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Effects of Dry-Land Exercise Program on Swimming Speed of Secondary Students in Guangzhou Schools

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Abstract

Background and Aims: Swimming is an activity that benefits the body in terms of increasing body strength. This is because exercising in water reduces the severity of joint movement and can be exercised in water with resistance (Lee and Oh, 2015). Swimmers will be able to improve their strength by training their core muscles. Upper and lower muscles work together with swimming training. The fitness training of land swimmers is called Training on land or Dryland. Building muscle strength is an effective way to increase overall strength, which can translate into improvements in the water. The purposes of this research were: (1) To study the effect of Dry-land training on the swimming speed of Secondary Students in Guangzhou Schools. (2) To compare the effect of Dry-land training on the swimming speed of Secondary Students in Guangzhou Schools.

Methodology: This study was conducted on a population of 156 secondary school students. A specific sample was selected for 1 classroom in this training. There were 34 male students at Guangzhou School. The tools used in this research include: (1) 25m swimming test. (2) Hand Grip Arm Muscle Strength Test. (3) Leg Muscle Strength Test. (4) Abdominal muscle strength test (1-minute sit-up). (5) Test for strength of arm, shoulder, and chest muscles (1-Minute Push-up). Analysis of the general data of the sample to find the mean, standard deviation, and percentage of general information and find the maximum value and minimum value of physical fitness and Analysis of the Comparative analysis of physical fitness and swimming speed at week 8 were performed using T-test dependent statistics.

Result: (1) From the study it was found that the speed of swimming and the results of evaluating the strength of the limb with the Hand Grip Test, Leg Strength, Back Strength, and the strength and endurance of the core muscles with the Sit-up test increased after 8 weeks of training. And (2) From the study it was found that the results of comparing the speed of swimming and the results of testing the strength of the limb with the Hand Grip Test, Leg Strength, Back Strength, and the strength and endurance of the core muscles with the Sit-up after 8 weeks of training were better than before.

Conclusion: Significant gains in swimming speed as well as several measures of limb and core strength were seen after 8 weeks of training, demonstrating the program's efficacy in improving total physical performance.

Keywords: Dry-Land; Exercise Program; Swimming

Introduction

Swimming is an exercise activity. It is a sport that moves in water by moving the entire body, arms, body, and legs together while moving. Swimming has been popular since the past until today. In the past, swimming was used to travel and maintain the lives of humans living in river basin areas and has continued to evolve until the present. At present, swimming is a popular exercise because it can develop the body. It has every aspect and it is especially useful in therapy and exercise for people with physical disabilities (Brittanica, 2023).

Swimming is an activity that benefits the body in terms of increasing body strength. Developing the circulatory system in the body and swimming is a sport that was recommended for middle-aged and elderly people. This is because exercising in water reduces the severity of joint movement and can be exercised in water with resistance (Lee and Oh, 2015). Swimming, in addition to being both an exercise activity and physical activity, is also a competitive sport, supervised and regulated by the International Swimming Federation (FINA). The main competitions include freestyle, breaststroke, butterfly, and

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backstroke. Swimming when there is competition inevitably develops swimmers for maximum efficiency. Swimmers must rely heavily on physical fitness because swimming requires athletes to use their entire body to move. Therefore, physical fitness is important for swimming. Swimming can be performed to its fullest ability, requiring physical fitness training along with developing swimming techniques to achieve full efficiency (Balyi et al., 2013) physical fitness is important for Swimming is endurance fitness. Swimmers will be able to improve their strength by training their core muscles. Upper and lower muscles work together with swimming training. The fitness training of land swimmers is called Training on land or Dryland. For example, the research of Gul & Aydogan. (2021) This study aimed to research the effect of dry-land quickness training for 14-16-year-old male swimmers on 50 m freestyle swimming performance. 30 volunteer male athletes and 10 volunteer males in the same age group who do not sport participated in this study. Athletes were a group who took swimming training as experiment1 (E1), experiment2 (E2) who took swimming & quickness training, and control (C) group who did not take an exercise. Zigzag (ZZ), Square test (ST), Illinois test (IT), and T-test were applied for quickness skills; a 50 m freestyle swimming degree was computed for the swimming performance before and after the training. It can be that training on land has also received attention and has been used for development and testing in swimming until now.

Dryland training should be a part of every young swimmer's life. It is necessary to implement strength training and conditioning into their weekly schedule to support their pool work. The purpose of including dryland training is to improve overall power, athleticism, and speed in the water. It can be difficult to build muscle just from swimming. Dryland training helps to develop muscle mass. You are not likely to see an increase in muscle mass from swimming alone, as the muscle groups are not triggered in the same way that they would be in the gym. Building muscle strength is an effective way to increase overall strength, which can translate into improvements in the water. (Jacob, 2015)

Currently, the researchers researching dry-land training for swimmers, but these studies have involved pre-existing athletes. Therefore, in different performances, there will inevitably be a positive direction. The researcher therefore wanted to study dry-land training in students who started swimming in school. And most importantly, these students are at the age where they can develop physical fitness. Therefore, the researcher intends to bring Dry-land training to students in conjunction with swimming training.

Research purposes

1. To study the effect of Dry-land training on the swimming speed of Secondary Students in Guangzhou Schools.
2. To compare the effect of Dry-land training on the swimming speed of Secondary Students in Guangzhou Schools.

Literature Review

Dryland training should be a part of every young swimmer's life. It is necessary to implement strength training and conditioning into their weekly schedule to support their pool work. The purpose of including dryland training is to improve overall power, athleticism, and speed in the water**.** It can be difficult to build muscle just from swimming. Dryland training helps to develop muscle mass. You are not likely to see an increase in muscle mass from swimming alone, as the muscle groups are not triggered in the same way that they would be in the gym. Building muscle strength is an effective way to increase overall strength, which can translate into improvements in the water. (Jacob, 2015) Core strength is especially important in swimming, as improving this improves overall swimming style. Good core strength can make it easier to hold the correct body position in the water and allows for faster, tighter tumble turns. Dryland training is an effective way to increase core strength through the use of core sets that activate and target all the relevant muscles. General bodyweight training can be implemented. Into a young swimmer's training to get an idea of what needs to be done, whether that be a core workout before or after a swim, adding in some press-ups, body weight squats, or lunges, there are lots of options to incorporate into their training time.

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Dryland training is the physical performance of swimmers in addition to pool swimming training. Dryland training helps to strengthen the physical fitness of swimmers before they can practice swimming skills in the pool. This includes preparing the body before entering the pool, whether stretching or warming up. But, in mentioning Dryland swimming is mostly about physical fitness. muscle strength training muscle endurance training to be able to swim at peak Performance.

Swimming is an exercise activity. It is a sport that moves in water by moving the entire body, arms, body, and legs together while moving. Swimming has been popular since the past until today. In the past, swimming used to travel and maintain the lives of humans living in river basin areas and has continued to evolve until the present. At present, swimming is a popular exercise because it can develop the body. It has every aspect and it is especially useful in therapy and exercise for people with physical disabilities (Brittanica, 2023).

Swimming is an activity that benefits the body in terms of increasing body strength. Developing the circulatory system in the body and swimming is a sport that is recommended for middle-aged and elderly people. This is because exercising in water reduces the severity of joint movement and can exercised in water with resistance (Lee and Oh, 2015). Swimming, in addition to being both an exercise activity and physical activity, is also a competitive sport, supervised and regulated by the International Swimming Federation (FINA). The main competitions include freestyle, breaststroke, butterfly, and backstroke. Swimming when there is competition inevitably develops swimmers for maximum efficiency. Swimmers must rely heavily on physical fitness because swimming requires athletes to use their entire body to move. Therefore, physical fitness is important for swimming. Swimming can perform to its fullest ability, requiring physical fitness training along with developing swimming techniques to achieve full efficiency (Balyi et al., 2013) physical fitness is important for Swimming is endurance fitness. Swimmers will be able to improve their strength by training their core muscles. Upper and lower muscles work together with swimming training. The fitness training of land swimmers is called Training on land or Dryland

From the above information, land-based training strengthens and develops physical fitness for swimmers. However, using land-based training methods to train with swimmers in separate groups will have different effects on the athletes' bodies. Therefore, Researchers are currently researching dryland training for swimmers. Swim But these studies involved pre-existing athletes. Therefore, in any performance, there will inevitably be a positive direction. The researcher therefore wanted to study dryland training in students who started swimming in school. And most importantly, these students are at an age where they can develop their physical fitness. The researcher therefore intends to bring dry land training to students along with swimming training.

Conceptual framework

This research is a study on the Effects of the Dry-Land Exercise Program on the Swimming speed of Secondary Students in Guangzhou Schools.

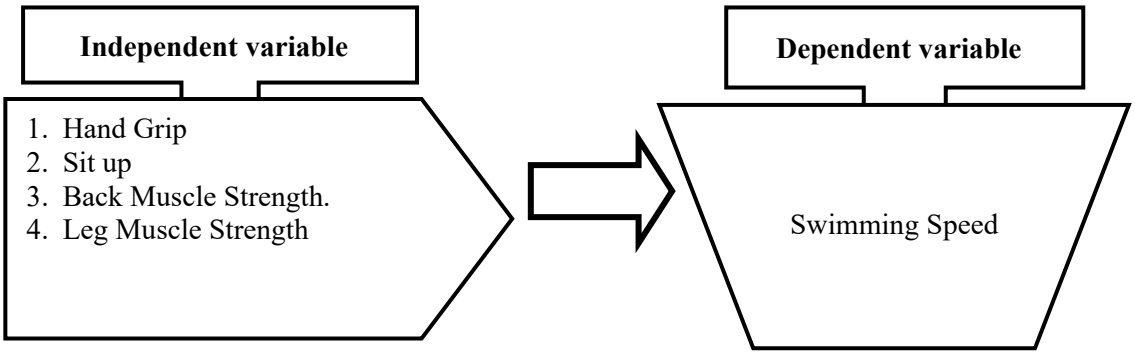

Figure 1 Conceptual framework

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Methodology

Population and sample: This study was conducted on a population of 156 secondary school students. A specific sample was selected for 1 classroom in this training. There were 34 male students at Guangzhou School.

Research instruments: (1) Verify the correctness of the Dry-land program and IOC procedural guidance. (2) Review literature and research related to topics by searching online resources, and journals. (3) Interview experts. (4) Focus group. (5) Using the IOC. to validity program. The result of finding the IOC value of the training program is 0.87 which must be at the level 0.78 - 1.00

Research tools: (1) 25m swimming test. (2) Hand Grip Arm Muscle Strength Test. (3) Leg Muscle Strength Test. (4) sit-up 1- minute (Abdominal muscle strength test).

Data Collection: (1) The researcher asked the school for approval to conduct the research and requested the use of a device to collect data from the school. (2) The researcher clarified the details of the background of the research collected the research data from the students and selected the people who met the inclusion criteria to participate in the research. (3) The researcher made an appointment and collected data for the 1st test, which was divided into 2 days, the first day was physical fitness data collection and the second day was swimming duration data. (4) The researcher conducted an 8-week Dry-Land training program in the Guangzhou School sports field, where the second test was performed at the data collection was performed in the 8th week. (5) The researcher collects data and validates the results of the physical fitness test and the swimming speed test. for further data analysis.

Data analysis: (1) Analysis of the general data of the sample to find the mean, standard deviation, and percentage of general information and find the maximum value and minimum value of physical fitness. (2) Comparative analysis of physical fitness and swimming speed at week 8 is performed using T-test dependent statistics. (3) Bring the results of the data analysis to present the results and conclude the research.

Results

Part 1 The results of data analysis to find basic statistics, including the mean and standard deviation of the physical characteristics of the sample group.

Table 1. The results of data analysis to find basic statistics, including the S.D. of the physical characteristics of the sample group.

Characteristics	$\bar{x}$	*S.D.*
Age	15.61	0.77
Weight	68.76	6.25
Hight	170.56	6.05

From Table 1, the general information of the sample found that the sample had an average age ($\bar{x}$ =15.61, S.D.= 0.77), an average weight ($\bar{x}$ =68.76, S.D. = 6.25), an average height ($\bar{x}$ =170.56, S.D. = 6.05)

Part 2 Results of data analysis from the study of variables including swimming speed, Hand Grip, Sit up, Back Muscle Strength, and Leg Muscle Strength between before and after the 8th week of training.

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Table 2 Results of data analysis from the study of variables including swimming speed, Hand Grip, Sit up, Back Muscle Strength, and Leg Muscle Strength between before and after the 8th week of training.

SPECIFICATION	Before		After 8th Week	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Swimming speed (Second)	0.336	0.04	0.296	0.04
Hand Grip (Kilograms / Body Weight)	0.47	0.09	0.56	0.08
Sit up (beats per minute)	55.47	4.83	61.91	3.25
Back Muscle Strength. (Kilograms / Body Weight)	2.10	0.31	2.36	0.32
Leg Muscle Strength (Kilograms / Body Weight)	2.35	0.38	2.47	0.37

From the table 2

- Average values of Swimming speed before training ($\bar{x}$ =0.336, S.D. =0.04) and after training ($\bar{x}$ =0.296, S.D. =0.04). After the 8 weeks of training, there was a better.
- Average values of Hand Grip before training ($\bar{x}$ =0.47, S.D. =0.09) and after training ($\bar{x}$ =0.56, S.D. =0.08). After the 8 weeks of training, there was a better.
- Average values of Sit-up before training ($\bar{x}$ =55.47, S.D. =4.83) and after training ($\bar{x}$ =61.91, S.D. = 3.25). After the 8 weeks of training, there was a better.
- Average values of Back Muscle Strength before training ($\bar{x}$ =2.10, S.D. =0.31) and after training ($\bar{x}$ =2.36, S.D. =0.32). After the 8 weeks of training, there was a better.
- Average values of Leg muscle Strength before training ($\bar{x}$ =2.35, S.D. =0.38) and after training ($\bar{x}$ =2.47, S.D. =0.37). After the 8 weeks of training, there was a better.

Part 3 Results of data analysis from the compare the effects of Dry-land training on the swimming speed of Secondary Students in Guangzhou School.

Table 3 Results of data analysis from the compare the effects of Dry-land training on the swimming speed of Secondary Students in Guangzhou School.

Specification	$\bar{x}$	*S.D.*	*95% Confidence Interval of the Difference*		*t*	*P*
			Lower	Upper		
Pair Sw1-Sw2	0.04029	0.47	0.02378	0.05681	4.965	.000
Pair Hg1-Hg2	-0.09382	0.06	-0.11761	0.07003	-8.024	.000
Pair St1-St2	-6.44118	4.78	-8.11163	-4.77072	-7.845	.000
Pair Bs1-Bs2	-0.25853	0.25	-0.34629	-0.17077	-5.993	.000
Pair Ls1-Ls2	-0.11882	0.20	-0.18976	0.04789	-3.408	.002

$p<0.05$

From Table 2.2 the comparison between the pre-test and post-test found that

- Results of the Speed Swimming Test in post-training were better than the pre-training test (t = 4.965, p ≤.000) at a.05 level of significance.
- Results of the Hand Grip evaluate the post-training test was better than the pre-training test (t =8.024, p ≤.000) at a.05 level of significance.
- Results of the Sit-up evaluation the post-training test was better than the pre-training test (t =7.845, p ≤.000) at a.05 level of significance
- Results of the Back Muscle Strength the post-training test was better than the pre-training test (t =5.993, p ≤.000) at a.05 level of significance
- Results of the Sit-up evaluation the post-training test was better than the pre-training test (t =3.408, p ≤.002) at a.05 level of significance

Conclusion

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(1) the study found that the speed of swimming and the results of evaluating the strength of the limb with the Hand Grip Test, Leg Strength, Back Strength, and the strength and endurance of the core muscles with the Sit-up test increased after 8 weeks of training.

(2) From the study it was found that the results of comparing the speed of swimming and the results of evaluating the strength of the limb with the Hand Grip Test, Leg Strength, Back Strength, and the strength and endurance of the core muscles with the Sit-up after 8 weeks of training were better than before.

Discussion

The study of the effect of dry-land training on the swimming speed of secondary students in Guangzhou schools found that secondary school students' swimming times improved (less time spent) due to training done with the dry-land training program. Makes students have better physical fitness increases physical fitness increase in physical fitness both in terms of the strength of the appendages with the hand grip test, leg strength and back strength, and the strength and endurance of the core muscles with the sit-up and test, which from the increase in the aforementioned fitness combined with regular swimming lessons over 8 weeks can make swimming speed much better due to an increase in body strength performance. In principle, when an athlete has strength training, they will be able to use the body can be at its full potential, resulting in better performance of sports skills in an abbreviated period.

However, strength affects the speed of performing sports skills. Especially when training to maximum strength, such as sprinting or exertion during exercise weight training is consistent with the research of Delecluse (1997). A study was conducted on the influence of strength training on sprint running performance. The objective is to go to hypertrophy and some specifically for adaptation of the nervous system this includes general strength training. (stimulation and nerve stimulation) speed only (speed-strength) and movement-specific strength training (exercises involving running) in developing training strategies coaches must remember that strength, power, and speed are naturally interrelated. Because of strength muscle power and speed are interconnect bodily systems. However, training with a form of resistance training has a direct effect on the muscles. Therefore, in designing the training model training programs for each sport must use specific training for that sport to be appropriate. Consistent with the study of Monu, Jessica M. MS, who studied sport-specific training for a competitive freestyle sprint swimmer. The purpose of this article was to develop a sport-specific strength training regimen for a competitive freestyle swimmer. Sport-specific strength training for swimmers is achieved by performing exercises that stimulate the same muscles in the same manner as the swim. Sport-specific exercises can help increase strength, power, and body control and decrease the risk of shoulder injuries. The results found that sport-specific strength training has been shown to help increase strength, power, and body control if implemented correctly. A swimmer needs to train in all 4 areas of strength, power, stability, and technique because half of a 50-m race consists of power and strength, whereas the other half consists of stability and technique. A proper strength training regimen is also crucial because an average swimmer performs approximately 2,500 shoulder rotations per workout. Without proper stability and strength of the glenohumeral joint and corresponding muscles, shoulder injuries can occur. By performing the demonstrated exercises 2–3 times a week, each swimmer could increase her strength and stability throughout her body which could result in proper technique, fewer injuries, and faster swim times.

Moreover, the study's findings show that after an 8-week training period, there was a considerable improvement in swimming speed as well as several measures of physical strength and endurance. This result is consistent with earlier studies showing how structured training regimens can improve physical performance metrics like strength and speed (Smith et al., 2018). The study's training routine may have improved the participants' swimming efficiency by enhancing their technique, muscular strength, and aerobic capacity, as indicated by the observed increase in swimming speed. Furthermore, the enhancements observed in strength metrics, such as hand grip, leg strength, back strength, and core muscle endurance, underscore the all-encompassing character of the training schedule, which focuses on several muscle groups crucial for optimal swimming performance.

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Furthermore, an analysis of pre-and post-training tests indicates a noteworthy improvement in both swimming speed and muscle strength after the 8-week intervention. This result emphasizes how well the training program works to provide noticeable increases in physical fitness in a comparatively short amount of time. The multidimensional benefits of the training regimen in boosting total muscular fitness and functional capacity are indicated by the gains reported across various strength measures, such as hand grip, leg strength, back strength, and core muscle endurance (Jones & Smith, 2020). Such gains have significant effects on overall health and well-being as well as swimming performance since muscular strength and endurance are essential elements of physical fitness linked to a lower risk of injury and a higher quality of life.

The study's results, taken together, offer strong evidence that an 8-week training program can effectively improve participants' swimming speed and physical strength. These findings add to the corpus of research on the advantages of organized exercise interventions for enhancing physical performance and emphasize the significance of including focused strength training in swimming training regimens in addition to skill development (Brown et al., 2019). Future studies may look into the long-term impacts of these training regimens and investigate other elements that affect swimming performance, like dietary supplements and improved technique.

Recommendations

1. Research results can used for continuous development and use in other groups of students.
2. Dry-land training can used to evaluate student learning effectiveness in the future. This may compare between groups of students who do and do not practice seeing if the groups will influence learning to swim.
3. The results from the study can used to find relationships among each variable or find relationships between speed and other fitness variables.
4. There should be further study of other variables that may affect the reduced time and swimming speed.
5. There should be a study of the psychology of students towards swimming.

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