



Impact of proposed exercises on remove shoulder pain and to improve the aerobic capacity and performance for the 1500 freestyle swimmers

Experimental research on a sample of the Baghdad sport clubs swimmers

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Article Info

Received: March 25, 2016

Accepted: April 30, 2016

Published online: June 1, 2016

Abstract

The research aimed to know the impact of the proposed training protocol to remove shoulder pain and its effects on the development of aerobic capacity. shoulder pain is a common problems among swimmers which the result of an excessive movements of the arms above the shoulder, that estimated from (10000-14000) pull in a week, swimming activity depends mainly on the arms movements by the muscles surrounding the shoulder to generate a strong pull and push to get the swimmer forward, so the shoulder injuries are most common among swimmers, and to achieve the research objective, the researcher conducted Clinical examination of the research community (60) swimmers, which found 10 swimmers aged (18-16) years were suffering from shoulder pain during daily workouts, those could not complete the 1500m, they were divided into two groups, experimental and control group, experimental group executed the proposed protocol which designed by the researcher, and the control group performed a traditional training curriculum which designed by their coach. The researcher did the necessary tests before and after the training period, which lasted 12 weeks, three training units per week, all the getting results were analyzed statically.

Key word: exercises, remove, shoulder, pain, aerobic.

1. Introduction

The term of shoulder pain generally used to describe the pain in or around the shoulder that associated mainly with events where frequent there movements of the arms are over shoulder level, as in the tennis, volleyball games, and shooting, swimming activities, and found that the shoulder injury occurs when the swimmers had an increase in the size and intensity of training during the fatigue, especially in free and the butterfly styles, which leads to increase loads on those joints that have high frequency movements during training. Shoulder joint is the most important among one of the body joints, because of the nature of the spindle joint (Ball & Socket), and therefore is prone to multiple injuries, including shoulder pain, dislocation, torn ligaments and tendons injuries, so the shoulder sling injuries are common in elite swimmers¹. As in many studies found, that these injuries were caused by a SAG and stretching of the ligaments that surrounding the shoulder which lead to weakness in the muscles working and therefore drop in performance and achievement as a result of the excessive repeat of the arms movement above the shoulder during daily workouts.

As it known that the rate of arm movements in swimming with senior swimmers ranging more than (12000)² arm pulls in a week, and this rate lasts for 8-12 and 14-28 hours per week, because the shoulder is the most important joint³, the continued movement of the head of the humeral and muscles of the rotator may causing the type of inflammation, which followed by pain, and it will be worse when the non-observance of the correct technique and principles of training occurred in terms of intensity and size. This type of pain occurs frequently in the swimmer's shoulder at the side of breathing (Costill, 1992) of arm pulls. When the medical reports indicate that there are three main reasons for shoulder pain, First: The result of training following fatigue in the muscles surrounding the shoulder, Second: The incorrect execution of arm movements while swimming, (Costill, D.L, et al 1989), Third: poor elasticity leads to weakness in flexibility, while the arm movement the muscles responsible for lifting the arm would generate lift pressure on the head of the humeral due to contraction at the beginning and end of the work.

To avoid the shoulder pain, the researcher used the following :-

- Strengthening the working muscles
- Correct technique with essential program
- Do elasticity exercises

¹ . McMaster Wc, Troup J ;A survey of interfering shoulder pain in United states competitive swimmers, Am J Sports Med 1993;21

² . Stoker D, Dink M, Jobe FW: Comparison of shoulder injury swimmers. in collegiate-and masters-level swimmers . Clin J Sport Med 1995; 5 (1):4-8

³ . Neer CS II: Impingement lesions. Clin Orthop.1983.173.pp70-77

And it is necessary to do the following¹ ;-

- Adequate warm up
- Reduce the training volume
- Neglect using hand glove
- Avoid overhead- hand moving

The researcher observed through follow-up procedures for selecting swimmers to participate in long-distance swimming events, there are a number of swimmers have not been able to achieve qualifying time of aerobic capacity (T.2000) test, which consider the number of arm pull be the most among the other events², the researcher found after clinical tests by the cadre of Orthopedics and Traumatology at the (Karama) hospital that the pain in the shoulder hindered the swimmer to achieve desired time, the researcher found that the problem lies in organizing the proposed training program based on a number of factors including the severity, size and the nature of the working muscles, so the researcher aimed to remove pain and to develop physical characteristics, to enable the swimmers to go back doing the physical training and required skills, as it was before the appearance of the pain. The researcher proposed that the training protocol have a positive effect in removing the swimmer's shoulder pain, and there will be a significant differences between the two pre and posttests, in measurement of aerobic capacity in swimming 1500 m freestyle of the control and experimental groups for the benefit of experimental group. The researcher achieved all the principles that organizing training exercises in terms of intensity, size, nature and purpose of exercises to return the shoulder to its natural state before the appearance of the pain³.

2. Methods

This study employed a pretest–posttest design. The sample was (10) swimmers those could not get the qualified times to participate in the 1500 m freestyle event, they were divided into two groups, the experimental and control group each (5) swimmers. The Participants of experimental group were assigned to exercise the proposed program, while the control group carried out the normal swimming-training program.

community and sample: the researcher choose (10) swimmers as sample of the study from the Baghdad clubs swimmers ages (18-16) those suffered from shoulder pain while conducting daily exercises, and themselves could not make an aerobic capacity test qualification. Clinical examination was conducted at (the Karamah hospital / bone fractures and consulting which located in Baghdad), to make sure there

¹ . Richardson.A.b. et al .: The shoulder in competitive swimming .A.j.Sports Med.1980.8:157-163

² Costill,et al: Adaptations to swimming training; influence of training.Med.sci.sport 1989.V.23:3 .

is no old fractures or inflammation or fibrosis of the muscle tendons, as well as rheumatic pulmonary, infections and diabetes tests that may increase visibility around the shoulder tendons¹, which cause the inflammation of nerves feeding the shoulder muscles and may increase the rate of appearance of cirrhosis in her muscles, and in the absence of satisfactory reasons, and based on the characteristics of the sample those divided into two groups (5) swimmers for each. In order to ensure the homogeneity of the sample a tests have been done in height, age, weight and age measurements.

Table (1) shows the value of the coefficient of variation and the age, weight and height measurements of sample members

Variables	mean	SD	Val.coe.	Result
height	170.5	1.44	0.080	Sig
age	17.5	0.2	1.27	Sig
weight	65	1.052	1.81	Sig

In order to create parity between the experimental and control groups in the variables, the researchers conducted a (T.test) in table (2) which shows no real difference between the two groups reflecting their equivalence.

Table (2) shows the standard deviations of 10 * 200 m and 1500 m freestyle swimming time and value (T) calculated result

Variables	Exp.		Con.		T. test		Result
	mean	Sd.	Mean	Sd.	calculated	tabular	
10x200m	2.394	0.071	2.392	0.208	0.02	2.31	Random
1500m	22.2	0.011	22.19	0.012	1.37		Random
Under freedom degree (8), level of indication (0.05)							

Research tools: stop watch, swimming pool.

The observed experiment: observed experience is a kind of practical training for the researcher to identify constraints and problem may face the researcher during the tests. so the researcher did an experiment on 15/3/2015 on a sample of five swimmers from outside research sample included tests on research.

Tests : the researcher conducted the following tests:-

1. Aerobic capacity test: the purpose of the test measure aerobic capacity in heart rate variables before and after the effort of swimmers.

Test method: each swimmer performed a set of repetitions (10*200m) Freestyle with equal comfort and recovery time (30 s). calculate the heart rate per minute, recording a performance of each repetition and the rate of extraction, the same way extract the heart rate after and before each repetition, heart rate account after each direct effort during (10 s) and multiply it by (6)².

¹ . Costill D.I.et,al,Swimming,testing and medical aspect of swimming, Blackwell scientific ,London ,1992,188

² . Ernest w. maglischo; Swimming Faster;Human Kinetics.U.S.A.2003.P.588

2. 1500 m freestyle swimming test: the test aims to measure the 1500m swimming time .

The proposed training protocol: the researcher organized the proposed training components aiming to eliminate shoulder pain and maintain fitness through emphasis on exercises that improve physical fitness. The researcher used three steps to get rid the shoulder pain¹:-

- correct arm movements technique, which may cause additional pressure on the shoulder construction , and accordingly can be removed up to 90% of the pain.
- Do some strength training using surgical tube to train of muscles arms beside flexibility exercises².
- do adequate aquatic relax exercises to relieve the pressure after performing training program.

The suggested special exercises were carried out over 12 weeks, three training sessions per week, aiming to improve the strength and flexibility of the arms muscles (abduction & adduction).

The experimental group performed a proposed exercises that focus on shoulder muscles. The control group participated in normal swim-training activities.

Testing Procedure

Measurements of each subject were taken before and after executing the program.

The researcher used the following statistical means to address tests results: Arithmetic mean, Standard deviation, T-test, Coefficient of variation, Correlation coefficient (Pearson)

3. Results and Discussion:

In order to achieve the research objectives and its prescriptions, and to know the effect of proposed exercises, the researcher highlights the result of tests conducted on a research sample before and after special exercises for both experimental and control groups. As show in table (3).

Table (3) shows the statistical results between the posttest of experimental and control groups for mentioned variables

Group	Test	Pre.t		Pos.t		(T) calculated	Result
		Mean	Sd	Mean	Sd		
Exp.	1500m	22.20m	0.011	20.00m	0.010	9.7	Sig
Con.		22.19m	0.012	21.05m	0.246	6.5	Sig
Exp.	Hr. .post.	159.2	1.03	156	0.699	6.2	Sig
Con.	10x200m.R.	158.9	0.69	157.8	0.92	4.72	Sig
Exp.	Recovery.hr	123	0.861	121	0.15	13.1	Sig
Con.		122.8	0.78	121.4	0.44	8.75	Sig

Tabular d.(4.60), freedom d. (4), Statistical significance (0.05)

² Scott A. Rodeo ; Shoulder pain in swimmers:Fina sport medicine .No 4 September 2002

² . . Miyashita,M;Fluctuations of swimming speed in the crawl stroke.The University of Tokyo.Tokyo.1977.

Table (3) shows statistical results for samples search posttest of 1500m, heart rate post 10x200m, recovery heart rate variables for experimental and control groups, which is greater than the value of tabular of (T) indicating that both groups had a different improvement in the mentioned variables, which the researcher attributes that to the influence of training used by both groups, yet the experimental group was better.

Table (4) shows the statistical results of the experimental and control groups of posttest for mentioned variables

Group	Variable	Mean	Sd	Calculator T	Tabular T	Result
Exp.	1500 m	20.00	0.010	9.64	1.86	Sig
Con.		21.05	0.246			
Exp.	Hr. pos. 100x200m.R	156	0.699	3.48	1.86	Sig
Con.		157.8	0.92			
Exp.	Recovery.hr	121	0.15	1.93	1.86	Sig
Con.		121.4	0.44			
freedom d. (8), Statistical significance (0.05)						

Table (4) shows statistical results for sample search posttest in a 1500 m, heart post rep. and rec. hr. between experimental and control groups which shows that control group greater than the experimental group in all variables, which the researchers attributed to the impact of the proposed training used by exp. group.

As show in table (4) there was an improvement in the results of the experimental and the control groups of posttests in all examined variables, although the performance of the experimental group was more significant than the control group. In repetitions performance time the experimental group improved (0.53m) and (0.25 m) for control, which the researchers attributed that to the influence of training program used by the experimental group, which focused on the muscle endurance training of exp. Group. As it agree with ¹(Boublik , Hawkins RJ).

Also tables (4) shows that there is a clear difference in aerobic capacity variables for pretests and posttest, in variable heart rate after each repetition which there is an improvement evolved the limits (3.2hr) for experimental and (1.1hr) for control, for the variable of heart rate during of recovery period was (123h.r) to (121 pm/d) for exp. (122.8 hr) (121.4 hr) to the con, the researchers attributed this improvement to the proposed training carried out by the experimental group, which was able to maintain such a rate of evolution and that it was better than the control group used traditional training programs.

Also tables (4) shows that there was a clear difference of pre and post tests in 1500 m swimming time , but the difference was clear and in favors of the experimental group than in the control group, by observing the results of a post test, where was a clear improvement in the post test for the experimental group, which was (2.2 m) and (1.4 m) for control,

¹ Boublik M, Hawkins RJ. Clinical examination of the shoulder complex. J Orthop Sports Phys Ther 1993;18:379-85.

which indicated that there was an improvement in aerobic capacity as a result of the improvement in average time of performance and heart rate before and after each repetition, which indicates that the swimmers had made a considerable effort to increase that improvement, since quickness of recovery time is considered to be the measurement of improvement, which attributed to the impact of the proposed training exercises which carried by the experimental group.

4. Conclusions & Recommendation:

Through the present, analyses and results discussion, the researcher found the following conclusion:

1. There is a clear contrast between the experimental and control group outcomes in removing shoulder pain.
2. The proposed training exercises had an impact on the development of aerobic capacity of swimmers through the results achieved in the post tests which conducted on a research sample swimmers.

The researcher recommends to give an importance attention to train arms to prevent shoulder pain.

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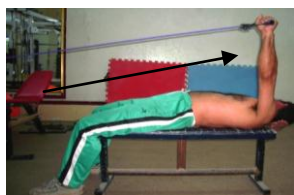
Schedule (1) arrange the water, ground proposed training

Training protocol	Week	Intensity	Terms
Warm up: water training ground exercises-8 * 50 m continuous swimming-4 * 100 m mounting effort per 100 m comfortable 30 sec-4 * 50 m short breaks (5-10 THA)-main group 6 * 200 p (150 m Catch-up) + 50 m-two strikes set routine: implemented in the following way:-25-50-75-100-75-50-25 m-series speed 6 x 25 m-200 m swimming pool relaxing light 2850 m	1& 2 & 3	Effort 30 – 50% pulse is 120-150 u/d average 70 – 75% pulse up to 170 u/d medium till 85% pulse up to 175 average 70-75% pulse up to 170 hr. up to 90%	Do not use hands swim of all types, because they generate additional resistance on muscles of the shoulder and arms.
Warm up: water training ground exercises-4 * 100 m continuous swimming (4 * 50 m) increasing effort per 100 m comfortable 30 sec -4 * 50 m short rec. time (5-10 sec)-main group 4 * 200 m – the following way:-25-50-25-75-100-75-25-50-25 m-300 m light pool relax 2950 m	4&5&6	% 30 – 50 0 pulse 120-150 moderate 70-75% pulse 170 70-75.-85-90% 180 hr.	
Warm up: water training ground exercises-8 * 50 m VA continuous swimming-4 * 100 m the average effort per 100 m comfortable 30 sec-4 * 50 m short breaks (5-10 sec)-main set 6 * 200 m – 50 m ordinary + (100 m Catch-up) + 50 m-two strikes set routine: implemented in the following way:-25-50-75-100-75-50-25 m-4 * speed range 25 m comfortable 30sec (last 25 m relaxed) 4 * 25 m comfortable 35 sec (25 m final relaxation)-400 m swimming relaxing 3200m	7&8&9	30 – 50% pulse is 120-150 pulse m. average 70 – 75% pulse up to 170 medium till 85% pulse up to 175 average 70-75% pulse up to 170 until 90% pulse up to 180 hr. intensity up to 80-85%	
Warm up :water training ground exercises-8 * 50 m swimming-4 * 100 m increasing effort per 100 m comfortable 30sec-4 * 50 m short rec. (5-10 sec)-main group 6 * 200 p (150 m Catch-up) + 50 m set routine: implemented in the following way:-50-25-50-25-75-100-75-25-50-25-50 m-4 * speed range 25 m comfortable 30 sec 4 * 25 m comfortable 35 sec 4 * 25 m comfortable 40 sec-400 m relaxing light swimming m 3450	10&11&12	30 – 50% pulse is 120-150 s/m average 75-80% pulse up to 170 s/m medium till 85% pulse up to 175 average 75-80% pulse until 180 s/m until 90% pulse up to 180 u/d under up to 90% of maximum pulse up to 185	

Schedule (2) articles of the ground proposed training

Aim	Week	Repetition	Ex.number
Strengthen arm left-muscles up and development head and upper arm bands to the right	1 2 6-3	2 (10 + constant comfort 10 sec) 3 x 10 repeat rest 15 sec 2 (3 x 10) using the weight of 1 kg gets 1 kg/week	1
Improved flexibility of the shoulder joint and surrounding muscles and smooth work right humerus head. Continue this exercise every day before performing aquatic training	1 2 6-3	2 (10 + 10) hard rest 30 sec	2
Strengthening the brachial muscle helps lift and upper arm included for the body and work on installing the humerus head on right.	1 2 6-3	3 X 10 rest 10 sec 3 x 10 using the weight of 1 kg 10 sec 3 x 10 increasing weight 1/2 kg/weekly	3
Strengthen the muscle above the supraspinatus and help keep the arm and raise it above the head	1 2 6-3	2(10 + 10 esc rest) 3 x 10 using rubber cord 3 x 10 using the weight of 1 kg increase of 1 kg/per week	4
Strengthen the biceps	1 6-2	3x10 rest 30 sec rubber cord 3x10 comfort 30 sec using 5 kg weight increasing 1 kg/weekly	5
Strengthen the infraspinatus muscle and elastic shoulder joint	1 2 6-3	10 + 10)hard + rest) 30 sec performance 3 x 10 using a weight of 2 kg increase 1/2 kg/weekly	6 + 7
Strengthening the latissimusbroad muscle that run on the dorsal Dwyer humerus inside and pull down the arm of a loft and unwrap avulsion on shoulder	12-7	3x10 using the weight of 5 kg 1 kg increases every week.	8
Serves to strengthen deltoid muscle work development to help rotate the humerus and improve muscle work to facilitate the work of the deltoid.	12-7	3x10 without resistance using heavy weight 1 kg a week increasing 1/2 kg weekly	9
Strengthening the latissimus dorsi and teres major and subscapularis muscle .	12-7	3x10 using rubber cord 3x10 using weight 5 kg per week increased 1.5 kg weekly	10
Strengthen the muscle that rotate the hum erus out and strengthen the contribution the deltoid to extant the arm out.	12-7	3x10 using rubber cord week 3 x 10 using weight 5 kg per week increased 1.5 kg weekly	11
Strengthen the pectoralis, deltoid to implement smooth movement when the movement of the head of the humerus forward and upward	12-7	3x10 using rubber cord 3 x 10 using weight 3 kg per week increased 1 kg weekly	12
Develop flexible muscles involved in work including deltoid and dorsal muscle	-12-7 -13	3x 10 rest 10 sec continue the rehearse for the experimental period	13
strengthening triceps muscle and dorsal muscle	7-12- 13	3x6, 3 x 8, 3 x 10 change every 2 weeks	14
Strengthening the deltoid and broad dorsal muscle	7-12- 14	Fixed repetitions 10 x 10sec rest between each repetition	14

The exercise



1. extend the arm up;
Starting position; prone on bench elevate the arm up using the surgical tube up to sense the pain



2. abduct arm up;
Starting position; spine on side on bench, abduct arm up as much as possible



3. abduct arm up from standing ;
Starting position; lift the arm up to the level of the shoulder



4. flex the elbow;
Starting position; flex elbow then extend it up



6. lift the arm from prone position;
Start position; On the bench from prone position : the swimmer lift the arm back up



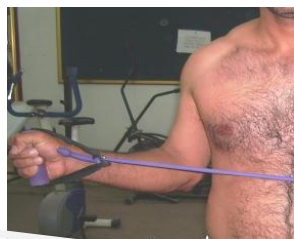
7. without resistance
Starting position; from standing position the swimmer elevate his hand back up using surgical tube.



8. extend hand up
Starting position; From prone on bench uplift arm up to appearance the pain



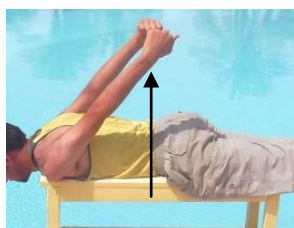
8. near forearm to chest;
Starting position; from standing position the swimmer near the forearm nearby the chest by bending the elbow



9. turn the forearm out of body;
Starting position; from standing position the swimmer put the arm beside the body, elbow flexed, then turn the forearm out of the body



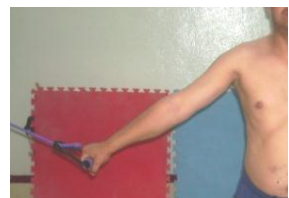
10. flex the shoulder;
Starting position; from sitting position the swimmer lift arm up over shoulder level



11. extend both arms up;
Start position; elevate both arms from prone position as much as possible



12. press up: Start position; from prone position the swimmer push up to extend elbows at its rang



13. pull arm
Start position; the swimmer pull the surgical tube as the arm 45° extended from the body side