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Effect of rehabilitation program in swimming pool on some physiological and physical variables for individual sports players

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Abstract
It is considered training Swimming Pool exercises since ancient times are one of best treatment methods, as it was used in treatment of muscle weakness and paralyzed ends thanks to feature of pregnancy and resistance, as flooding on water allows body to move easily and is easy to move on land. Research sample was chosen in intentional way from those infected with individual games of Basra Governorate Clubs for sports season 2022/2023 various injuries and are subject to rehabilitation and physical therapy programs by specialized doctors, who number (20) players. Researcher used experimental curriculum in one experimental group and n conducting scientific transactions for tests used in research on community, and conducting an exploratory experience on a group of players who did not participate in experiences as well as on basic research sample, proposed rehabilitation program was applied to use Swimming Pool exercises. Pre and post- tests were applied to measure physical and physiological research variables. Researcher built proposed rehabilitation program using and applying Swimming Pool training according to following scientific foundations.

1. Taking into account principle of gradient from easy to difficult to perform training within training unit program within Swimming Pool.
2. Taking into account principle of integration of exercises (two leg - arms - trunk) to achieve maximum benefit.

Most important recommendations were

1. Implementing proposed qualification program for what has a positive impact on physical and physiological variables of all injured players.
2. Necessity of conducting or similar studies and research at physical and physiological level in or patients with double injuries.

Keywords: Rehabilitation program, swimming pool, physiological and physical variables

1. Introduction

1.1 Definition of Research

1.2 Introduction Research

Consciousness has increased and belief in benefits of Swimming Pool training has spread, it is now one of latest methods, as aqueous medium exercises act as preventive and physical therapy in face of many cases of infection or rehabilitation. water medium training is one of latest training and common training methods at present time, as water fitness exercises are one of "favorite training forms and does not need swimming skill and that any person has desire to practice water training can find appropriate place to perform water fitness exercises'. (Abdul Rahman Ibrahim: 2009) [5]. Exercises of Swimming Pool have been known since ancient times, as it was used in treatment of muscle weakness and carrying bodies and resistance, so kindness on water allows body to move easily and is easy to move on land. re are several factors that indicate interest in studies that indicate benefits of water exercises for high -level athletes and levels of rehabilitation and physical by performing a few exercises in water center through intensity of rapid training and thus gaining high physical fitness, which in turn leads to avoiding injury and helps to return to Natural condition, hospitalization stage after performing competitions or violent exercises, or water exercises can be performed on a daily basis, increase time of training unit, and raise some motor capabilities such as (Strength, flexibility, balance).

Results of some studies indicate that instead of spending days of week between rehabilitation within rehabilitation and physical therapy centers, it is better to determine days for training and rehabilitation within water. This works to add more motivation and suspense among individual games players that training within Swimming Pool has a positive impact on physiological responses functional efficiency of various body systems, tension guide for rhythm of heart, "ratio of lactic acid concentration, heart rate, blood pressure, biological capacity of lungs. It is among physiological benefits with exercises maximum consumption of oxygen, "improves overall functional efficiency of various body systems" and exercises of Swimming Pool can be performed daily without concern for muscles or joints after injury. Walking or running because of knee injury, for example, you can train in water.

1.2 Research problem

Despite importance of sport for all ages, which are confirmed by results of research and studies all time, many see it as a kind of luxury and few are ones who take a lifestyle and keep practicing it regularly. Weakness is more than muscles of trunk and legs, which are important muscles of all our kinetic activities, and individual games. During work of researcher, teaching and trained at University of Basrah for various sporting events have noticed that many of players injured in sports clubs in Basrah Governorate do not prefer to practice minor sporting exercises after various injuries During races because of its stress on injury, prefer to practice exercises of Swimming Pool because of its impact on level of physical, physiological and psychological fitness as well as suspense, so researcher's references to use of a proposed qualification program using Swimming Pool training in an attempt to improve level of some physical and physiological variables among players Individual games with various injuries. importance of research lies in showing importance of water medium training to develop special fitness elements of infected individual games and show importance of water medium training to improve special physiological variables in performance and link physical and physiological aspect helps in developing rehabilitation programs for individual games infected.

1.3 Research Aims

1- Identify effect of a qualifying curriculum using swimming pool, some physical variables (flexibility- balance- muscle strength) among individual players infected in Basrah Governorate clubs.

2- Identify effect of a qualifying curriculum using swimming pool some physiological variables (pulse rate - blood pressure - number of breathing times) among individual games infected in Basra Governorate clubs

1.4 Research hypotheses

1. There are statistically significant differences between pre and-post- test of experimental group in physical variables (flexibility - balance - muscle strength) in favor of experimental group.
2. There are statistically significant differences between pre and-posttest of experimental group in physiological variables (Pulse rate-blood pressure - number of breathing times) in favor of experimental group.

1.5 Research fields

1.5.1 Spatial field: Players of Basrah Governorate Clubs for individual games injured under rehabilitation

1.5.2 Time's field: during from 12/11/2022 to 2/3/2023.

1.5.3 Human field: swimming pool at Basrah University Center in Basrah Governorate and Fitness Hall.

2. Research Methodology and Field Procedures:

2.1 Research Methodology

Researcher used experimental curriculum due to its suitability for nature of research method for one experimental group.

2.2 Research Sample

Research community included players of individual games in Basrah Governorate clubs, clubs with different types of sporting injuries in various individual sports games. research sample was chosen in intentional way from those infected with individual games of Basrah Governorate Clubs, various injuries, and y are subject to rehabilitation and physical therapy programs by (20) specialized doctors.

Table 1: Shows arithmetic mean, standard deviation, kurtosis factor and mediator in basic variables of research sample.

Variables	Unit Measurement	Mean	Variables	Unit Measurement	Mean
Age	Year	28.55	2.801	27	1.55
Length	Cm	178.75	1.559	177	1.03
Wight	Kg	69.14	2.034	68	0.04

From table (1) that values of Kurtosis in physical variables (age-length-weight) under research have been limited between (3 ±), which considers that distributions approach moderation in all physical tests, which indicates homogeneity of research sample.

Table 2: shows arithmetic Mean, standard deviation, Kurtosis and mediator laboratories in physical variables of members of research sample

Variables	Taste		Variables	Taste		Variables
Physical	Muscle strength	Kg	57.68	6.55	56.1	2.04
	Flexibility	Cm	7.77	4.85	7.01	1.12
	Balance	Sec	3.57	3.55	3.44	1.09

From table (2) that values of spraining transactions in variables under research have been limited between (3 ±), and this indicates that distributions approach moderation in both physical variables (muscle strength - flexibility - balance), which indicates homogeneity of research sample.

Table 3: Arithmetic Mean standard deviation, sprain and mediator in physiological research variables of sample members

Variables	Taste Name	Unit Measurement	Mean arithmetic	Standard deviation	Mediator	Kurtosis
physiological	Pulse rate	Pulse count	14.9	4.57	15	0.81
	blood pressure	degree	17/567	3.57	37/557	0.22
	number of breathing times	count	51.16	5.53	50	0.02

It is clear from table (3) that values of spraining transactions in physiological variables have been limited between (3 ±), and this indicates that distributions are close to moderation in both physiological variables (pulse rate - blood pressure - number of breathing times), which indicates at sample.

2.4 Data Collection Tools

2.4.1 Devices and tools used in research:

1. Rest meter is to measure length and weight.
2. A measurement tape
3. Swimming pool
4. Stop watch.

2.3 Expert Opinions Survey Forms and Reference Survey

1. Determine physical variables under research.
2. Determine physiological variables under research.
3. Determine basic tests to measure physical and physiological research variables.

2-3-3 Reference Survey method

A: reference survey and exploration of experts' opinions on physical variable tests:

Researcher briefed and surveyed for scientific references and previous Arab and foreign studies specialized in field of rehabilitation (I man Farouk: 2009) and treatment exercises in order to limit and determine most important and most appropriate physical tests used in research. Gentlemen, field of sport physiology and sports rehabilitation, to determine basic tests to measure research variables, as in a table (4)

Table 4: Tests used to measure physical research variables

Measurement	Variables	Test	Unit Measurement	Agreement ratios
physical	Balance	stand on template balance	Sec	100
	Flexibility	Sitting test and extend trunk	Cm	83.3
	Muscle strength	Dynamometer	Kg	83.3

From Table No. (4) percentage of experts' agreement on test is under discussion to measure Physical research variables (balance- flexibility- muscle strength) proportions ranged between (100% to 83.3%) of expert opinions. Researcher considered that se percentages are good according to admission criteria.

2.3.4: Reference survey and exploration of experts' opinions on physiological variables tests

Researcher briefed and reference survey of scientific references and previous Arab and foreign studies specialized in field of medical rehabilitation and rape tic exercises in order to limit and determine most important and most appropriate physiological tests used in research, in addition to that researcher sought opinion of experts to determine tests under research to measure physiological variables of research sample and opinions of masters were limited Experts in field of sports physiology and sports rehabilitation to determine basic tests to measure research variables.

Table 5: Tests used to measure physiological research variables

Measurement	Variables	Test	Unit Measurement	Agreement ratios
Physiological	Pulse rate	Passion at carotid artery	Count	100%
	Blood pressure	Blood pressure device mercurial	Degree	83.3%
	Number of breathing times	Number for resident	Count	83.3%

It is clear from Table No. (5) Percentage of experts' agreement on tests is under research to measure physiological research variables (pulse rate - blood pressure - number of breathing times). Proportions ranged from (100% - 85%) of expert opinions. Researcher considered se proportions acceptable.

2.4 scientific transactions for tests used in research

Researcher conducted scientific transactions for tests used in research on exploratory sample of research community, which did not participate in basic experience, which has reached (8) injured players on Tuesday, 15/11/2022 in afternoon in Basrah Swimming pool.

2.4.1 Tests of Sincere

Testimony of test means ability of test to measure what was put for it.

2.4.2 Sincere of Differentiation

To calculate sincerity of tests and standards that measure physical and physiological research variables of research sample, researcher used sincerity of differentiation, so researcher applied se tests and standards to a reconnaissance sample number (8) injured players where significance of differences was found using (T) test as in Table (6)

Table 6: Indication of differences between distinctive and Non- distinctive groups in some physical variables

Type of test	Variables	M/U	Distinctive group		Non- distinctive group		Different between averages	T Value	Level of indication
			M	S	M	S			
Physical	Balance	Cm	25.46	4.21	21.10	3.12	3.16	*1.64	moral
	Flexibility	Sec	5.05	1.62 3.5	0.69		2.55	*1.85	moral
	Muscle strength	Kg	8.15	4.22	6.50	4.88	2.75	*1.49	moral

Table "T" value at 0.05 = 2.26

It is clear from Table No. (6) existence of a statistical sign at level of significance (0.05) between two groups distinctive and Non- distinctive to injured players in some physical variables (Flexibility-balance- muscle strength) in favor of Distinctive group, which indicates sincerity of se tests while y were placed for it

Table 7: Indication of differences between t distinctive and Non- distinctive group groups in some physiological variables

Type of Test	Variables	M/U	Distinctive group		Non- distinctive group		Distinguish between averages	T Value	level of indication
			M	S	M	S			
Physiological	Pulse Rate	Count Pulse	91.5	3.15	96.10	3.14	3.7	*1.80	Moral
	Blood pressure	Degree	130.25	1.10	148.32	1.08	28.26	*1.63	Moral
	Number of breathing times	Count	13.98	1.18	16.9	3.9	1.91	*1.96	Moral

Table "T" value at 0.05 = 2.26

From Table No. (7) existence of a statistically function at level of significance (0.05) between distinctive and non-Distinctive groups of infected players in some physiological variables (pulse rate- blood pressure- number of breathing times) in favor of distinctive group, which indicates sincerity of tests in what was placed for them.

2.4.3 Stability tests

Test is stabilized by extent of its ability to give same results when using it to take frequent measurements from same exploratory sample of (8) injured players, -applying tests for second time on same sample, a period of ten days between first application and second application shows table (8):

Table 8: Stability laboratories for physical tests under research

Type of Test	variables	M/U	First application		Second application		Different between averages	Correlation factor	Level of Indication
			M	S	M	S			
Physical variables	Flexibility	Cm	25.46	4.21	23.10	1.12	1.16	0.857	Moral
	Balance	Sec	5.05	1.62	6.5	0.69	2.45	0.874	Moral
	Muscle strength	Kg	8.15	4.22	8.50	3.88	0.15	0.799	Moral

Table "R" value at 0.05 = 0.514

From Table No. (8) There is a statistically indicative relationship at indication level (0.05) first and second applications of physical and physiological variables are under research, which indicates stability of se tests when conducting measurement.

Table 9: stability laboratories for physiological tests

Type of Test	variables	M/U	First application		Second application		Different between averages	Correlation factor	level of indication
			M	S	M	S			
Physical variables	Pulse rate	Count Pulse	91.5	3.15	92.15	3.02	2.15	0.981	moral
	blood pressure	degree	130.25	1.10	133.06	1.10	1.92	0.968	moral
	number of breathing times	count	13.98	1.18	14.05	1.13	0.07	0.931	moral

Table "R" value at 0.05 = 0.514

From Table No. (9) There is a statistically indicative relationship at level of significance 0.05 between first and second applications of physical and physiological variables, which indicates stability of se tests when conducting measurement.

2.4.4 Suggested pool swimming Training Program:

Proposed program aims to use exercises to "develop physical variables (flexibility - muscle strength) and develop some physiological variables" (Hatem Hussein Murad Adel: 2002) as well as (pulse rate - blood pressure - number of breathing times) at research sample.

2.4.5 Foundations for building proposed training program (Muhammad Ibrahim: 2005) [6]

Researcher built proposed rehabilitation program using exercises of water medium according to following scientific foundations: taking into account principle of gradient from easy to difficult to perform training within and training program taking into account principle of integration of exercises (two leg - arms - trunk) to achieve maximum benefit possible. And pay attention to performance of prolongation, flexibility and physical preparation before implementing rehabilitation unit.

Table 10: time distribution of proposed qualification program shows.

Purpose of unit	Duration
Warm	20 minutes
Muscle prolongation	20 minutes
Swimming pool exercises	30 minutes
Calm and conclusion	20 minutes
time of unity	60 minutes

From Table No. (10) that total time of training unit (60 minutes) is divided into four parts and represents Water midfields (50%) of total time of training unit (Mohamed El - Sayed Morsi: 2009) [7].

2.5 Post - Tests
Were conducted on 20/11/2022, on Sunday, four o'clock in Basrah University swimming pool and fitness hall according to following arrangement:

Table 11: physical and physiological research variables and tests for measurement

Variables	Tests
Flexibility	Stand on the balance beam
balance	Goniometer
Muscle strength	Dynamometer device
Average Pulse	at the carotid artery
blood pressure	Mercury sphygmomanometer
number of breathing times	The number of breaths per minute

2.6 Main Experience
proposed rehabilitation program was implemented by using swimming pool training on club players who are affected by individual games, and represent members of experimental group by (3) months for a period of (1) week by two units per week, from 25/11/2022 to 25/2/2023.

2.7 post - Tests
Post – test was conducted on 27/2/2023, which happened on Monday at three in afternoon in Basrah University swimming pool and fitness hall.

2.8 Statistical treatments used
Researcher used SPSS statistical version 21.

3. View and Discuss Results
3.1 First: View results

Table 12: Indication of differences between pre and post –test of group in physical variables

Variables	M/U	Pre- Test		Post-Test		T Value	Level of Indication
		M	S	M	S		
Muscle strength	Kg	23.46	23.46	4.21	2.12	2 .*18*	Non-Moral
Flexibility	Cm	4.05	4.05	1.62	0.69	3.73	Moral
Balance	Sec	6.15	6.15	4.22	4.88	2.69	Moral

Table "T" value at 0.05 - 2.14 level
From Table (12) in presence of statistically significant differences at level of significance 0.05 between Pre- test and post- test of experimental group in some physical variables (flexibility- balance- muscle strength) where value of (T) calculated for flexibility variable (3.73) came and value of (T) equilibrium variable (2.69), and value of calculator of muscle strength variable (2.18), which is higher than test (T) at level of significance (0.05), indicates existence of statistically significant differences between Pre –test and post -test of experimental group in muscle strength variable.

Table 13: Indication of differences between Pre -test and post-test of sample in physiological variables

Variables	M/U	Pre- Test		Post-Test		D/F	T Collected value	Level of indication
		M	S	M	S			
Pulse Rate	Count Pulse	91.5	3.15	87.25	3.28	5.35	*2.59	Moral
Blood pressure	Degree	130.25	1.10	120.10	1.69	29.95	*3.28	Moral
Number of breathing times	Count	13.98	1.18	29.15	1.46	4.73	*3.69	Moral

Table "T" value at 0.05 - 2.14 level
From Table No. (13) statistically significant differences at level of significance (0.05) between Pre-test and Post-test standards of experimental group in some physiological variables (rate of blood pressure- number of breathing times where value of (T) of rate of pulse rate (2,59) value of (T) calculated for blood pressure variable (3.28) came and value of (T) came to number of breathing times (3,69) and this is higher than (T) test level of significance (0.05), which indicates existence of improvement in some Physiological variables of research sample.

Table 14: Indication of differences and improvement rate between Pre-test and post-test of sample in physiological variables

Variables	M/U	Pre- Test		Post-Test		D/F	Rate improvement	T Collected Value	Level of Indication
		M	S	M	S				
Pulse rate	Count Pulse	91.5	3.15	87.25	3.28	5.35	%25.10	* 2.59	Moral
Blood pressure	Degree	130.25	1.10	120.10	1.69	29.95	%23.01	*3.28	Moral
Number of breathing times	Count	13.98	1.18	29.15	1.46	4.73	%29.31	*3.69	Moral

3.2 Discuss Results

A-Discussing Results of levels of physical variables under research

Through arrivals, it was found that re are statistically significant differences between post-test and pre-test at a level some physical variables (muscle strength - flexibility - balance in favor of post –test). To verify validity researcher compared results of Pre –test and post-test measurement at research sample, and it is clear from Table No. (12), (14) presence of statistically significant differences at level of significance 0.05 between tribal and dimensional measurements of experimental group in (balance - flexibility - muscle strength) researcher attributes those differences in (flexibility) to proposed rehabilitation program using exercises of water medium that practices water center income and is characterized by easy and simple movements and has a significant physical and physiological effect and its dependence in first place on development of balance. This is due to nature of qualifying program that depends on swimming pool training Water that requires very slow performance in addition to not containing frequent stability. Results are consistent with studies (Miha *et al*. 2003) [11] (Huang: 1997) [10] in "that exercises of swimming pool contribute to improvement of some physical changes in balance - flexibility and muscle strength."

3.2.1 Discuss Results of physiological variables

Through results, it was found that re are statistically significant differences between Pre-test and Post-test of experimental group in level of some physiological variables in favor of post-test Where researcher compared results of Pre and post- tests at research sample and it is clear from Table No. (13), (15) presence of statistically significant differences at level of (0.05) between pre and post- test of experimental group in level of some physiological variables of post –test group of experimental group under research and attribute researcher that that Improvement to proposed qualification program application using swimming pool training under research. In this context, some recent study indications are that light exercise for a period of twice a week has an "effective effect on physical and physiological level" and results of this study are consistent with a study (Nader Tawfiq: 2011) [8] and a study (Hind Attia: 2011) [9] to "that exercising within water community It has a positive effect on upgrading physiological aspects (pulse rate - blood pressure). Results of Table No. (14) indicated that re are statistically significant differences between Post-test and post-test of experimental group at level of some physiological variables (rate of blood pressure pulse- number of breathing times) under research, which indicates effect of exercises of proposed swimming pool on proposed qualification program "It affected positively on level of some physiological variables of research sample" (Islam Khalil: 2006) [1], which states that re are statistically significant differences between Pre-test and post-test of experimental group at level of some physiological variables (Pulse rate- blood pressure- number Breathing times) in favor of post-test group.

4. Conclusions and Recommendations

4.1 Conclusions

Presence of statistically significant differences between Pre and post-test averages in level of (balance elements, flexibility and muscle strength).

Presence of statistically significant differences between Pre-test and post averages in level of some physiological variables (pulse rate - blood pressure - number of breathing times).

5. Recommendations

1. Applying proposed qualification program for what has a positive impact on physical and physiological variables of all injured players.
2. Necessity of conducting or similar studies and research at physical and physiological level in or patients with double injuries.
3. Guidance by implementing proposed qualifying program because of its positive impact in improving level of physical and physiological characteristics.

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