"Effect of different rehabilitation methods dependent on some bio Kinematics variables to improve in kinetic of the shoulder"

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Abstract

prepare a rehabilitation curriculum using various qualifying methods according to some bio kinematics and physical variables, and to identify the effect of the method on improving the kinetic range of the shoulder joint, and the research sample included (6) of the national team players (in volleyball).

The researcher reached several conclusions, including an improvement in the motor range of the shoulder joint in movement (flexion, abduction, and extension), as well as an improvement in the muscle strength of the muscles working on the shoulder joint at the research sample, as well as an improvement in some of the kinematic variables under study. By adopting the proposed rehabilitative program according to some bio kinetics and physical variables in health centers, the physiotherapy center, and sports medicine, it is also necessary to stress the importance of the link between rehabilitative therapeutic exercises and the mechanical principles and principles of performance and according to the conditions of correct motor performance of the exercises.

Keywords: rehabilitation, Kinematics and kinetic

1- Introduction:

Technical performance related to high achievement is related to the required kinetic ability that expresses the functional efficiency, mechanical and according to the requirements of the Sports skill, vice versa. increased interest in rehabilitative methods associated with exercises to return athlete's to his normal situation, In addition to understanding the body's movements through performing the exercises by correct mechanical conditions for technical performance, Rehabilitation of muscle strength, Muscular-nervous compatibility and extent of the joint, Through the researcher's experience in the field of training and rehabilitation of sports injuries, It is noticeable that the injury occurs in many Volleyball players, especially in an important joint such as the shoulder joint and in the skill (attack or spike), for which the movement of this joint has a basis in the performance of these skills. When an injury occurs but its treatment is neglected, it will causes joint movement problems,

limits the players' capabilities and technical competence, affects the flow of training, and reduces the ability to compete.

The purpose of this study is Finding a rehabilitation program that deals with sports injuries. It contains various rehabilitation methods that are performed according to some bio Kinematics and physical indicators, in which the correct performance mechanism is taken into account and helps in the rehabilitation of those with shoulder joint injuries in some sports such as volleyball game.

2- Methodology

The researcher used the experimental method to design one group to suit the research. The sample was deliberately tested by the players with shoulder joint injuries and the semi-severe condition, they were (6) players from the premier volleyball clubs.

Several variables and different tests were chosen, which included physical tests, measurements of the kinematic range of the shoulder joint and some biochemical variables, and after being presented to a group of experts * with experience and specialization, the tests that obtained an agreement rate (86%) were chosen, these tests are:

2-1 Physical tests:

- Test the kinetic range of the arm at the shoulder joint by reading the degrees attached to the goniometer.
- A muscle strength test for the group of shoulder motion muscles to record the number of kilograms recorded on the dynamometer.

2-2 Bio Kinematics variables:

To extract the kinematic variables of volleyball skills, the variables were chosen that are appropriate to the objectives of the research as the variables were extracted by Video shooting as follows:

- Angle variables
- Angle of the shoulder joint: This is the angle between the hip joint and the shoulder joint and the line connecting the elbow joint to the shoulder joint.
- Trunk tilt angle: is the angle between the line connecting from the hip joint to the shoulder joint with the horizontal line passing from the hip joint horizontally and parallel to the floor.
- Angular velocity variables (degrees / second)
  1. **Angular velocity of shoulder joint**: It is the product of dividing the value of the angular transition of the shoulder joint by the time of this transition, as it was extracted by finding the difference between the two angles of the first shoulder at the maximum curvature of the back and the second at the moment of aiming or throwing.
  2. **The angular velocity of the tilt of the trunk**: It is the product of dividing the value of the angular transition of the hip joint by the time of this transition, as it was extracted by finding the difference between the first hip angle at the vertical line, and the second at the moment of aiming or throwing

2-3 The tests

The technical performance of the injured shoulder was photographed on 09/08/2019 in the hall of Al-Karkh Sports Club. Using a video camera with a frequency of 25 photos / second, The safety of the location was confirmed by pre-marking the beginning and the end of the movement, The focus of the camera lens (1.5 m) was above ground level for jump serve, 2m, attacking, and the midpoint of the player's movement path (4m) was away from the camera. The players were

photographed with the video camera placed on the right side of the player. Because the players use the right hand so that the shooting line is perpendicular to the midpoint of the player's movement path.

2-4 The proposed rehabilitation program

After studying, observing, conducting interviews and reviewing many studies, research and references related to the subject of research, defining the methods of physical therapy and rehabilitation used in treatment centers, A rehabilitation program was prepared to strengthen the group of shoulder joint muscles, achieve balance between them, and stretch the ligaments connected to the joint, which leads to an increase in the range of motion. The curriculum consists of 8 weeks with (24) qualifying units and is applied in (3) units per week which are (Sunday - Tuesday - Thursday), The rehabilitation unit time ranges between (50-60) minutes, including (15) minutes to warm up and prepare to perform the rehabilitation unit. The rehabilitation unit includes several methods. Use of rehabilitation equipment such as Infrared device for 5-10 minutes and Ultra Sauna device for 5-10 minutes.

The program also included specialized exercises to increase the range of movement in the shoulder join and Resistance exercises with different iterations and stresses set in proportion to the need of the injured and with rest periods between exercises for each device. The researcher has observed the principle of gradual giving of exercises from easy to difficult, because iterations start from (5 repeats) in the first week to reach (15 repetitions) in the sixth week, as well as the rehabilitative exercises contained a group of exercises to strengthen the muscles of the shoulder joint, which included exercises to raise, lower and rotation arm, these exercises are given after physical therapy devices.

3- Results

Table (1) The table show the mean, standard deviations and T-value for physical variables of pre-test and post-test. The significance level is 0.05.

Variables	measuring unit	pre-test		Post-test		T value		sig
		Mean	deviation	Mean	deviation	calculated	tabulated	
Flexion	Degree	126.833	11.178	162.167	3.6560	6.828		Sign
Abduction	Degree	126.00	8.173	160.00	5.4772	18.261		Sign
Extension	Degree	20.333	5.006	47.167	1.8348	11.162		Sign
Flexion strength	KG	1.308	.185	3.4	.16733	16.854	2.57	Sign
Abduction strength	KG	1.066	.150	3.1667	.20656	19.726		Sign
Extension strength	KG	.850	.116	2.1167	.21679	17.718		Sign

The degree of Tabular at freedom degree (5) and under the significance level (0.05)

The above table shows the development in the values of the important physical variables affecting after the application of the rehabilitation curriculum also the differences in the mean were all significant. As follows:

- **Kinetic range variables of the shoulder joint**

The mean of pre- test for flexion was   (126.833) ,and standard deviation (11.1788), while the mean of post-test become   (162.167) ,and standard deviation (3.656). T value is (6.828) .

The mean of pre- test for abduction was   (126.00) ,and standard deviation (8.1731), while the mean of post-test become   (160.00) ,and standard deviation (5.477). T value is (18.261) .

The mean of pre- test for extension was   (20.333) ,and standard deviation (5.0067), while the mean of post-test become   (47.167) ,and standard deviation (1.834). T value is (11.162) . We note that the values of (T) calculated in all variables (flexion, abduction and extension)   are greater than the tabular value(2,57) , This means that all Kinetic range variables of the shoulder joint

are significant and in favor of post- tests. The researcher attributes the significance of the differences to the diversified rehabilitation program that includes counting physical Methods and with regular repetitions that led to the development of the muscular harmony of the muscles surrounding the shoulder joint Thus, the improvement of the kinetic range of the joint and the development of the range of motion of the extension test is an inevitable result because there is an evolution in the flexion test, when there is a dynamic similarity in the performance of the two movements that leads to the correct expansion of the ligaments, thus the movement and complete control of the body (Wajih Mahjoub 1989 P 90).

Also the accuracy of the rehabilitation curriculum clauses, which contain multiple physical methods, and the commitment of the research sample to applying the vocabulary of the curriculum according to the requirements of the distribution of the training effort during the specified time period taking into account the sample's ability to apply the exercises, which was positively reflected in the development in the muscle groups working in abduction and flexion movements on the joints with The relationship with these movements.

- **Muscle strength variables of the shoulder joint:**

The mean of pre- test for flexion strength was (1.3083) ,and standard deviation (.18552), while the mean of post-test become (3.4) ,and standard deviation (.167). T value is (16.854) .

The mean of pre- test for abduction strength was   (1.066) ,and standard deviation (.15055), while the mean of post-test become   (3.166) ,and standard deviation (.1505). T value is (19.726) .

The mean of pre- test for extension strength was (.850) ,and standard deviation (.11690), while the mean of post-test become   (2.116) ,and standard deviation (.2167). T value is (17.718) . , This means that all muscle strength variables of the shoulder joint

are significant and in favor of post- tests. This reasoning difference is due to the different training exercises and rehabilitative methods that the sample members have applied on scientific and biomechanical foundations that have proven their

effectiveness and their effect on the development of the muscle strength of the surrounding muscles, and with a similar course for skill and with different stresses and repeats that continued throughout the course of the curriculum, which led to an improvement in muscle strength and this is due to an increase in ability Muscles to contract at a faster rate when performing successive movements, and this is consistent with what (Abdulaziz Al-Nimr and Nerman Al-Khatib)mentioned, according to (Owen), that training on continuous and intense re-exercises helps improve compatibility between the movements of the arms and trunk and The two men, and help to improve the strength of working muscle groups in a manner that serves the proper performance of the skill (Abdul Aziz Naif: 1996, p. 113).

Table (2) Shows the mean and the standard deviations for both pre-test and post-test ,and the calculated with tabulated (T) value of the kinematic variables.

Variables	measuring unit	pre-test		Post-test		T value		sig
		Mean	deviation	Mean	deviation	calculated	tabulated	
Shoulder joint angle	Degree	153.07	7.39	172.43	18.33	3.027		Significance
Angular velocity of the shoulder joint	Degree/sec	513.41	82.61	558.74	38.079	2.98	2.57	Significance
Trunk tilt angle	Degree	73.65	3.59	87.93	4.45	3.66		Significance
The angular velocity of the tilt of the trunk	Degree/sec	267.28	45,43	315.29	31.26	4.34		Significance

The degree of Tabular at freedom degree (5) and under the significance level (0.05)

We note from Table No. (2) that the calculated value of (T) for the shoulder angle (3.077) is bigger than its tabular value (2.57) and this means that the difference is significant, the calculated value of (T) for the angular velocity of the shoulder joint (2.98) is bigger than the tabular (2.57) This means that the difference is significant, the calculated value of (T) for the angle of inclination of the stem (3.66) is bigger than the tabular (2.57) This means that the difference is significant, and the calculated value of (T) of the angular velocity of the tilt of the trunk was (4.34), which is bigger than the tabular (2.57), which means that the difference is significant. The researcher attributes the significant difference of the Kinematic variables under discussion to the codified and diversified rehabilitation program that is associated with precise qualitative exercises given according to correct angles to the requirements of the technical performance of the movement, which led to an improvement in the kinetic range of the shoulder joint and by increasing the elasticity of the muscles surrounding the joint, where the rehabilitation curriculum helps to Prevent muscle weakness and

atrophy, developing muscle strength and increasing the flexibility of the joints, ligaments and stimulating the muscles and increasing their ability to contract. (Sumaiya Khalil 1990, p. 73), As it is clear that this approach was appropriate for the muscle during the extent of the shoulder joint, which caused the emergence of the large extent of this joint in order to achieve good muscle moment during movement.

The researcher also indicates that the positive and effective return on the exercises applied by the sample members has improved the muscular work of the joint muscles in the joints of the affected arm (right) represented by the movement of the shoulder strap, which increased the ability of the players to feel the movement and improve the angles of the parts of the body involved in a manner that serves the smooth movement of the arm With a fast and sophisticated kinetic performance, in addition to increasing kinematic coordination and its importance in transferring the amount of movement from the trunk to the arms across the shoulder joint, this is confirmed by (Talha Hossam El-Din) that the main goal in sports that include the skill of throwing or pushing or kicking is to achieve speedIn the movement of the limb away from the body by developing the angular velocity between the parts (joints) of the limb used, and the mechanics of the movement of these parts must be taken into consideration when choosing exercises for this type of performance (Talha Hossam El-Din: 1993 p. 370). This is what the researcher sought to achieve by means of the qualifying approach, which worked on developing angles and angular velocity of the affected part of the body in the research sample.

4- Conclusions and recommendations
4-1 Conclusions
1. The rehabilitation curriculum led to an improvement in the results of the dimensional variables, which represent the kinetic range of the shoulder joint
2. The qualification approach led to an improvement in the results of the biomechanical variables

4-2 Recommendations
The researcher recommends the following:
1. Ensure good warm-up to prevent injury
2. Emphasis on adopting the rehabilitative approach according to some biochemical variables due to its role in restoring the motor range of the affected joint, as well as in improving the form of performance.
3. Adopting other rehabilitation methods in the treatment and rehabilitation of the shoulder joint and other variables, and selecting rehabilitation curriculum exercises in a manner consistent with the level of injury and fitness for the injured.

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Appendix No. (1)
A questionnaire for selecting tests

Variables	Tests	Agreement ratios
Physical	1. Measurement of the range of motion of the shoulder joint (flexion, abduction and extension)	%85
	2. Muscle strength working on the muscles of the shoulder join(flexion, abduction and extension)	%90
Bio kinetics	1. Shoulder joint angle	%80
	2. Angular velocity of the shoulder joint	%80
	3. Trunk tilt angle	%89
	4. The angular velocity of the tilt of the trunk	%87

Appendix No. (2)
The names of experts

The name of the expert	The scientific title	Specialization
Sumaya Khalil	professor	Rehabilitation
Frank Abdul Karim	professor	Biomechanic / yard and field
Mahmoud Musa Al-Aqili	professor	Tests / handball
Hoda Shihab	Assistant Professor	Biomechanics / Gymnastics
Saad Hussain	expert	Joints Surgery PhD

Appendix No. (3)
Sample of some rehabilitation units

Variables / devices	Time	Repetition	Rest
Infrared device	5-10 minutes	1	2 minutes
Massage device	5-10 minutes	1	2 minutes
TDP device	5-10 minutes	1	2 minutes
Physical exercises	**Repetition**	**Groups**	**Rest**
1. Lifting and lowering the arms	5	2	15 seconds
2. Rotate the arms out.	5	2	15 seconds
3. Rotate the arms from inside.	5	2	15 seconds
4. The arms are tangled from behind, raised and lowered.	5	2	15 seconds
5. The arms are tangled from the front, raised and lowered.	5	2	15 seconds