

Effect of exercises on the VertiMax device on the endurance of under 16-years of age discus throwers

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ABSTRACT

The primary aim of the present study was to prepare a set of exercises on the multi-resistor VertiMax device and to identify the effect of these exercises on the development of the endurance of discus throwers under 16 years old. The design of the present study was experimental. Participants were selected using purposive sampling method. A total of 5 discus players constituted the sample of the study. The authors found a significant improvement in the levels of endurance and performance as a result of the training on the VertiMax device. Therefore, it is recommendable to use exercises on the VertiMax device to improve the endurance and performance of under 16-years of age discus throwers.

KEYWORDS

VertiMax; Endurance; Discus throwers

1. INTRODUCTION

Education and sports are two of the significant measuring sticks and an essential piece of industry in any country at any point of time. Hence, every country works to the best of their efficiency to structure an activity plan for the advancement and the improvement of the sports. Overall the development occurred with respect to the types, devices and auxiliary tools that entered the education and training of players in order to improve their performance at every stage of their game. Innovation and creativity, and the discovery of modern means of devices and equipment has significantly modernized and strengthened the framework of the sports industry.

There are multiple games under the umbrella of athletics. Discus throw is a solo game in which the player throws a disc of 1 to 2 kg into the air as far as possible within the prescribed zone by remaining inside a circle. This requires high physical strength and good balance to perform. Over

the years the discus throw has attracted great attention. But many players encounter problems with respect to the performance and training. The coach must find the training method which is consistent with the physical abilities of the players. Special strength exercises have become an important part of throwing technique. Special strength exercises are one of the main training methods for improving the performance stages of throwing by developing working muscles. Strength training can also be done using various assistive devices. Strength training is a very important component in achieving success in the sports of discus. The ability to throw the discus needs highest level of force and a strong upper body. Preparing a set of exercises according to these devices helps in achieving best performance and to integrate muscle strength. From the foregoing, finding physical aids to be used in developing strength of the player, which reflects a state of development at the physical level and relying on the results of kinetic analysis and the use of modern training methods such as Vertimax, leads to the development of special endurance associated with performance. Hence, the present study was conducted to develop a set of exercises along with the use of a training device (Vertimax) with the aim to develop special endurance in the players of the game of discus throw.

Discus throwing activities are among the activities that requires high physical strength and good balance to perform and interdependence between their technical stages in order to achieve integration in their skill and physical performance. Special strength exercises have become an important part of throwing technique. Special strength exercises are one of the main training methods for improving the performance stages of throwing by developing working muscles. The methods adopted by the training coaches include the use of weights, medicine balls etc. With all the strengthening aids, strength can be developed on the part of the body targeted. The use of a multi-directional device (Vertimax) puts resistance on every part of the body at once according to the kinetic analysis.

Hence, the problem was identified by the researcher and the primary aim of the present study was to prepare a set of exercises on the multi-resistor device Vertimax and to identify the effect of the exercises of the multi-resistor device Vertimax in developing the endurance of discus throwers under 16 years old. The researchers hypothesized that there would be statistically significant differences between the pre and post-tests in the endurance of the research group.

2. METHODS

2.1. Participants

The present study was conducted on a group of discus throwers falling under the age of 16 years old. The study was conducted within the time frame of March 2021 to May 2021 in the Specialized School of Athletics of Al Shaab International Stadium. The present study had an experimental study design (Table 1). Participants were selected using purposive sampling method. A total of 5 discus throwers, which constituted 90 % of the research community, were recruited as the participants of the study.

Table 1. The experimental design of the research

Group	Pre-test	Independent variable	Post-test
Experimental	Special endurance and achievement	Vertimax exercises	Special endurance and achievement

2.2. Instruments

There are multiple ways by which the researchers can collect the data and solve the research problem in order to achieve the objectives of the research, using various tools, devices, sources, extensive review of previous literature and conducting personal interviews with the experts specialized in the field of discus throw (Wajih, 2002).

In the present study, many tools and devices were used for the purpose of data collection with the aim to achieve the objectives of the research. The various tools used in the present study included Vertimax device, medical scale, laptop, tape measure, adhesive tapes (phosphorescent markers), electronic stopwatch and 6 tablets of 2 kg of Chinese origin. The tests used in this research were the push-up test and the discus throw achievement test.

The push-up test (Diaa & Nofal, 2001) was intended to measure the specific endurance of the muscles of the arms. Each participant was asked to lie in the prone lying position (inclined). From an inclined prone position, the participant was asked to bend and extend the arms the maximum number of times keeping into mind that the chest should touch the ground when bending the elbows and the arms should be fully extended when going up. Participants were asked not to stop during the performance, and the number of valid attempts made by the participant was recorded.

The discus throw achievement test intended to measure the best distance travelled by the disc (achievement). The participants were asked to perform the throw based on the International Law of Athletics. Each participant was given three attempts. The best of these three attempts was recorded.

2.3. Procedures

The pre-tests for the research sample were carried out in the month of March 2021 on the playground of the Ministry of Youth and Sports. After the pre-tests, the two researchers applied the exercises with the Vertimax device at a rate of 4 training units per week for a period of 8 weeks, with a total of 38 training units. The researchers adopted the method of repetitive training in a gradual manner during the training units. After the training units, the post-tests were accomplished by the researchers in the month of May, with the same instruments and under the same spatial and temporal conditions.

2.4. Statistical analyses

In the present study, the statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS). The researchers calculated for the different variables arithmetic means, standard deviations, and t tests.

3. RESULTS AND DISCUSSION

Table 2 presents the results of the pre and post-tests of the research sample, for the variables special endurance and achievement.

Table 2. Results of the pre and post-tests of the research sample

Variables	Measuring unit	Pre-test		Post-test		Difference between arithmetic means	Difference between standard deviations	T value	Sig.
		Mean	SD	Mean	SD				
Special endurance	Count	11.25	1.28	13.00	0.75	1.75	0.526	7.000	Sig
Achievement	Count	34.12	1.49	37.20	2.68	3.08	1.28	5.34	Sig

The two researchers attributed the reason for this development to the exercises that were applied on the device, which had a significant impact on developing the endurance values of the

muscle by increasing the muscle work and the instantaneous push time, as the results of the two tests were significant in favor of the post-test.

Some researchers asserted that there is a need to increase the intensity and the amount of work done to develop the endurance of the arms, emphasizing the size of the resistance used by its amount, direction, point of impact and the amount of longitudinal tension of the muscle, as well as the point of connection of the muscle to the bone and its relationship to the joint.

Al-Fadhli (2015) in their study stated that a muscle can contract with great amount of force when it is in the lengthened position in the preparatory phase. In the lengthened position, the muscle force travels a long distance and hence it yields better contraction which is less in the shortened position of the muscle. The difference in distance determines the difference in the power production and this changes the efficiency of muscle work (Omosgurad, 1999).

From the researchers' point of view, the development in the endurance level occurred as a result of exercises prepared by them for the participants of the experimental group. These exercises included jumping with the installation of resistance to the arms, as well as the movements of throwing and throwing with the installation of resistance. It helped in enhancing the physical ability and their sense of the value of the force required to achieve the kinetic paths. The increase in strength in both arms and legs means that there will be an increase in the body's total linear speed and angle, and this in turn was reflected in the level of their performance.

In addition to this, these exercises also modulated certain reactions in the musculoskeletal system and the nervous system. The participants of the experimental group were not accustomed to this. It contributed in developing the strength in the muscle groups especially for the stage of throwing mode and achieving a significant increase in their level of endurance that plays an effective role in increasing their speed of performance. Muscle strength training is one of the forms that affect the development of ability and works hand in hand to advance the level of the digital level in various sporting events (Omosgurad, 1999).

The development of muscle capacity contributes to the significant enhancement in its efficiency and the neuromuscular compatibility. An increase in the muscle strength occurs with the activation of the large number of muscle fibers (Othman, 2000).

Many evidences have highlighted and supported the importance of special strength training for discus throwers in a positive sense. Many authors have stated that strength is very important and that it must be specific. One of the important part of training of the players is focused on development of their strength (Dintiman, 1989).

The researchers attributed this development to the exercises performed by the participants of the experimental group which aimed at developing the physical abilities of the players. This led to the development of special endurance, which was positively reflected in their raised level of performance. In a study, authors have stated that the strength training exercises should be done very carefully with utmost precision and accuracy while following the same motor level as well as the direction and extent of joint movement and speed of the shooter's movement (Safa & Muhammad, 2009).

The researchers considered that the special force of throwing is a vital element in the game of the players that should not be left ignored in any case. The variables have a direct impact on their level of performance. It has been inferred from the previous literature that the increase in the specific endurance is accompanied by an increase in the velocity of the body parts and the instantaneous velocity of launch. These forces affect the other variables in another way which means that here is an exchange of influence between the internal and external forces that affect the final path of the center of the body. The center of gravity helps to achieve a high motor balance for the player to ensure the continuation of speed in the parts of the body. It indicates the integration of the thrust in the different joints of the body (Dainty & Norman, 1987). The semi-final stage of throwing is the stage of the position of preparation for the throw. Throwing is the decisive stage in which the final performance is done by the player by giving the best shot of throw with the maximum speed. Considering the muscle contraction of the arms and trunk, the starting speed is often about ten times the speed of muscle contraction. Law of lever states that the development of the force of muscle contraction will also increase the speed of the throw (Sareeh, 2013).

In addition to above, the correct technique of the discus throw requires the motor coordination between the different parts of the body along with the group action of the muscles participating in the motor performance. It contributed greatly to investing the rapid force and linked them in a harmonic kinetic framework. The rapid application of the vector force depending on the law of propulsion improves the dynamic distribution and achieves a high amount of movement for the expected tool, the moment it leaves the hand of the shooter. The law of propulsion states that pushing anybody during a period of time equals the change arising in the movement process of the body during a period of time leading to the achievement of the farthest possible distance for the thrown tool. According to this, there is a direct relationship between the increase in the speed of launch and the extension of the body, which adheres to the synchronization in performance and kinematic coordination between the parts of the body and propulsion at the same time.

4. CONCLUSIONS

The authors found a significant improvement in the levels of endurance and performance as a result of the training on the VertiMax device. Therefore, it is recommendable to use exercises on the VertiMax device to improve the endurance and performance of under 16-years of age discus throwers.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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