tabular value at 0.05 significant level, which indicates the reliability of the tests subjected to study.

1/4/5 Basic experiment:

After the researcher conducted the exploratory study and its findings, he conducted the basic study, which was conducted as follows:

1/4/5/1 Pre- measurements:

Pre-measurements (co-ordination and technical abilities) were applied to the members of the research sample for the experimental and controlling groups in the period (10-12 / 9/2020) in the “Young Muslim Association” at Benha.

1/4/5/2 Basic study:

The training program (High Intensity Interval Training) was applied to the experimental group, and the traditional program - specified by the person in charge of the training process in the “Muslim Youth Association” at Benha – was applied to the controlling group members for a period of 8 weeks, from (15/9/2020 to 8/11/2020). Taking into account the application of High Intensity

Interval Training directed at the development of the coordination abilities which specified by the researcher only on the experimental group players. With matching training program execution time on the two research groups (experimental - controlling).

**** Designing training program Steps:**

The content of the training program was determined and selected basing on the analysis of the training programs that scientific references and previous studies referred to.

**** The Objective of the training program:**

The proposed program aims to develop the co-ordination abilities of the wrestlers, and then improve the effectiveness of the technical performance

subjected to study. The training program includes a set of special exercises similar to the phases of performance as basic exercises to develop the level of technical performance of the skills subjected to study, which were presented to the experts.

**** Principles and Standards of building the proposed training program:**

In the light of the objective of the training program, the researcher has put the following principles and standards:

- Availability of safety and security factors during program implementation.
- The content of the program must be appropriate to the nature and characteristics of the age subjected to study
- The program takes into consideration the individual

differences between research sample players.

- Taking into consideration that the breaks are appropriate for the used load.
- Taking into consideration the intensity and volume of the load in proportion to the objective of each training unit.
- Taking into consideration the principle of fluctuation in the degree of load during the training program periods.
- Flexibility of the program and its acceptance of practical application.
- Availability of possibilities tools and sets appropriate to the nature of the research.
- Taking into consideration the selection and arrangement of exercises within the program.
- The form of performance in training is similar to the nature of the performance of wrestlers.

**** Designing the Proposed Training Program Determinants:
Program Time Period :**

The researcher specified the time period for the proposed program as two months, including 8 weeks, during the special preparation period (As 3 training units during the week). Accordingly, the number of training units becomes 24 training units.

**** Program Basic Variables:**

1- Load Intensity:

During the program, the researcher has taken into account that the load intensity for high-intensity interval training ranges between (80%- 90%). It interspersed with 40% to 50% as exercises with less

intensity to reach partial recovery to help the player to complete the physical part. We find that the intensity of the performance is determined by distance and weight.

2- Load Volume:

The load size for high-intensity interval training with an average time (45 m) ranges between work and rest inside the training unit.

3- Interval Periods of Rest:

Interval periods of rest range between each exercise (10 s), and between each group (1 m).

** Exercises Selection and Arrangement:

Exercises selection process was based on an analysis of the needs of the wrestlers and the motor pathways of the skill subjected to study. It was arranged in proportion to the objective of the program and in a way that helps the continuation of muscular work between the muscle groups of the body parts used in the skill.

** Training Unit Content:

Training unit includes the following:

•Preparatory Section: Time (10 m)

- Warm-up exercises to prepare the body's muscles and stimulate blood circulation.
- Flexibility and muscle stretching exercises.

•The main Section: Time (45 m)

- Technical trainings to develop the special co-ordination abilities and the effectiveness of the technical performance of the skills subjected to study for wrestlers.
- high-intensity interval trainings for the development of the co-

ordination abilities of wrestling (Kinetic linkage ability- Motor response ability- Suitable Effort Exert ability- Changing positions adaption ability- Maintain balance ability- Evaluation position ability)

•**Final section: Time (5 m)**

-Relaxation exercises with muscle stretching and various lights jogging around the mat.

1/4/5/3 Post- Measurements:

Post- measurements of the two groups (experimental - controlling) were made in the variables subjected to study, and under the same conditions as the pre- measurements during the period (10 - 12/11/2020).

1/5 Results Presentation and discussion:

1/5/1 Results Presentation:

Through the title and objective of the research, and based on the results of the statistical analysis, the results of the research were presented through the following tables:

Table (5)

The differences between the pre and post measurements of the experimental group and the rates of improvement in the variables subjected to study

N= 8

Variables		Pre-measurements		Post-measurements		difference between two averages	T value	Improvement percentage
		Mean	SD (\pm)	Mean	SD (\pm)			
	Kinetic linkage ability	6.25	1.03	5.12	1.24	1.12	*2.04	%18
	Motor response ability	1.76	0.35	1.23	0.10	0.52	*4.17	%29.71
	distance	5.62	1.81	3.87	0.69	1.75	*2.24	%31.11
	Time	7.25	1.03	4.87	0.64	2.37	*4.75	%32.75

variables of coordination abilities	Suitable Effort Exert ability	Legs strength	19.25	3.91	11.37	5.97	7.87	*2.60	%40.90
		Back strength	18.15	3.31	13.75	2.54	4.37	*2.52	%24.13
		Right grip strength	11.75	2.12	9.37	0.91	2.37	*2.31	%20.21
		lift grip strength	12.15	2.58	9.25	0.46	2.87	*2.50	%23.71
	Changing positions adaption ability		5.12	0.64	4	0.75	1.12	*2.64	%21.95
	Maintain balance ability	Kinetic balance	3.01	0.47	4.37	0.51	1.36	*5.68	%45.34
		Static balance	20.5	3.92	26	3.70	5.5	*2.98	%26.82
Evaluation positionability		1.87	0.83	3.12	0.35	0.25	*3.48	%66.66	

variables of technical abilities	Reverse waist lift	2.57	0.20	2.92	0.04	0.35	*5.96	%13.59
	High waist turnover	2.67	0.10	2.93	0.11	0.26	*4.52	%9.79

(T) Value at the significance level (0.05) = 1.761

Table (5) shows that there are statistically significant differences at significance level (0.05) between the pre and post measurements of the experimental group, and rates of improvement in the variables subjected to study (Kinetic linkage ability- respond ability- Physical effort ability- The ability to adapt to changing situations- The ability to maintain dynamic and static balance- The ability to evaluate the situation). It is also evident that the rate of improvement ranged between (9.794% and 66.666%).

Table (6)

The differences between the pre and post measurements of the controlling group and the rates of improvement in the variables subjected to study

N= (8)

Variables		Pre-measurements		Post-measurements		difference between two averages	T value	Improvement percentage	
		Mean	SD (±)	Mean	SD (±)				
variables of co-ordination abilities	Kinetic linkage ability	6	0.92	5.62	0.74	0.375	1.41	%6.25	
	Motor response ability	1.77	0.31	1.66	0.20	0.113	1.35	%6.33	
	Suitable Effort Exert ability	distance	5.5	1.61	4.87	0.69	0.625	0.68	%11.36
		Time	7	0.75	5.87	0.64	1.125	2.71	%16.07
		Legs strength	19	3.77	17.62	2.06	1.375	0.81	%7.23
		Back strength	18.5	3.07	16.87	1.80	1.625	1.36	%8.78
		Right grip strength	12	1.85	11.37	1.84	0.625	0.58	%5.20
		lift grip strength	12.37	2.87	11	1.30	1.375	1.04	%11.11
	Changing positions adaption ability	5.37	0.51	4.875	0.35	0.5	1.83	%9.30	
	Maintain balance ability	Kinetic balance	3.13	0.52	3.875	0.35	-0.74	3.17	%23.60
		Static balance	20.87	4.015	22.62	2.13	-1.75	1.02	%8.38
Evaluation position ability	2	0.92	2.5	0.53	-0.5	1.33	%25		

variables of technical abilities	Reverse waist lift	2.68	0.19	2.712	0.16	-0.025	0.30	%0.93
	High waist turnover	2.75	0.09	2.8	0.05	-0.05	1.33	%1.81

(T) At the significance level (0.05) = 1.761

Table (6) shows that there are statistically significant differences at the significance level (0.05) between the pre and post measurements of the controlling group, and the rates of improvement in the variables subjected to study (Kinetic linkage ability- respond ability- Physical effort ability- The ability to adapt to

changing situations- The ability to maintain dynamic and static balance- The ability to evaluate the situation) and (Reverse waist lift, High waist turnover). It is also clear that the rate of improvement ranged between (0.930% and 23.604%).

Table (7)

The differences between the two pre-measurements of the experimental and controlling groups and the rates of improvement in the variables subjected to study N= (8)

Variables		Post-Experimental group		Post-Controlling group		difference between two averages	T value	Improvement percentage	
		Mean	SD (\pm)	Mean	SD (\pm)				
variables of co-ordination abilities	Kinetic linkage ability	5.12	1.24	5.62	0.744	-0.5	0.979	9.756	
	Motor response ability	1.23	0.10	1.66	0.206	-0.425	*5.434	%34.35	
	Suitable Effort Exert ability	distance	3.87	0.69	4.87	0.690	-1	*2.711	%25.80
		Time	4.87	0.64	5.87	0.640	-1	*2.711	%20.51
		Legs strength	11.37	5.97	17.62	2.065	-6.25	*2.334	%54.94
		Back strength	13.75	2.54	16.87	1.807	-3.125	*2.147	%22.72
		Right grip strength	9.37	0.91	11.37	1.846	-2	*2.155	%21.33
		lift grip strength	9.25	0.46	11	1.309	-1.75	*3.110	%18.91
	Changing positions adaption ability	4	0.75	4.87	0.353	-0.875	*2.520	%21.87	
	Maintain balance ability	Kinetic balance	4.37	0.51	3.87	0.353	0.5	*2.309	%11.42
		Static balance	26	3.70	22.62	2.133	3.375	*2.412	%12.98
Evaluation positionability	3.12	0.35	2.5	0.534	0.625	*2.309	%20		
variables of technical abilities	Reverse waist lift	2.92	0.04	2.71	0.164	0.213	*3.900	%7.28	
	High waist turnover	2.93	0.11	2.8	0.053	0.137	*2.464	%4.68	

(T) Value at the significance level (0.05) = 1.761

Table (7) shows that there are statistically significant differences at the significance level (0.05) between the two pre-measurements of the experimental and controlling groups, and the rates of improvement in the variables subjected to study (Kinetic linkage ability- respond ability- Physical effort ability- The ability to adapt to changing situations- The ability to maintain dynamic and static balance- The ability to evaluate the situation) and (Reverse waist lift, High waist turnover). It is also clear that the rate of improvement ranged between (4.680% and 54.945%).

1/5/2 Results Discussion:

Discussion of the first hypothesis: There are statistically significant differences between the pre and post measurements of the experimental group in the co- ordination abilities and the effectiveness of technical performance in favor of the post measurement.

The researcher attributes these differences between the pre and post measurements of the experimental group in terms of co- ordination abilities and the effectiveness of technical performance and the improvement in which they were made in favor of the post measurement in the results to the effect of the training program, which used high-intensity interval training on co-ordination abilities. Which in turn affected the effectiveness of technical performance, which the researcher applied on the members of his experimental research sample (the experimental group).

These agree with **Abdel-Khaleq, E. (2005) (8)**, who believes that co- ordination abilities are one of the basics of technical performance requirements, and they differ from each other in their

dynamic orientation. Co-ordination abilities do not appear as individual abilities but are always linked with each other to use in its content the overall motion structure in a consistent manner. Co-ordination abilities are also linked to other athletic achievement conditions which represented in the physical, technical and psychological capabilities. And if work is well coordinated between these abilities, the highest level of general motor co- ordination can be achieved, which is required to perform motor skills which are characterized by motor control.

These results are also agreeing with what **Mustafa, A. (1998) (10)** indicated, as he mentioned that in order to make the wrestler mastering the connection between the preapprehension of the attack and its execution, moving on to defense, doing a counterattack, and following up this attack, this improves the link between parts of the skill, from pre-attack to basic performance. Then the final position of the movement needs to train the wrestler in the art of connecting the parts of one skill. Then the final position of the movement needs to train the wrestler on the Connection of the parts of one skill or connecting movements that can be used in the match, and that is by training in sequential movements in a specific way.

Discussion of the second hypothesis: There are statistically significant differences between the pre and post measurements of the controlling group in the co-ordination abilities and the effectiveness of the technical performance in favor of the post measurement.

The researcher attributes these differences between the pre

and post measurements of the controlling group in the co-ordination abilities and effectiveness of technical performance and the improvement in which they were made in favor of the post measurement in the results to the continuity and regularity of the wrestlers of controlling group within the training program. This led to the occurrence of the adaptation process in the training and consequently the rise in the level of co-ordination abilities which led to an improvement in the measures of the complex technical performance subjected to study. The researcher's findings are consistent with what **Abdul-Basir, A. (1999) (7)** referred to in that the process of adaptation in training and upgrading the level cannot be completed or developed except through continuous training.

This is consistent with the results of the studies of **Rayhan, A. (1993)**, **Hussein, N. (2004) (11)**, and **Ezzat, Kh. (2007) (5)**. As they indicated that the program followed with the controlling group leads to improvement of pre- measurements than post- measurements.

It also agrees with **Abd al-Latif, E. (2009) (3)** that the co-ordination abilities are the first basis upon which the process of acquiring and mastering the necessary motor skills is based .Which enables players to connect and combine parts of a skill or more than one skill in one frame, and performing it in consistency, sequence and high efficiency without any defects or confusion in the motor performance. As such, it represents an essential link from the series of multiple achievement factors, which is important for achievement continuation and achieving athletic higher levels.

Discussion of the third hypothesis: There are statistically

significant differences between the two pre-measurements of the two groups (experimental - controlling) in the co-ordination abilities and the effectiveness of technical performance in favor of the experimental group.

The researcher attributes these differences between the two pre-measurements of the two groups (experimental - controlling) in the co-ordination abilities and the effectiveness of technical performance in favor of the experimental group in the results to the effect of the training program that used high - intensity interval training on co-ordination abilities which in turn affected the effectiveness of technical performance. The researcher applied the training program on the members of the experimental research sample (the experimental group) without the controlling group that used the traditional program.

This is consistent with what **Abdel Maksoud, A. (1994) (2)**, as he referred to the existence of a correlation between co-ordination abilities and motor skills. As the co-ordination abilities represent a fundamental basis for the acquisition of motor skills. Also the training targeted to motor skills is considered a basis for advancing the level of co-ordination abilities. In this way, the mutual overlap between them indicates the extent to which the level of each of them depends on the level of the other (6: 284)

Rayhan, A. and Mahmoud, A. (1999) also mentioned- citing from **Johansen, R. & Wangberg, R. (1998) (9)**, that wrestling needs co-ordination abilities. As they are one of the affecting factors on the technical performance level of the players of this sport. The co-ordination abilities do not appear as individual abilities, but rather

are always linked to other factors of athletic achievement such as physical and tactical fitness components. The co-ordination abilities are also related to each other, and this becomes apparent when it is necessary to link the parts of one skill or two complex skills. Then we need , for example, the Kinetic linkage ability, which is one of the components of the co-ordination abilities that serve the technical and tactical performance (3: 7).

These results are also consistent with what **Mustafa, A. (1998) (10)** indicated, as he stated that in order to make the wrestler masters the link between the pre- attack and its execution, moves on to defense, does a counterattack and follow upit, and improves the link between the same skill parts from Pre-Attack to Basic Performance then the Final movement position, he needs to be trained on the art of connecting the parts of one skill or linking movements that can be useful in the match. And that is by training in sequential movements in a specific way.

These results are also consistent with the studies of **Witwit, B. (2009) (4)** and **Emara, A. (2010) (1)**, that the program designed with the objective of developing the co-ordination abilities of wrestling has already led to the development of these co-ordination abilities. This in turn reflected positively on the development and improvement of the skills subjected to study.

1/6 Conclusions and Recommendations:

1/6/1 Conclusions:

- The high - intensity interval training have a positive effect on the variable of co- ordination abilities of the experimental

research sample.

- The high-intensity interval training led to the improvement of the effectiveness of the technical performance for reverse waist lift and high waist turnover of the experimental research sample.

- The traditional program showed an effect on the variables subjected to study, which represented in co-ordination capabilities and the effectiveness of the technical performance. This returns to the regularity in training from the controlling group, and inclusion of traditional program on physical and technical trainings specialized for wrestling.

- The differences in rates of improvement between the two groups (experimental - controlling) in the physical and technical research variables showed the superiority of the experimental group that used the training program which contains high-intensity interval training on the controlling group that used the traditional program.

1/6/2 Recommendations:

- The necessity to perform exercises in a way that mimics the nature of performance and takes the same movement pathway for athletic skills.

- Preparing codified programs to develop and improve the co-ordination abilities of wrestling.

- Activating the role of co-ordination abilities in training programs to upgrade the athletic skills of wrestlers in different stages.

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