International Journal of Computational Research and Development (IJCRD)
International Peer Reviewed - Refereed Research Journal, Website: www.dvpublication.com
Impact Factor: 5.015, ISSN (Online): 2456 - 3137, Volume 9, Issue 1, January - June, 2024

THE EFFECT OF BALLISTIC TRAINING ON THE DEVELOPMENT OF THE START-STOP PHASE OF THE 50-METER FREESTYLE

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Cite This Article: Ammar Muhi Khaleel Alghurabi, "The Effect of Ballistic Training on the Development of the Start-Stop Phase of the 50-Meter Freestyle", International Journal of Computational Research and Development, International Peer Reviewed - Refereed Research Journal, Volume 9, Issue 1, January - June, Page Number 24-26, 2024.

Abstract:

Athletes that engage in ballistic training, also referred to as power training, raise weights, accelerate them, and then let them go, as opposed to gradually decreasing them. Elite athletes were the ones who initially employed it in an effort to increase their explosiveness and speed. This study sought to ascertain if ballistic resistance training will enhance female students' swim start performance. The study included ten female fourth-graders from a physical education at the Islamic university in Najaf. The average height and age of the students were 1.77± 3.02 meters and 21.14± 1.25 years, respectively. Two groups of participants were evenly split. The experimental group did ballistic resistance training for six weeks, while the control group followed a traditional training schedule. SPSS software was used to statistically analyze the data. The results showed that the experimental group performed better than the control group in terms of power and swimming start speed. Ballistic resistance training for six weeks demonstrated positive benefits on swimming starts and power performance levels under the research conditions.

Key Words: Swimming Start, Strength, Power Training.

1. Introduction:

Several factors that influence performance become apparent during swim training. One of these elements is power. Strength training is a common strategy used by swim instructors to help their students gain more power because power is the product of strength times velocity and is positively correlated with swim performance (Hirofumi et al., 1993; Johns et al., 1992; Toussaint and Vervoorn, 1990). They contend that improving one's performance through strength training improves swimming abilities. Both in and out of the water, strength exercises are performed. If dry-land strength training improves one's capacity to sprint while swimming, however, that much is unknown.

There are various strategies and concepts for developing a successful training regimen that can improve performance. Ballistic education is one method of producing a powerful power. This method can be used to make up for the absence of accelerate associated with weightlifting by allowing one to explode via every phase of action. Acceleration fails to drop till the weight is removed because it improves throughout the entire range of movement. This kind of training is typically employed in between conventional upper body exercises, such medicine ball tossing, and lower body exercises, like leaps. Trainers in sports involving explosive performance develop techniques to improve athletes' performance in these sports.

Exercise with balls makes up one of the most important methods for increasing strength. The conventional method training with weights (nonballetic) stops the muscles from achieving its optimum performance for an entire second following it starts. Contrarily, ballistic training forces the player to use their respective positions muscle's maximum speed in less than 0.2 seconds, which is comparable to the arm's speed during competitive throwing shooting training, also called strength training, was initially used by professional athletes to improve their speed.

Originating from the Greek verb ballein, which translates as "to threw," comes from the Latin word ballistic. When engaging in this type of education, a competitor increases and releases their body weight into "free space." Ballistic training frequently uses activities such as bench throws, jump squats, cleans, snatches, and push presses. Scheett (2004)

When an athlete participates in ballistic training, their body is forced to recruit and activate fast-twitch muscle fibres. This is important because specific muscle fibres have the greatest potential for growth and strength. throughout ballistic training, muscles must get accustomed to getting quickly and forcefully. For this kind of conditioning, the brain and nervous system needs to collaborate and produce the greatest effect in a short span of time. As stated by Brandon (2003)

Studies indicate that there comes to be a limit to the maximal strength growth. Any additional strength gains after a certain point will only benefit the athlete at the high force/slow velocity end of the spectrum. This implies that there won't be any sudden rises in force or strength)

On the other hand, explosive exercise has a greater association with athletic achievement and has been shown to increase energy and the rate of force output in comparison with strength exercise. Strength training methods may vary in terms of acceleration and force qualities due to the broad scope of the term. Plyometric leaping and throwing executes typically use greater speed and less force, while Olympic lifting performs like strength cleans apply higher force and lower velocity. Exercises involving ballistic weights that fall somewhere in between both of these variations are those utilizing intermediate necessitate and velocity, like bench press sends and barbell squat jumps. (Hammett and Hey, 2003)

take up to 75% of a movement. According to Elliot et al. (1989), the bar decelerates over the last 24% of the range of motion when doing 1-RM bench presses. The bar slows down during the last 52% of the range of motion at 81% of 1-RM. Studies have indicated that optimal outcomes may be achieved by loading the bar with a weight that maintains positive acceleration throughout the lift's entire range of motion. Therefore, the purpose of the research had been to find out if ballistic resistance exercise would improve the efficiency of female students during swim starts.

2. Materials and Procedures:

2.1 Participants:

The study included ten female fourth-graders from physical education department at the Islamic university in Najaf. The average age was 21.14±1.25 years, and the average body height was 1.77± 3.02 meters, according to anthropometric measurements. Two groups of participants were evenly split. While the control group engaged in a conventional training regimen, the experimental group (n = 5) underwent resistance training using ballistic movements for a duration of six weeks. None of the participants had any medical diseases known to impact bone metabolism, including osteoporosis, diabetes, cardiovascular disease, or bone fractures. None of the subjects mentioned using alcohol, cigarettes, or anti-seizure drugs.

2.2 Instructional Guideline:

Ballistic activity was the focus of the six-week in-season training regimen. According to Newton and Kraemer (1994), exercises like jump squats that include free weights should be performed with a load of 30% to 35% 1-RM. The load for many ballistic workouts is determined by the item weights. Kettlebells range in weight from 10 to 32 kg (22-70 lbs), in contrast to medicine balls, which weigh between 2 and 6 kg (4.4–13 lbs).

3. The Following is a Summary of the Ballistic Power Training Exercises:

- Maintain equilibrium, lift feet together, leap towards chest, hold medicine ball, stand with ball between feet, launch within rope, sprint front and rear, step up and down, and jump in reverse until chest strikes. Donning medicine ball on each foot and maintaining feet apart are essential steps.
- Exercise involves standing with a medicine ball on each foot, leaping forward, pause, and passing it to a colleague. Other exercises include crouching, lifting weights, jumping backward, moving weights, walking up and down, using a weight on feet, high jumping forward, and using a jumping rope. These exercises can be done with various weights.
- Perform various exercises, such as climbing and descending with a 0.25-kg weight, squatting and jumping, and jumping explosively over a box while holding a weight.

4. Analytical Statistics:

The study utilized SPSS for statistical analyses, reporting results in means ± SD. Non-parametric measures were compared using the Friedman test, with a p-value of less than 0.05.

5. Finds:

The study analyzed the pre-, mid-, and post-tests of start distances and start times in crawl swimming.

Table 1: The pre -, mid -, and post-tests of start distances and start times in crawl swimming

Variables		Experimental Group			Control Group		
		Pre-Tests	Mid-Tests	Post-Tests	Pre-Tests	Mid-Tests	Post - Tests
Start Distance	Mean Rank	1.68	3.48	5.31	1.68	1.68	1.68
	K	25			25		
Start Time	Mean Rank	2.31	3.14	4.39	2.46	2.46	2.46
	K	16.55			24.95		

Table 1 reveals significant differences in start distance and start time between pre-mid and post-test measurements.

Table 2: There were significant differences in start distances and start times between experimental and control groups in crawl swimming.

Variables	Groups	Rank Number	Rank Mean	Rank Total	U	P Sign
Start Distance	Experimental	3	1	3	2.87*	0.009
	Control	2	0.5	1		
Start Time	Experimental	3	2.5	7.5	2.80*	0.012
	Control	2	1	2		

6. Discussion:

The study found that a ballistic training program significantly improved start distance and time, regardless of exercise type, according to Ramadan's theory of explosive muscular strength development, resulting in greater improvement in muscle exercises like leaping from a squatting posture.

Ballistic training enhances motor performance, muscle contraction speed, and explosiveness across joint range of motion, consistent with previous research demonstrating its effectiveness.

It was also shown that ballistic training is an effective means of increasing muscle strength and speed because most exercises are performed explosively without reducing velocity. In muscles, an elongated contraction is replaced by a shorter contraction with maximal velocity (McCoy et al. 1984; Linthorne, 2001).

It has been suggested by Newton et al. that heavy loads (80%–90% 1-RM) can improve maximal dynamic performance, while relatively light weight loads (30% 1-RM) can be lifted quickly to maximise power production (Newton, et al. 1997). Atha defined dynamic performance as strength efforts made multiple times until fatigue or time constraints prevented them (Atha, 1981).

Ballistic resistance denotes a high acceleration of the load or the person entering free space.

The bar's propensity to slow down towards the end of the concentric phase of movement is a problem with conventional resistance training and power development. This issue is resolved by ballistic training. This could be overcome if the athlete really throws or leaps with the weight. Ballistic resistance, according to Newton and Kraemer (1994), indicates that the load or the person entering free space is moving at a high acceleration.

Other studies, however, have not demonstrated that strength training on dry land improves swimming speed. In one study, tethered swimming power and competitive swimming performances were not significantly improved by collegiate swimmers who combined weight training and swimming over a group that trained solely with swimming (Zatsiorsky, 1995).

Three sets of eight to twelve repetitions, three days a week, comprised the general weight training programme followed by the resistance training group. The majority of the exercises were created to mimic swimming motions by targeting the large shoulder and trunk muscle groups. The majority of the exercises included arm extensions as well as shoulder adduction and extension motions. Over the course of the study, neither group showed any improvement in their stroke lengths.

Practical Applications It was found that a ballistic training programme enhanced the distance and time of start swimming (crawl) for female students in a physical education department. A substantial sample of participants of both sexes and ages must be included in the study of this type of exercise programme.

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