

## THE EFFECT OF IN-WATER EXERCISES ON THE BLOOD PARAMETERS AND KINETIC BALANCE AMONG THE JIU-JITSU PLAYERS WITH A SEVERE SPRAIN OF THE ANKLE JOINT

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### Abstract

The purpose of this paper is to preparing exercises in-water on the blood parameters and kinetic balance for the Jiu-Jitsu players with a severe sprain of the ankle joint. The researcher used the experimental method with the design of equal groups for its suitability in solving the research problem and achieving its objectives. The researchers sample was selected (8) of Jiu-Jitsu players suffering from a severe sprain of the ankle joint (rupture of the ligaments of the entire joint with the instability of the ankle joint) in the Baghdad governorate clubs, and with (8) ankle joints, (4) right ankle joint and (4) left ankle joint, where the ages of the injured athletes ranged between (16-18) years, and whose condition requires them to undergo a rehabilitation program for the purpose of returning to their sports activity. The researchers distributed the research sample to two equal groups, with (4) injured athletes (the experimental group) according to the (rehabilitative curriculum inside the pool) and (4) injured athletes (the control group) according to the (traditional curriculum outside the swimming pool). The sample was chosen in The light of diagnosing the type of injury, which was determined by the specialist doctor, and the sample was homogeneous and the two groups were equal. The most important conclusions were reached the exercises inside the water play a major role in raising the level of blood variables and kinetic balance among Jiu-Jitsu players with severe sprains of the ankle joint. And the recommended was adopting the exercises in the water that are proposed by the researcher, as they play a major role in raising the level of blood variables and achieving the level of kinetic balance for the Jiu-Jitsu players with severe sprains of the ankle joint.

**Keywords:** Ankle joint. Exercises. Physiological

### Introduction

Scientific progress is a basic premise for the advancement of civilization and the progress of countries, and this is what we see in most Western countries through scientific and research innovations for raising the level in various fields, including economic, educational, social and even sports. On the sports side, science played a major role in achieving the highest levels of sports through sports training and supporting sciences, whether mechanical, physiological, psychological, or even rehabilitative and therapeutic, so that the player does not stop progressing even if he has a sports injury. Therefore, the science of medical and therapeutic rehabilitation is one of the basic and important sciences in the aspect of training and sports competitions, and because it has an important role in the treatment and rehabilitation of injuries to individuals and their prevention. In order for them to be able to perform their duties inside the stadium and in sports competitions, during which the locomotor system is exposed to great effort, especially in the working muscle groups, cartilage and ligaments mainly and in various parts of the body, especially the working parts. The injuries of the ancestral limb are among the most common injuries of this game for the use of repeated beatings with the legs and because of

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the weakness of the working ligaments and muscles, which affects the joints as well as affects the balance. Physiological variables, including blood variables.

Ankle joint injuries constitute a high percentage of the total injuries for Jiu-Jitsu players because of the repeated beating resulting from performing these movements. Ankle joint injuries are the most common types of injuries in the lower extremities, these injuries are usually accompanied by many negative side effects, and perhaps the most prominent of these negative side effects is determining the movement of Detailed and inability to achieve achievements.

This requires the use of exercises using auxiliary training aids, including the swimming pool, as it reduces pressure and increases muscle tension in the affected part while performing similar movements. Hence the importance of the research that was obtained through the researchers' experience in the game of Jiu-Jitsu , rehabilitation, treatment and the physiological aspect, which they found there is a problem that determines the movement of the ankle joint resulting from severe sprained injuries to the ankle joint and finding the best ways to treat it by giving some therapeutic and rehabilitative exercises inside the swimming pool within The therapeutic program that works to develop the strength of the muscles working on the affected joint and the development of the range of motion of the joint itself, in order to restore the affected member to its normal activity and play the game.

### Research problem

Jiu-Jitsu is one of the combat sports in which frequent injuries occur and which restrict the player from performing and returning to the same level as a result of improper rehabilitation and fear of injury again. Through the researchers' experience in medical treatment and rehabilitation and the Jiu-Jitsu game, he found the parts of the body for the Jiu-jitsu players most vulnerable to injury, especially the joints of the lower extremity, which differ in their structure and movement from other joints because of their importance in bearing the weight of the body as well as its balance, in addition to the lack of codified rehabilitation methods for the rehabilitation of the injured And how to use exercises and therapeutic methods and restore the required balance and the important physiological aspect, including blood variables inside the body. This is what prompted the researcher to study this problem and build an appropriate treatment program, which is the rehabilitation of the ankle joint

injury in the swimming pool. We may contribute to the return of the injured players to participate in tournaments at the same level.

### Research objective

- Preparing exercises in the water on the variables of blood and kinetic balance for the Jiu-Jitsu players with a severe sprain of the ankle joint.
- To identify the differences between the results of the pre and post-tests of the two experimental and control groups in the blood variables and the kinetic balance of the Jiu-Jitsu players with a severe sprain of the ankle joint.
- Identifying the differences in the results of the post-tests between the control and experimental groups in the blood variables and the kinetic balance of the Jiu-Jitsu players with a severe sprain of the ankle joint.

### Research hypotheses

- There are significant differences between the results of the pre and post-tests and in favor of the post-tests of the experimental and control groups in the blood variables and kinetic balance of the Jiu-Jitsu players with a severe sprain of the ankle joint.
- There are significant differences in the results of the post-tests between the control and experimental groups, and in favor of the experimental group, in the blood variables and kinetic balance of the Jiu-Jitsu players with a severe sprain of the ankle joint.

### Research fields

- Human field: Jiu-Jitsu players with a severe ankle sprain (complete ligament tears with the instability of the ankle joint) in Baghdad sports clubs.
- Time field: (18/1/2021) to (7/8/2021)
- Spatial field: Al-Hedod Sports Club pool.

**Research methodology and field procedures**

**Research Methodology**

The researchers used the experimental method with the design of equal groups for its suitability in solving the research problem and achieving its objectives.

**Community and sample research**

The researchers sample was selected (8) of Jiu-Jitsu players suffering from a severe sprain of the ankle joint (rupture of the ligaments of the entire joint with the instability of the ankle joint) in the Baghdad governorate clubs, and with (8) ankle joints, (4) right ankle joint and (4) left ankle joint, where the ages of the injured athletes ranged between (16-18) years, and whose condition requires them to undergo a rehabilitation program for the purpose of returning to their sports activity.

The researchers distributed the research sample to two equal groups, with (4) injured athletes (the experimental group) according to the (rehabilitative curriculum inside the pool) and (4) injured athletes (the control group) according to the (traditional curriculum outside the swimming pool). The sample was chosen under the diagnosing the type of injury, which was determined by the specialist doctor and the sample, was homogeneous and the two groups were equal, as shown in Table (1).

**Means of collecting information**

**Data collection methods**

- \* Arab and foreign sources.
- \* Statistical tools.
- \* Tests and measurements used.

**Tools and devices used**

- \* Metric tape measure.
- \* Medical scale.
- \* Stopwatch.
- \* Swimming pool
- \* Straps, ropes and elastic bands for the affected joint.
- \*medicine ball
- \* (Ruby) device to analyze white blood cells (WBC).
- \* A special refrigerator for keeping blood samples tubes.
- \* Sterile glass tubes well to save blood samples.
- \* ICE BOX for placing and transporting blood samples.
- \* Sterile plastic syringes and needles for drawing blood samples.
- \* Special tubes containing an anticoagulant (EDTA) to save blood.
- \* Elastic band (Tourniquet) to tie the patient's arm.
- \* Automatic pipette for taking blood and serum samples.

**Tests used (El-Shahat. 1996)**

**Static balance test**

- Test name: Standing test with the feet longitudinally on the crossbar (static balance)

- Test purpose: static equilibrium measurement
- Tools: A stopwatch - a device consisting of a wooden board, in the middle of which is a crossbar, height (20) cm, length (60) cm and thickness (3) cm.
- Performance specification: The tester stands on the edge of the crossbar with both feet, with the left foot preceded by the right foot, and the instep of the back foot touches the heel of the front foot.
- Instructions:
  1. The tester performs the test with his shoes
  2. The hands should be the stability of the middle (on the waist) while performing the test
  3. Dropping the foot and touching the ground means the end of the test.
- Register the sample records the time during which he was able to maintain his balance over the crossbar and even touch the board or the ground with any part of the body.

**The kinetic balance test**

- Test name: kinetic balance test
- The purpose of the test: to measure kinetic balance
- Tools: A device made of wood and has eight sides (the specifications are mentioned in the figure), a line is drawn in the middle of one of the eight sides, the height of the device (20) cm, to serve as the starting and ending line.
- Performance specifications: The laboratory stands on the edge of the device and above the starting line. The laboratory walks on the edge of the device to make a full turn of confrontation that ends with a step with both feet of the starting line (the end), and if the laboratory loses its balance and touches the ground, it must return again to the edge of the device from the same place it fell.
- Instructions:
  - 1- The laboratory performs the test while barefoot
  - 2- If he loses his balance and touches the ground on him by returning to the edge of the device from the same place he fell.
  - 3- The laboratory is not allowed to rely on anything while walking on the edge of the device, and it is not allowed to touch the device with both hands or hold any tool with both hands in order to help maintain balance.
- Recording: It records for the laboratory the time during which it was able to maintain its balance on the device.

**Measurement of blood parameters**

A blood sample (5 cm) was drawn for all of the research samples, the control and experimental groups, and then the blood in the syringe was emptied into sealed glass test tubes containing EDTA to preserve the blood. After that, the serum was separated from the blood components in a centrifuge. In addition, put it in the freezer of the refrigerator until the completion of the withdrawal of the rest of the sample and then analyzed.

**Exploratory experiences**

The researcher conducted the exploratory experiment on 18/1/2021 on the same research sample by applying the suggested exercises inside the swimming pool and knowing the appropriate size and how to perform them,

**Table 1:** Shows the homogeneity and parity between the two groups in the research variables.

Tests and measurements used	Measuring unit	Control group			Experimental group			T value	Type sig	
		Arithmetic mean	Standard deviation	Variation coefficient	Arithmetic mean	Standard deviation	Variation coefficient			
Body measurements	Age	year	28.56	2.547	8.918	28.745	2.665	9.271	0.086	Sig
	Height	Cm	172.65	2.235	1.294	172.84	2.336	1.351	0.101	Sig
	Weight	kg	65.47	1.896	2.895	65.235	1.847	2.831	0.153	Sig
Blood variables	WBC. white blood cells	L/×10 <sup>9</sup>	13.845	0.652	4.709	13.778	0.687	4.986	0.122	Sig
	Hemoglobin HB	g/dl	15.623	0.644	4.122	15.745	0.689	4.375	0.224	Sig
Kinetic side	Static balance	second	1.997	0.325	16.274	1.987	0.275	13.839	0.04	Sig
	kinetic balance	second	28.745	1.214	4.223	28.567	1.658	5.803	0.15	Sig

Tabular (T) value at the degree of freedom (6) and level of significance (0.05) = 1.943

as well as for identifying the obstacles and difficulties that may accompany the performance for avoiding them.

**Field experience**

**Pre-tests:** The tribal tests were conducted on 8/2/ 2021

**Therapeutic exercises inside the pool**

Exercises were prepared using training aids inside the swimming pool and were programmed into a rehabilitation program for a period of (8) weeks, comprising (24) rehabilitation units and at a rate of (3) rehabilitation units per week, and the time of one qualifying unit was between (25-30) minutes.

The application of the exercises took into account the principles of training and rehabilitation through the gradual difficulty of performing the exercises from easy to difficult for the injured ankle joint, and the purpose of these exercises was to strengthen the muscles working on the ankle joint, as well as to return the ankle joint of the injured to the normal range of motion and in all directions of movement. The exercises were applied on 9/2/2021 and ended on 6/4/2021.

**Post-tests:** Post-tests were conducted on 7/4/2021.

**Presentation, analysis and discussion of the results**

By noting the tables (2), (3) and (4), which showed us there is a development in blood variables, rehabilitation and improvement in the movement of the ankle joint for the better, which is due to the therapeutic exercises used, whether for the control or experimental group that worked on the rehabilitation of the ankle joint through The development of strengthening the working muscles of the ankle joint, as well as raising the level of flexibility required by restoring the normal range of motion, in addition to the quality of the exercises used and targeted, which played a major role in improving blood variables, especially white blood cells, as the percentage of these cells increased after injury, and as a result of therapeutic exercises Its percentage decreased significantly and reached its normal rates and ratios, which led to the emergence of these significant differences, and this change is attributed to the increase in immune responses after performing exercises, and this was confirmed by (Bayoumi and Samie, 2008)"White blood cells play an important role in the occurrence of infection, and they are one of the main blood cells in addition to the red cell and platelets, but all of them are formed from a multipotent stem cell in the bone marrow known as a hematopoietic stem cell". Swimming exercises also, play a major role in the occurrence of blood changes, especially white blood

cells, and this was confirmed that, (cuzzolin et. al, 2000)"regular training leads to a reduction in adhesion between cells so that they can cross into the broken tissues, especially skeletal muscles, and thus increase their effectiveness."

As for the effect of the exercises used on the blood variables, including hemoglobin (Hb), the researcher sees for the purpose of restoring the normal position of the injured ankle joint, as the exercises work to strengthen the muscles working on the joint and increase the amount of hemoglobin (Hb) in a larger amount as a result of the processes of contraction and diastole during the performance of the exercises And this is what he mentioned "since the increase in hemoglobin is a nature in order to combine with oxygen in order to supply the muscles working during physical work as much as possible" (Falah Mahdi Abboud, 2005).

While (Gervais, 2003) sees, "Continuing training increases the body's ability to deliver the largest amount of oxygen to the active tissues (skeletal muscles) and confirmed that the increase in hemoglobin is a result of continuing training, which leads to an increase in the athlete's ability to carry oxygen in the largest amount possible."

Therapeutic exercises using the various treatment methods inside the water had an effective role in raising the level of kinetic balance among the injured players (Jiu-Jitsu ), it is necessary for the technical performance in this game, and this is what was indicated by (Al-Tohamy. 1981) "that every player practicing exercises must have kinetic abilities It is guaranteed by the kinetic balance to be able to control the positions of the body with the change of its movements in many directions"

**Conclusions**

- Exercises inside the water play a major role in raising the level of blood variables and kinetic balance among Jiu-Jitsu players with severe sprains of the ankle joint.
- Codification of exercises and the use of therapeutic methods inside the swimming pool is considered a catalyst in raising the level of blood variables and kinetic balance among Jiu-Jitsu players with severe sprains of the ankle joint.

**Recommendations**

- Adopting the exercises in the water that are proposed by the researcher, as they play a major role in raising the level of blood variables and

**Table 2:** Shows the values of (T) pre and post the control group in the tests of blood variables and kinetic balance.

Tests used	Pre		Post		Standard Error	Calculated (T) value	Type sig
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
WBC. white blood cells(L×10 <sup>9</sup> )	13.845	0.652	11.562	0.657	0.777	2.938	Sig
Hemoglobin HB (g/dl)	15.623	0.644	16.54	0.774	0.287	3.195	Sig
Static balance (second)	1.997	0.325	1.745	0.174	0.077	3.272	Sig
kinetic balance (second)	28.745	1.214	26.512	0.523	0.557	4.008	Sig

Tabular value (T) at the degree of freedom (3) and below the level (0.05) = 2.353

**Table 3:** shows the values of (T) pre and post the experimental group in the tests of blood variables and kinetic balance.

Tests used	Pre		Post		Standard Error	Calculated (T) value	Type sig
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation			
WBC. white blood cells(L×10 <sup>9</sup> )	13.778	0.687	10.225	0.674	0.775	4.584	Sig
Hemoglobin HB (g/dl)	15.745	0.689	17.523	0.867	0.532	3.342	Sig
Static balance (second)	1.987	0.275	1.422	0.116	0.187	3.021	Sig
kinetic balance (second)	28.567	1.658	25.654	0.423	0.841	3.463	Sig

Tabular value (T) at the degree of freedom (3) and below the level (0.05) = 2.353

**Table 4:** shows the post (T) values between the control and experimental groups in the tests of blood variables and kinetic balance.

Tests used	Control group		Experimental group		Calculated (T) value	Type sig
	Arithmetic mean	Standard deviation	Arithmetic mean	Standard deviation		
WBC. white blood cells(L×10 <sup>9</sup> )	11.562	0.657	10.225	0.674	2.462	Sig
Hemoglobin HB (g/dl)	16.54	0.774	17.523	0.367	1.989	Sig
Static balance (second)	1.745	0.174	1.422	0.116	2.691	Sig
kinetic balance (second)	26.512	0.523	25.654	0.423	2.211	Sig

Tabular value (T) at the degree of freedom (6) and below the level (0.05) = 1.943

achieving the level of kinetic balance for the Jiu-Jitsu players with severe sprains of the ankle joint.

- Emphasis on the legalization of exercises and the necessity of using therapeutic methods inside the swimming pool, because it is considered a catalyst in raising the level of blood variables and the kinetic balance of the Jiu-Jitsu players with severe sprains of the ankle joint.
- Conducting similar research and studies concerning all the injuries that the body is exposed to in its upper and lower parts of the Jiu-Jitsu players because they are the most vulnerable players to injuries.

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