

## Proposing a training program to improve balance and agility for judo wrestlers, (13-15) years

أثر برنامج تدريبي مقترح لتحسين التوازن والرشاقة للاعبين الجودو 13-15 سنة

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### Abstract:

This study aims to investigate the impact of the proposed training program on developing some physical traits and throwing skills in judo for the age group of 13-15 years. The study utilizes programmed educational and training units during sessions. The experimental approach was employed, conducting tests for balance and agility on an experimental sample consisting of 40 wrestlers following the proposed program, compared to a control sample of 46 wrestlers receiving training from another coach. Statistical analysis revealed significant differences favoring the experimental sample in terms of balance, agility, and throwing skills. Consequently, further studies are recommended to explore the effect of developing specific motor skills on judo performance.

**Keywords:** training program, agility, balance, judo.

ملخص:

تهدف هذه الدراسة إلى معرفة اثر البرنامج التدريبي المقترح في تنمية و تطوير بعض الصفات البدنية و بعض مهارات الاسقاط في رياضة الجودو لسن 13 - 15 سنة وذلك باستعمال الوحدات التعليمية والتدريبية الخاصة المبرمجة أثناء الحصة ، حيث تم استخدام المنهج التجريبي في البحث الذي تضمن إجراء اختبارات (التوازن والرشاقة) على عينة تجريبية التي يستعمل فيها البرنامج المقترح تشمل 40 مصارع و التي يشرف عليها الباحثان ، والعينة ضابطة التي تمارس برنامج من طرف مدرب اخر و تشمل 46 مصارع ، و أفرزت نتائج المعالجة الإحصائية على وجود فروق ذات دلالة إحصائية بين نتائج الاختبار والبدي لعيني البحث لصالح العينة التجريبية في كل من صفتي التوازن و الرشاقة و مهارات الاسقاط. و عليه نوصي بإجراء مزيد من الدراسات التي تتناول أثر

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## **I- Introduction**

Developed countries have significantly focused on highlighting physical dimensions and distinguishing them as a main axis in sports preparation. They believe that developing elements of physical fitness should be a top priority with a high degree of importance. Comprehensive preparation for athletes is considered essential in training processes. Modern research focuses on exploring and understanding the challenges faced by wrestlers to ensure the best results through the application of advanced scientific methods in planning and directing training programs. Despite the notable progress in the sport of wrestling (judo) at the global level, the field of research in this context suffers from a deficiency that affects the competitive ability of wrestlers in facing global challenges.

From our experience as players, coaches, and referees in this field, we have noticed a clear neglect in developing and training other motor abilities such as agility and balance, relying solely on developing basic physical qualities like strength and speed. Researcher Faiza Ahmed emphasized the need to analyze judo requirements and develop precise motor abilities to overcome the opponent, especially in the field of throwing skills, which are essential in this sport (Faiza, 2011, p. 45).

Given this, researchers believe that the cornerstone of training should include specialized exercises to develop motor abilities such as agility and balance. These exercises should be directed towards the muscular and skill work of judo, using special means and tools to ensure coordination and balance, stimulating the motor system to improve performance and avoid injuries.

However, there is a lack of similar research in the field of combat sports, highlighting the importance of conducting additional studies to provide a broader and deeper understanding of the role of these abilities in improving athletes' performance. Moreover, these coaches lack the methodology for training on these specific exercises and the scientific approach in sports training sciences, as well as how to plan and apply them during training sessions. These are the main reasons and problems that motivated us to conduct this field study on how to select

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appropriate exercises to achieve this purpose in the importance of the impact of developing some specific motor abilities (agility and balance) on the skill performance of young judo wrestlers. Hence, the researcher poses the following questions:

### **General Question**

Do the proposed exercises affect the development of specific motor abilities (agility, balance) and improve skill performance in the throwing phase among judo wrestlers?

### **Sub-Questions**

1. Do the proposed exercises affect the development of some specific motor abilities (agility, balance) for wrestlers?
2. Does developing some specific motor abilities (agility, balance) affect the effectiveness of skill performance?
3. Does developing some specific motor abilities (agility, balance) affect skill performance in the throwing phase using different methods (throwing with upper limbs, trunk, and legs)?

### **Hypotheses**

#### **1. General Hypotheses**

The proposed exercises positively affect the development of some specific motor abilities (agility, balance) and the effectiveness of skill performance among judo wrestlers.

#### **2. Specific Hypotheses**

-The proposed exercises positively affect the development of some specific motor abilities (agility, balance).

-Developing some specific motor abilities (agility, balance) positively affects the effectiveness of skill performance in the throwing phase using different methods.

1. There are statistically significant differences between the experimental and control samples in tests of some specific motor abilities (agility, balance) and the effectiveness of skill performance in favor of the experimental sample after the experiment.

## **II - Methods and Tools**

**Research Method** We used the experimental method in our research, considering it one of the most reliable methods for obtaining results and its suitability for the nature of the research problem and achieving the objectives. The experimental method allows for results with a high degree of validity and objectivity.

### **Spatial Domain**

The research was conducted in the judo hall of the amateur Miloi Judo Club in Oran.

### **Temporal Domain**

The proposed training program was applied during the 2022-2023 training season.

### **First Phase**

This phase involved conducting the preliminary experiment, which lasted from 2022/12/06 to 2023/01/27.

### **Second Phase**

This phase involved implementing the main experiment, which lasted from 2023/02/02 to 2023/04/10, with three sessions per week. The researcher conducted the pre-tests from 2023/02/03 to 2023/02/05, and the post-tests were conducted after the specified training period, on 2023/04/10 and 2023/04/11.

## **1. Research Sample and Selection Method**

The researcher, after conducting the preliminary study, determined the sample from the original population, which totaled 86 judo wrestlers. The sample was selected intentionally from the amateur Miloi Judo Club in Oran. The study sample consisted of 86 male wrestlers with similar physical characteristics, years of training (more than 2 years), and belt grade (green). The sample was divided into two groups: an experimental group that included 40 wrestlers, who followed the proposed training program, and a control group that included 46 wrestlers, who followed a traditional training program using individual free exercises and partner exercises to develop specific motor abilities (agility, balance). The study aimed to examine the effect of these exercises on the skill performance of judo wrestlers.

## **2. Research Tools**

A set of tests was identified to measure specific motor abilities (agility, balance). The researcher collected 20 standardized tests from various scientific sources and references to measure these motor abilities. The researcher then analyzed and extracted a set of results, as shown in the following table, based on the opinions of Mohamed Hassan Allawi and Nasr El-Din Redwan. They mentioned that "any component or skill that receives less than 25% of the total opinions should be excluded from the intended experiment" (Hassan, 2006, p. 360).

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<b>Test</b>	<b>Description</b>	<b>Objective</b>
<b>Agility Test</b>	Push-up Position	The objective of this test is to measure agility.

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<b>Test</b>	<b>Description</b>	<b>Objective</b>
<b>Balance Test</b>	from Standing Test (Bury Test)	The objective of this test is to measure balance, specifically the ability to maintain stability.
	Standing on the Ball of the Foot on a Block	
<b>Coordination Test</b>	Running in Figure 8 (Fleishman Test)	The objective of this test is to measure an individual's ability to change body position quickly while moving forward (coordination).
<b>Comprehensive Test</b>	Jumping Over Marks	The objective of this test is to accurately measure agility and jumping ability while maintaining balance and coordination during and after movement. It is a comprehensive test measuring agility, balance, and coordination.

**1- Scientific Foundations of the Tests**

To measure the validity of the test, the researcher calculated the reliability coefficient for each test, whether for motor or skill abilities, using the test-retest method. The tests were conducted on judo wrestlers, excluding any other influencing variables. The period between the pre-test and post-test during the preliminary experiment lasted one week on the same sample and under the same conditions as the first test. The researcher ensured strong homogeneity by considering age, weight, and approximate age. Additionally, wrestlers with heavyweights were excluded from the preliminary and main experiments.

After completing the motor and skill tests (pre and post) for the preliminary experiment according to the specified criteria, the researcher performed statistical analysis and derived the results using the simple correlation coefficient known as Pearson correlation. This statistical analysis yielded a set of results summarized by the researcher in the following two tables:

<b>Test</b>	<b>Sample Size</b>	<b>Degrees of Freedom</b>	<b>Overall Significance Level</b>	<b>Tabular Value</b>	<b>Computed Value</b>	<b>Statistical Significance</b>
Push-up Position from Standing Test (Bury Test) in (120)	04	03	0.05	0.878	0.90	Significant
<b>Coordination Test</b> Running in Figure 8 (Fleishman Test)					0.96	Significant

Test	Sample Size	Degrees of Freedom	Overall Significance Level	Tabular Value	Computed Value	Statistical Significance
<b>Agility Test</b>						
<b>Balance Test</b>					0.98	Significant
Standing on the Ball of the Foot on a Block						
<b>Comprehensive Test</b>					0.95	Significant
Motor Balance (Jumping Over Marks)						

Table No. 01: Demonstrates the stability of motor skills tests.

Test	Sample Size	Degrees of Freedom	Overall Significance Level	Tabular Value	Calculated Value	Statistical Significance
Te-Waza (Technique of Hands) (30s)					0.90	Significant
Morote-Seol-Nage						
Goshi-Waza (Technique of Hips) (30%) O-Goshi	04	03	0.05	0.878	0.96	Significant
Ashi-Waza (Technique of Legs) (30s) Osoto-Gari					0.98	Significant

Table No. (02): Demonstrates the stability of skill tests

Based on the results from the previous tables, it becomes clear that these tests exhibit a high degree of stability. All calculated values were notably high in both motor skills and skill assessments, ranging from a minimum of 0.90 to a maximum of 0.98. This indicates a strong correlation between pre-test and post-test results across all these assessments. The statistical findings confirm the stability of all tests used. Moreover, the Pearson stability coefficient for each test exceeded the tabular value of 0.878 at a significance level of 0.05 and 3 degrees of freedom.

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To ensure the validity of the tests, the researcher employed self-validity as the most accurate method for experimental grades compared to true grades, thereby minimizing measurement errors. The coefficient of self-validity equals the stability coefficient square root. Relying on this type of validity led to the results shown in the following tables at a significance level of 0.05 and degrees of freedom (n - 1).

<b>Test Description</b>	<b>Sample Size</b>	<b>Degrees of Freedom</b>	<b>Overall Significance Level</b>	<b>Tabular Value</b>	<b>Calculated Value</b>	<b>Statistical Significance</b>
Balance Agility Test (Supine Stance from Standing Position) (Berry Test) at (120)					0.90	Significant
Coordination Test (Running in Figure 8) (Fleishman) (T)	04	03	0.05	0.878	0.96	Significant
Balance Test (Standing on Foot Comb on a Cube) (T)					0.98	Significant
Motor Balance (Jumping over Marks)					0.95	Significant

Table 03: Demonstrates the validity of the motor skills test.

<b>Test</b>	<b>Sample Size</b>	<b>Degrees of Freedom</b>	<b>Overall Significance Level</b>	<b>Tabular Value</b>	<b>Calculated Value</b>	<b>Statistical Significance</b>
Te-Waza (Hand Techniques) (30s) Morote-Seol-Nage	04	03	0.05	0.878	0.90	Significant
Goshi-Waza					0.96	Significant

Test	Sample Size	Degrees of Freedom	Overall Significance Level	Tabular Value	Calculated Value	Statistical Significance
(Hip Techniques) (30%) O-Goshi Ashi-Waza (Leg Techniques) (30s) Osoto-Gari					0.98	Significant

Table 04: Demonstrates the validity of the skill test

It appears you're discussing the statistical results and methodology of a study involving both motor skills and skill assessments, likely in the context of judo or a similar sport. Here's a translated summary of your text:

Based on the statistical results recorded in the previous tables, it is evident that both motor skills and skill tests exhibit a high degree of self-validity. This is indicated by the calculated values of the self-validity coefficient for the tests being greater than the tabular Pearson correlation coefficient, ranging between 0.90 to 0.98 for both motor skills and skill assessments. Each calculated value exceeds the tabular value of the correlation coefficient set at 0.878, at a statistical significance level of 0.05 with 3 degrees of freedom.

**Equipment and Tools Used**

- Scales, whistle, electronic medical weight scale, electronic height measurement scale, result recording form, judo uniform (Keikogi), judo mat (Tatami), pens, colored adhesive tape, markers, chairs, high jump stand, display.

**Specifications of the Tests Used**

The researcher conducted motor and skill tests over two full days, dedicating the first day to skill tests and the second day to motor tests. A specialized team consisting of judo coaches and instructors was involved. Prior to the motor and skill tests, anthropometric measurements were taken, including height, weight, arm length, waist length, leg length, and directions.

**Motor Tests**

**1. Agility Test:**

- Supine Stance from Standing Position (Berry Test) in 20 seconds.
- Objective: Measure agility.

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- Tools: Stopwatch.
- Instructions: Participants start in a standing position, move to a squatting position upon the start signal, then to a supine stance, return to squatting, and finally return to standing. The body must remain straight during the standing position, and the buttocks must touch the ground during squatting. The test is repeated as quickly as possible for 20 seconds.
- Scoring: Each correct stance transition scores one point. Calculate the number of correct attempts (repetitions within 20 seconds).



**Figure 01: Slanting Supine Stance Test (Berry Test) in 20 seconds.**

**1. Balance Test**

**Standing on Foot Comb on a Cube**

**Purpose:** Measure static balance.

**Tools:** Stopwatch with multiple timings and a thin type, smooth ground with shoes and socks removed.

**Performance Specifications:** The participant stands on the edge of the apparatus with one foot on top of a cube (10 x 10 x 10 cm), see Figure No. (34). The other foot is placed on a board or on the ground. Upon hearing the start signal, the participant lifts the foot that is on the board or ground so that they are balanced on the foot on the cube, maintaining balance on the apparatus for as long as possible.

**Instructions**

The participant performs the test barefoot.

Hands should be placed steadily at the center during the test. Lowering the free foot indicates the end of the test.

**Recording:** The time during which the participant maintains balance on the apparatus is recorded, from the moment the free foot leaves the board or ground until any part of the body touches the board or ground

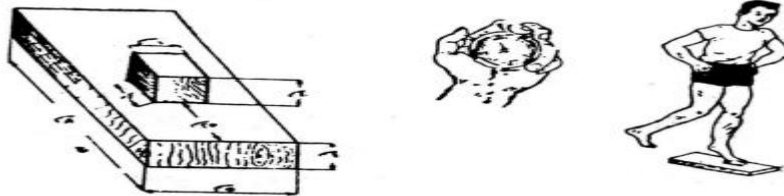


Figure 02: Balance Test Standing on Foot Comb on a Cube

### Comprehensive Test for Transitioning over Marks

- **Purpose:** Measure agility, jumping accuracy, balance retention, and coordination during and after movement.
- **Tools:** Multiple-timing stopwatch, measuring tape, eleven (11) markers fixed on the ground.
- **Performance Specifications:** The participant stands on the first mark with their right foot, then jumps to stand on mark number (1) with their left foot's sole completely covering the mark. They attempt to maintain this position for a maximum of five seconds, then jump to stand on mark number (2) with their right foot, again attempting to stabilize for a maximum of five seconds, and so on until reaching the tenth mark, using the same method with a foot change for each jump. Each stance is on the foot sole. Each attempt scores ten points, five of which are awarded for a correct and proper jump, requiring the foot to land so as to completely cover the mark on the ground. The other five points are recorded for each second the participant can maintain balance after landing, with the total test score reaching 100 points.
- **Test Instructions:** Penalties on this test can be classified into two types: errors related to incorrect landings on the marks and errors in balance after landing.
- **Errors in Landing on Marks:** The participant loses five points for an incorrect landing and a total lack of landing. An example of an error in landing may be:
  - Failure to land on the ground at the end of the descent.
  - Touching the ground with the heel or any part of the body except the sole of the foot.
  - Failure to cover the mark on the body. In case of any mistakes in landing, five points are deducted, and the participant is allowed to place themselves in the correct position above the mark, continue

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to conduct the test to hold for five seconds, and then jump to the next mark in sequence.



**Figure 03: Comprehensive Test for Transitioning over Marks (Sergey, Bolensky, 2009 p.89) (Hassan, 2006 p.89)**

**Skill Tests** In sports activities, there are numerous methods and means used for performance measurements. Certain sports, such as wrestling, judo, gymnastics, and others, pose challenges in using objective tests as performance measures due to the multiplicity of technical motor skills involved.

Judo, for instance, lacks objective skill tests due to the multitude and complexity of motor skills required. The skill tests in judo are mainly focused on throwing techniques ("Nage"), which are common and widely used in the sport. These throwing tests are essential for assessing the performance of wrestlers and are tailored to competitive requirements, where a single valid throw ("Ippon") can end a match within seconds or minutes. Wrestlers who excel in these tests demonstrate high potential for success.

According to Masoud Ali Mahmoud, these throwing skills involve a struggle of strength, requiring muscular strength and high skill from the wrestler.

The throwing techniques ("Nage") in judo are varied, as mentioned previously.

The researcher has identified specific skills sufficient for measuring the wrestler's performance level through two tests:

### **First Test**

**Measurement of Multiple-Technique Throwing Skills** The researcher previously mentioned that throwing skills encompass three different methods depending on the body part used by the wrestler:

- The first method involves throwing the opponent using the arms or shoulders ("Te-Waza").
- The second method involves throwing using the seat or waist ("Koshi-Waza").
- Through the aforementioned methods, the researcher was able to identify one skill for each method.

### **First Performance of Hand Skill ("Morote-Seoi-Nage" Technique des mains)**

**Form 04: First performance of the Morote-Seoi-Nage skill**



The second performance of the hip O-Goshi technique

**Form 05: Second performance of the O-Goshi skill.**

Third performance: Leg technique 'Soto-Gari'

**Form 06: Third performance of the Soto-Gari skill.**



- Objective of the test: To measure the effectiveness of skill performance for several previously mentioned throwing skills. This test assesses the wrestler's ability to execute the maximum number of correct throws in each stage lasting 30 seconds, with one skill performed per stage.
- Test execution method: Three wrestlers are positioned on the mat, each one meter apart, assuming the 'shizen-tai' stance. They are of the same weight and similar physical specifications as observed from their appearance. The testing wrestler stands in front of the first wrestler, engaging in a normal grip and assuming the 'shizen-tai' stance together.
- Upon starting signal, the testing wrestler executes the throw on the first wrestler, assisted by supporting from the arm and then releasing him.
- The fallen wrestler gets up as quickly as possible, while simultaneously the testing wrestler performs the same technique with wrestlers number 2 and 3, then repeats with the first wrestler, continuing until the designated time ends.

**Evaluation method**

- All throws executed within 30 seconds are counted if they meet the criteria for correct throws, along with the technical level of performance, awarding a full point 'ippon'.
- Any skill executed that does not meet the above criteria is not counted.

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- This test is conducted over three stages (rounds): Round 1: Hand throwing skill 'Morote-Seoi-Nage'. Round 2: Hip throwing skill 'Goshi'. Round 3: Leg throwing skill 'Soto-Gari'. Each round lasts 30 seconds per skill, with sufficient rest between rounds for each tester.
- The researcher relied on three referees affiliated with the regional judo league.
- The test is explained and demonstrated scientifically once to all participants.

**Considerations during test execution**

- The positions of the three wrestlers are determined according to the specified distances and illustrated in the diagram.
- The command to stop is issued after 30 seconds.
- After starting the throw and when the designated time ends, the throw is counted if the thrown wrestler's feet leave the mat, such as in 'Seoi-Nage' (back carry) or 'O-Soto-Gari' (sweeping the leg stood upon), for example.
- Throws are performed on both the right and left sides for each throw.
- Any wrestler among the three may be substituted if they appear to assist the testing wrestler, such as jumping with them, for instance, or any other performance that negatively affects the assessment level (Masoudi, 2012). [Source link provided for further details.]

**VI. Discussion**

Presentation and analysis of the results of the specific motor ability tests for the research sample

Test	Sample Size	Degrees of Freedom	Overall Significance Level	Tabulated Value	Computed Value	Statistical Significance
Flexibility Test (Perry Test) in (120)					0.90	Significant
Agility Test (Running Figure 8) (Fleischman) (t)	40	03	0.05	0.878	0.96	Significant
Balance Test (Standing on a Foot Arch on a Cube) (t)					0.98	Significant

Test	Sample Size	Degrees of Freedom	Overall Significance Level	Tabulated Value	Computed Value	Statistical Significance
Motor Balance (Jumping Over Marks)					0.95	Significant

**Table 05: Illustrates the statistical processing dimensions (1) of our computed study in the test of specific motor abilities for the research game**

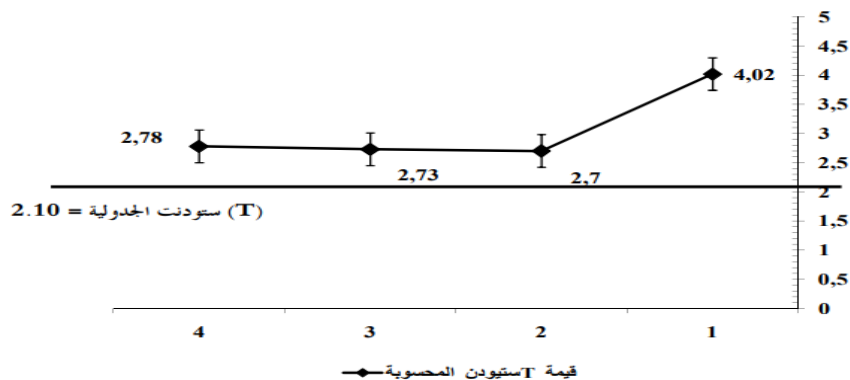


Figure 07: Represents the computed (T) value of the student in the tests of specific motor abilities for the research sample.

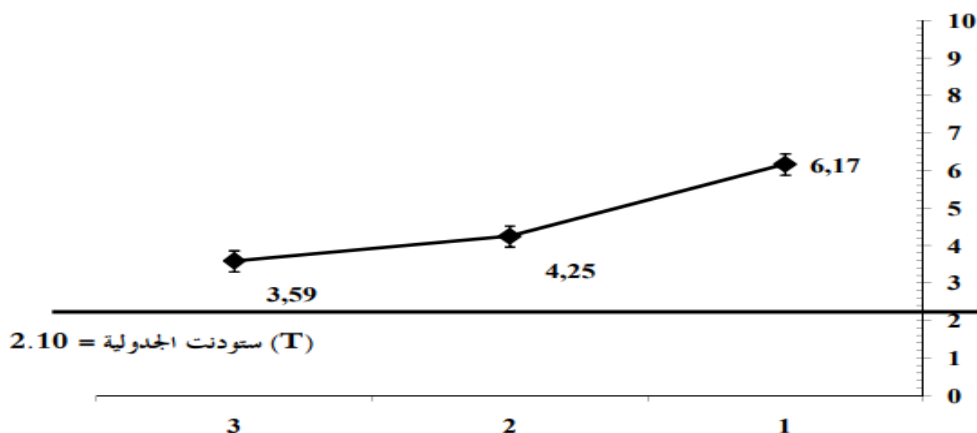
Test	Sample Size	Degrees of Freedom	Overall Significance Level	Tabulated Value	Computed Value	Statistical Significance
Te-Waza (Hand Techniques) (30s) Morote-Seoi-Nage					6.17	Significant
Goshi-Waza (Hip Techniques) (30%) O-Goshi	20	18	0.05	2.10	4.25	Significant
Ashi-Waza (Leg Techniques) (30s) Osoto-					3.59	Significant

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Test	Sample Size	Degrees of Freedom	Overall Significance Level	Tabulated Value	Computed Value	Statistical Significance
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Gari

**Table 06:** Illustrates the results after statistical processing of the computed 'T' student in the tests of specific motor skills for the research sample.



**Figure 08:** Represents the computed 'T' student value in the tests of specific motor skills for the research sample.

Based on Table 01, which illustrates the computed 'T' values in the tests of specific motor abilities, it is evident that: the computed 'T' values in all tests of specific motor abilities are sequentially (402, 2.70, 2.73, 2.78), all of which are greater than the tabulated 'T' value (2.10) at a significance level of 0.05 with 18 degrees of freedom. This indicates significant differences between the two groups, suggesting non-homogeneity in the research sample in the motor skills tests. This statistical significance between the results of the two groups in the tests of specific motor abilities favors the experimental group.

In light of the aforementioned results, Figure 01 illustrates the computed 'T' values in the tests of specific motor abilities for the research sample, showing that all

values are greater than the tabulated 'T' value, indicating statistically significant differences in favor of the experimental group. This demonstrates the positive impact of the training program on enhancing agility, balance, and coordination, which are important motor skills for performance.

Comparison of the results of the motor skills tests between the research groups in the post-test phase, after conducting the post-test motor skills tests by the experimental and control groups, the researcher processed the results statistically using the computed 'T' values and comparing them with the tabulated 'T' value (2.10) at a significance level of 0.05 with 18 degrees of freedom.

Table 02 clarifies the computed 'T' values in the post-test motor skills tests as follows: The computed 'T' values in all motor skills tests were sequentially (6.17, 4.25, 3.59), all of which are greater than the tabulated 'T' value (2.10) at a significance level of 0.05 with 18 degrees of freedom. This indicates significant differences between the two groups, showing non-homogeneity in the research sample in the post-test phase. These statistically significant differences between the two groups in the post-test motor skills tests favor the experimental group, attributed to the effectiveness of the proposed training program in developing specific motor skills applied to the experimental group in increasing agility, improving balance, and enhancing motor skill performance in various throwing techniques.

The researcher agrees that these findings align with previous studies indicating a direct correlation between motor and skill abilities, affirming that a well-designed training program focusing on agility, balance, and coordination exercises is one of the most effective ways to develop and improve movement. Figure 02 illustrates the aforementioned results, showing that all computed 'T' values in the post-test motor skills tests for the research sample are greater than the tabulated 'T' value, indicating statistically significant differences in the post-test results, favoring the experimental group in measuring motor skill performance effectiveness.

## **V. Conclusion**

This chapter has presented and discussed the results derived from the basic study, where after statistical processing, it became apparent that both the experimental

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and control research samples were homogeneous in both motor skills and motor abilities tests. This homogeneity was established at the beginning of the basic experiment after procedural adjustments to key variables. Regarding the training program for specific motor skills, agility and balance, the results of pre- and post-measurements after applying the proposed training program showed a clear positive development in agility and balance. Statistical analysis also revealed significant differences between the pre-test and post-test results for both research samples in favor of the post-test in specific motor abilities (agility, balance). The comparison in the post-test results between the two research samples in these tests indicated statistically significant differences in favor of the experimental group, demonstrating the extent of development achieved by the experimental group in enhancing specific motor skills (agility, balance, and coordination), and increasing the effectiveness of motor skill performance. This leads us to conclude that the proposed training program was more effective in developing specific motor skills and improving motor skill performance compared to the control group.

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