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Impact of Special Exercises on Developing Motor Balance and Technical Performance in the Discus Throw for Female Students

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Abstract

Through interviews the two researchers had with faculty members of the college and discussions with them, it became evident that there is a weakness in motor skills due to the lack of special exercises aimed at improving motor balance among female students. This has led to a deficiency in the technical performance of this activity. The aim of this research was to develop special exercises and examine their impact on enhancing motor balance and technical performance in the discus throw for female students. Both researchers hypothesized that there would be no statistically significant differences between pre-test and post-test scores of the research samples regarding motor balance and technical performance in the discus throw. The research samples consisted of 20 second-year students from the College of Physical Education and Sports Sciences for Women for the academic year 2023-2024, and they were homogeneous. The researchers used questionnaires and tests as tools to achieve the research objectives. They adopted a dynamic balance test involving transitions over markers and a performance evaluation test for the discus throw activity. After conducting the pre-tests, the specially designed exercises were implemented, which varied by using plastic discs, a rotating disc, kettlebells, and hanging ropes. The program was carried out over a period of 8 weeks, comprising 16 educational units. Following this, post-tests were conducted on the research sample, and the researchers employed statistical packages to analyze the results. The researchers concluded that special exercises had a positive impact on both motor balance and technical performance in the discus throw for female students, as evidenced by the significant differences favoring the post-test results. It became clear that the female students achieved a better technical performance in the discus throw activity. The researchers recommended the necessity of using educational programs that focus on motor skill variables, including motor balance, within physical and skill preparation programs for female students. This aligns with one of the United Nations' sustainable development goals in Iraq, which is quality education, to provide students with opportunities to acquire diverse skills through various learning methods. and this achieves one of the sustainable development goals of the United Nations in Iraq which is (Good Health).

Keywords | **Special exercises, motor balance, technical performance**

Introduction:

During this period, many sciences have advanced, and motor learning has received considerable

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attention, evident in the increased studies and scientific research related to learning, motor skills, and motor control. These studies have formed the foundation of the field of motor behavior, aiming to achieve the highest level of motor learning and mastery of motor skills.
Specialists in the field of learning have turned to methods designed to facilitate the learning process and enhance students' technical, tactical, and motor abilities through scientifically-based, well-planned programs. One of these methods is specialized exercises, which directly contribute to improving students' performance levels. These exercises, in addition to developing motor abilities, also work to integrate skill execution, thus elevating the technical stages of the discus throw. They have become an essential part of the learning and training process for discus throwers.

Motor balance is considered the fundamental element that determines the success of technical performance, through controlling the athlete's body in both static and dynamic situations. Mastering technical performance is crucial in most sports activities, as it implies high coordination and smoothness in execution within a short period. This is closely related to elevating the athletes' motor and physical abilities, enabling them to perform technical skills at their best.
The discus throw is one of the individual events in track and field, characterized by its physical and motor demands, requiring the athlete to focus intensely on the technical stages of the event and to possess a high level of motor balance to achieve a high level of technical performance.
Thus, the importance of this research lies in the preparation of specialized exercises to develop motor balance and technical performance in the discus throw for female students. It also highlights the role and importance of motor balance, aiming to provide specialists with exercises that can be used as a tool to achieve results that meet athletes' ambitions and raise their level of technical performance.
Through interviews conducted by the researchers with the faculty members and discussions regarding the students' performance in the discus throw event in track and field, it was found that there is a weakness in their technical performance in this event. This weakness was a reflection of poor motor abilities due to the lack of specialized exercises aimed at developing motor balance in the students, which resulted in flaws in both the skill execution and technical performance in this event. This observation motivated the researchers to design specialized exercises that could potentially help improve the motor balance and technical performance of the female students in the discus throw. It is essential for the students to possess good physical and technical attributes to achieve optimal performance. The research aimed to prepare specialized exercises to develop motor balance and technical performance in the discus throw for the students, as well as to explore the impact of these exercises on improving motor balance and technical performance. The researchers hypothesized that there would be no statistically significant differences between the pre- and post-tests of the research samples regarding motor balance and technical performance in the discus throw.

Method and Procedures:

The researchers used the experimental method, as it is suitable for the nature of the research, employing a one-group pre-test and post-test design. Ali Saloom referred to the experimental method, stating that it is "the method that allows for real testing of hypotheses concerning cause or effect relationships" (6). The research population was deliberately selected and consisted of second-year female students from the College of Physical Education and Sports Sciences for Women for the academic year 2023-2024, totaling 42 students. From this group, 20 students were randomly

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selected for the discus throw event. The researchers ensured homogeneity in certain variables, as shown in Table 1

Table .1 It illustrates the homogeneity of the sample in the research variables (height, mass, age).

Variables	Unit of Measurement	Arithmetic mean	Median	Standard Deviation	Skewness Coefficient
Height	cm	135.54	142	5.5	0 .22
weight	kg	61 .22	61	6 .28	0 .65
Age	years	20.75	20	0.485	0.630

It is noted from Table (1) that the values of the skewness coefficient are within the range of (+/-1), indicating the homogeneity of the research sample and that it falls within a normal distribution. The researchers used various tools and devices, including 10 lightweight hollow discs, 10 legal discs weighing 1 kg, a Nikon camera, 10 turntables, rubber ropes, measuring tapes, and a German-made electronic scale to measure weight. The researchers also prepared a questionnaire for a set of tests and measurements, which was presented to experts and specialists in learning, athletics, and testing. An 80% agreement rate was adopted, and the following tests were selected:

Dynamic Balance Test by moving over markers (Ali Jassim) (5), aimed at measuring balance by having the test subject move between markers placed 1 meter apart. A score of 10 points is awarded for each successful jump, with five points given for landing on the ball of the foot and additional points for each second the subject can maintain balance after landing.

Technical Performance Evaluation Test for the Discus Throw (Shahad) (8). The students' performances were filmed and then reviewed by evaluators to provide appropriate feedback. The score is out of 100, after the form was presented to experts to assign grades for each stage of the technical performance. A preliminary trial was conducted with four students from the main population on Monday, January 28, 2024, at 10 a.m. The researchers then conducted the pre-tests on the research sample at the field.

The discus throw test was conducted at the College of Physical Education and Sports Sciences for Women in Baghdad at 10 a.m. on Tuesday, January 29, 2024. After reviewing relevant studies and scientific sources, the researchers developed specific exercises for motor balance and technical performance that suited the sample. The exercises were progressively structured and varied, using plastic discs, turntables, measuring tapes, and suspended ropes. The duration of the program was 8 weeks, with two educational units per week, using the low-intensity interval training method with a work-to-rest ratio of 1:1. The total number of units was 16, with each unit lasting 90 minutes, 75 of which were dedicated to the main part of the educational unit. After completing all the educational units according to the specific exercises, the researchers conducted the post-tests under the same conditions and methods as the pre-tests.

Results:

Table .2 It shows the arithmetic means, standard deviations, the difference in arithmetic means, standard deviations, and the calculated and tabulated (T) values for the research sample in the pre-tests and post-tests.

Variables	Pre-tests	Post-tests

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	Arithmetic Mean	Standard deviation	Arithmetic Mean	Standard deviation	Mean difference	Standard Deviation of the Mean Difference	Calculated (t) value	Sig Value	Significance
Motor balanced Test	52.25	2.900	61.12	5.93	8.87	3.03	5.814	0.001	significant
Technical Performance Evaluation	24.57	0.16	52.25	2.900	27.57	2.74	10.69	0.000	significant

Significant at a significance level of < 0.05 with 19 degrees of freedom

Discussion:

From observing Table 2, it is evident that the individuals in the research sample achieved a significant improvement in the post-test for dynamic balance. The researchers attribute this progress to the careful planning of the units based on specific exercises that were aligned with the key aspects of throwing procedures, from the preliminary position to the throw and maintaining balance. Additionally, the scientific approach to learning suitable for the age group of the research sample played a crucial role. Diana and Aseel Jaleel state, "Proper planning through the use of modern methods and techniques in the field of motor learning led to the creation of various and specialized exercises that align with each learner's capabilities and result in the development of their motor and physical abilities, thus enhancing their technical performance" (2).

The researchers also considered diversity and variation in the specific exercises, which contributed to the development of the variables under investigation. Farouk indicates that "increasing the students' experience through the provision of educational exercises aimed at developing dynamic balance enabled them to enhance both the quantitative and qualitative levels by providing a suitable environment" (10). Furthermore, Abdul Jalil and Ali, quoting Jaffri, emphasize that "balance is a capability required by all athletes as it represents the foundation for a player's stability during performance, transition, or even during training" (3). Ali Jassim points out that "balance requires the ability to perceive location and dimensions using sight or without, and the integrity of the nervous system is one of the important factors for dynamic balance, with specific exercises leading to tangible development of this component" (5). Al-Sheikhly states, "Balance involves maintaining a stable relationship between the body and the force of gravity" (9).

The researchers believe that it is essential to contribute to improving the technical performance of students in order to enhance the discus throw proficiency. They attribute the improvement in the technical performance of the research sample to the reflection of the results of dynamic balance, as a result of using the specific exercises designed by the researchers, which combined physical exercises with technical performance training for the discus throw. This combination worked on enhancing the students' technical performance, especially during the throw with high accuracy. Duaa and Al-Hashimi assert that "an athlete who exhibits stability in balance finds it easier to learn performance techniques, unlike those with weak balance, who face slower and more challenging learning processes, and thus may not achieve their goals" (1). Additionally, Issam Abdul Khaleq states, "Achieving balance and stability is fundamental,

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as it represents an individual's ability to control their body's position during both stability and movement by managing muscular and nervous systems" (4). Suleiman and Sundus affirm that "when an athlete repeats the performance correctly and according to the coach's instructions and proper technique, they can learn the stages of the discus throw event without errors, enhancing their performance and reaching a stage of precise coordination" (7).

Conclusions:

Through the presentation and discussion of the results from the pre-tests and post-tests, the researchers concluded that the duration of the independent variable, represented by the number of educational units, was suitable for the development of the research sample in dynamic balance. This was evident in the students' control over body movement during and after the throw. Additionally, the enhancement of dynamic balance using specific exercises had a positive impact on the execution of the technical performance of the discus throw. Based on these conclusions, the researchers recommend the necessity of using specific exercises to develop dynamic balance and the technical performance of the discus throw due to their effectiveness in improving performance. Furthermore, they emphasize the importance of providing sufficient time within the educational units for students to practice the stages of the technical performance of the discus throw. The researchers also suggest employing this type of training with different samples from youth teams and conducting similar studies across various age groups.

Author's declaration:

Conflicts of interest: None

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

Ethical-Clearance: this manuscript approved by local ethical committee of physical education and sport sciences college for women on (June /2024)

Author's contributions:

All contributions of this study were done by the researchers (M.J., A. J. and E.E.) who get the main idea and work on writing and concluding also with number of experts, the researchers themselves in Statistics, Haifaa Jawad in revision, Nibal Ahmed in translating, Maurizio Bertollo in proofreading

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Appendix

Appendix (1) Questionnaire for Evaluating Technical Performance in Discus Throwing

	Preparatory Section	Main Section	Final Section
Skill Section	1- Preparation stance 2- Disc-holding 3- Swing	1.Rotation 2.Power Position (Throwing Position) 3.Throwing	Balance
Percentage	20%	%70	%10
Degree	20	70	10

Appendix (2)
Exercises Used in Educational Units

1. Standing Position: The student stands with the left foot forward and the right foot back, holding the discus attached to elastic bands.
2. Side Standing Position: The arm holding the discus is fully extended to increase rotation speed and improve the elbow angle during the throw. The student stands sideways with the arm extended, then twists the arm and throws.
3. Standing on the Rotating Disc: The student stands on the rotating disc and performs preliminary swinging movements.

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4. Pulling the Disc: The throwing arm pulls the discus from back to front, creating a taut arc during the throw and improving the angle of the discus. The student stands facing the elastic bands, pulling the throwing arm from back to front to create the taut arc.
5. Weight Transfer and Rotation: The student leans on the front of the left foot and rotates on the disc using the right leg.
6. Throwing to a Target: The student stands on the rotating disc and throws the discus at a specific point on the net, focusing on the rotation step to **familiarize w**ith the tool and choose the appropriate grip.
7. Pulling the Disc with Suspended Ropes: The student holds one of the suspended ropes with one hand and performs a rotation while throwing with the throwing arm.
8. Rotation within the Circle: The student performs rotations inside the circle using a discus attached to an elastic band.
9. Throwing a Miniature Plastic Disc: The student holds a small plastic discus and performs rotations followed by a throw.

Appendix (3)
Educational Units

Educational Goals

- Teaching the technical performance of the rotation phase and maintaining balance in the discus throw event- Educational Objectives - Instilling self-confidence. - Promoting teamwork.

Academic Year: Second Year

Location: College of Physical Education for Women / Indoor Sports Hall

Main Section: (45 minutes) divided as follows: -

Explanation and Presentation: (15 minutes) The phases to be learned and the exercises to be used will be explained and presented.

Application: (30 minutes).

Exercises	Equipment Used	Total Time (minutes)	Volume		Rest		Time per Repetitions (Seconds)
			Rep	Set	Between Reps (Sec)	Between Sets (min)	
8	Disc fixation kettlebells	4	3	2	30	1.5	10
6	Disc with rope	5	3	2	30	1.5	10
5	Disc with balance disc	5	10	2	30	1.5	3

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تأثير تمرينات خاصة في تطوير التوازن الحركي والأداء الفني لفعالية رمي القرص للطالبات

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مستخلص البحث

من خلال مقابلة الباحثتان لتدريسيات الكلية والحوار معهن اتضح ضعف القدرات الحركية نتيجة قلة التمرينات الخاصة التي تطور من التوازن الحركي لدى الطالبات مما أدى الى خلل في الأداء الفني لهذه الفعالية .وهدف البحث الى اعداد التمرينات الخاصة والتعرف على تاثيرها في تطوير التوازن الحركي والأداء الفني لفعالية رمي القرص للطالبات , وافترضت الباحثتان انه لا توجد فروق ذات دلالة إحصائية بين الاختبارات القبلية والبعدية لدى عينة البحث في التوازن الحركي والأداء الفني لفعالية رمي القرص للطالبات, وتكونت عينة البحث من 20 طالبة من المرحلة الثانية في كلية التربية البدنية وعلوم الرياضة للبنات للموسم الدراسي (2023-2024), تم التجانس بينهن, واستخدمت الباحثتان استمارات الاستبيان والاختبارات كأدوات للوصول الى تحقيق اهداف البحث , اعتمدت الباحثتان اختبار التوازن الديناميكي بالانتقال فوق العلامات واختبار تقيم الأداء الفني لفعالية رمي القرص .وبعد اجراء الاختبارات القبلية تم تطبيق التمرينات التي تم اعدادها وتنوعت من خلال استعمال الصحون البلاستك , القرص الدوار والكيترات . والحبال المعلقة) وكانت مدة تنفيذ البرنامج 8 أسابيع بواقع وحدتين تعليمية استعمل فيها مجموع الوحدات 16وحدة بعدها تم اجراء الاختبارات البعدية على عينة البحث واستعملت الباحثتان لمعالجة النتائج الحقيبة الإحصائية وخلصت الباحثتان الى ان التمرينات الخاصة تؤثر ايجابياً بمتغيري التوزان الحركي والاداء الفني لفعالية رمي القرص للطالبات من خلال وجود الفروق المعنوية لصالح الاختبار البعدي اذ اتضح من خلال تحقيق الطالبات الأداء الفني الجيد لهن في فعالية رمي القرض ,واوصت الباحثتان بضرورة استخدام البرامج التعليمية التي تهتم بمتغيرات القدرات الحركية وبضمنها متغير التوازن الحركي ضمن برامج الاعداد البدني و المهاري للطالبات وهذا يحقق احد اهداف التنمية المستدامة للأمم المتحدة في العراق وهو التعليم الجيد لإتاحة الفرصة امام الطلبة لكسب مهارات متعددة نتيجة استخدام أساليب مختلفة في التعلم . وهذا ما يحقق احد اهداف التنمية المستدامة للامم المتحدة في العراق (الصحة الجيدة).

الكلمات المفتاحية | **تمرينات خاصة , التوازن الحركي , الأداء الفني**