

The Effect of Collagen (Kaatsu) Training on the Mechanical Pin of Elbow Joint and Its Relation to Pain Level

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Abstract: Aim of the study is to determine the effect of collagen plus kaatsu training on elbow joint pain, Range of motion, strength of the muscles around the joint, arm and forearm circumference, together with potassium level the researchers used the experimental method of pre-post assessment of one group, (7) injured athletes were the sample of the study, entered in Alyaseen clinic in Cairo, for treatment of elbow joint, their age between 20 -30 years, they were subjected to a collagen (kaatsu) training, to determine its effect on the variables tested before and after the proposed program. The results indicated a positive results after the proposed program and decreased elbow joint pain, increase range of motion and strength of the muscles around the elbow joint together with decrease potassium at may be concluded that the proposed rehabilitation program induced a positive effect upon injured elbow joint athletes and help in the rapid return to the play field.

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1. Introduction and research problem

Scientific development must be based upon updated scientific principals and to solve the problems that may face physical education development specially sport injuries and rehabilitation (2:1).

Brain clar et al (2011) stated that in the past years a new innovated regime of training named kaatsu training or occlusion training (15:323).

The most important biochemical changes affected with this training are the biological regulators that help homeostasis, due to the accumulation of hydrogen ions during effort of rehabilitation after injury, which in turn lead to decrease the training efficiency by two ways, the first one, is that its increase, decreased the muscle cells capability to produce ATP, the second one, is the speed of H⁺ ions with captions to form lactic acid leading to obstacle relaxation process (13:266).

Brent rushall and Aboeella Abdel Fatah (2016) showed that occlusion of blood flow is a Chinese technology used in sport training and physiotherapy and sport medicine to increase strength and hypertrophy of the muscles, by using low intensity training of 20-30%. (50% of repmaximam) named blood flow restriction (kaatsu), it is also named occlusion or ischemic strength training. The suitable name for this training is (BFR) or kaatsu. (3:33).

This method was innovated by Yoshiaki Sato, the Japanese scientist in 1983, then it is spreaded in USA, Germany, France and Italy (17:65).

Nowadays, the (BFR) training or rehabilitation is one of the most training subjected to argument in the field of physical and health society, due to its results in

hypertrophy and strength of the muscles, the idea was related to the Japanese Yoshiaki Sato, 1966, when he noticed a severe pain in the Ankle, due to long time sitting, of traditional Japanese in a long party, in this celebration, he noticed that his legs were anaesthetized due to the sitting position, and it was similar to the pain post weight lifting this sensation of edema was due to decreased blood flow to the muscles while sitting for a long duration, in this period he was also injured in his ankle and ligaments during skin the physician told him that he will need 6 months for recovery, Sato tested himself and trained isometric ally for (205) three times daily, and was cured after 6 weeks, and after 6 months of experimentation, he was able to know the effect of blood flow, then the basic training principle was completed after 4 years, He reached a protocol which is safe and efficient for blood occlusion, comprised the lengths and shapes of the compressors and the needed pressures, also the position of the bands in relation to the body, in 1973.

Sato discovered that the kaatsu training is useful for preservation and rehabilitation the muscles during injuries, kaatsu training was spreaded in all Japan in 1983, His invention was adopted in 1977, then redeveloped as kaatsuMasterTM2003, to permit the domination of a precise and safe pressure, He began to use bicycle tubes in the beginning, together with bands then afterwards, substituted the tubes with aerobic bands controlled by the computer, the idea was to use a band around the arms and legs during weight lifting and prevent flowing of the blood during training, training, which decrease slower flowing of the blood and congestion of the extremities and vasodilatation of

the capillaries and the participation of muscle fibers and increase lactic acid concentration which make kaatsu training unique he also noticed that the training may stimulate muscle growth and strength in half the duration, by using $\frac{1}{3}$ the weight compared to other training methods, which decreased the danger of being injured, and may be a safe method for rehabilitation after injured, and decrease pain of the injured person (17: 77).

The role of the biological regulators is noticed as it is chemical compounds that decrease H^+ ions in case of acidity, also in case of alkalinity, and PH regulation of the blood, and in case of fatigue, there are a decrease in ATP and energy production, which decreased potassium pumping to the outside membrane of the muscle, and attenuate the unity to tropomyosin which results to prevent tropomyosin to its communication part of action, while in case of increased ATP production this increased calcium pump to the sarcoplasmic reticulum which increase its unity to troponin which led to remove tropomyosin far away from its communication with actin and myosin leading to communicate the cross bridges of myosin with actin and increase muscle contraction and help rehabilitation post injury, specially the efficiency of the muscles surrounding the joint (12:354) Kadri and Seham (2011) indicated that muscle practice may be a test of the efficiency of the control system on the homeostasis, as the training may lead to change many variables of the homeostasis, for example, the muscle produce during the severe performance a great amount of lactic acid, which may increase acidity in and out the muscle cells this increased acidity is a burden on the acidity control of the body, so the severe physical performance may increase carbon dioxide and this can be equilibrated by increasing respiratory rate, and blood flow rate for increasing oxygen supply to the active muscles and get rid of the excess CO_2 resulting from metabolism and the great amount of heat that must be ejected to prevent overheating, it is of importance that the control system of the body respond quickly and efficiently to prevent extreme changes in Homeostasis, which help in producing the suitable environment for rehabilitation of the sport injuries and its complications (13:20).

In the years (1973 to 1982), Sato has put a protocol of training of kaatsu, to be suitable for all ages and with different types of pains kaatsu training was differentially named as flow restriction training and Ischemia and hyperemia training, which depend upon oxygen lack for elevation or sport performance, as this training may lead to increased oxygen debt used to cover the duration of the physical activity, this is performed by using an intensity load with decreasing respiratory rate which induced oxygen

lack, even at the cell level, and this training name hypoxia.

Nowadays, some researchers used this method by decreasing oxygen inside muscle fibers by blocking the blood flow, oxygenated, to the cells, leading to ischemia, then open the arteries for normal blood flow inducing hyperemia to increase blood flowing to the tissues (4: 34) (6:55).

Takano et al, (2002) (11) reported that kaatsu training is an updated method for rehabilitation and physical training, performed by blocking the arterial blood in the muscle that is activated for 10-15 minutes, and with intensity 20%, and the highest sets not exceeding three sets, with a frequency of 20-30, and rest interval of 30-60 seconds (18:39) takano et al, (2005) reported that due to ischemia, oxygen level decreased inside muscle fibers, this process is also accompanied with accumulation of lactic acid in the muscles, thereafter, due to opening of the arteries, which allow blood flow and increased blood in the muscles and oxygen and get rid of lactic acid by oxidation leading to decrease pain sensation of the injured (19:121) (22:50) Bahaasalama (1992) (4) reported that in case of anaerobic training in case of physical training or rehabilitation of injury, lactic acid is released from the muscles to the blood then the liver, where chemical processes occur regulators possess an important role in reducing pain after training (6:53).

Kadri (2011) added that the rapid accumulation of H^+ ions due to severe exercises, affect negatively on the muscle activity, it is very important that the body possess regulators to control acid alkaline concentration, that unable these exercises to be the best exercises in case of rehabilitation of injury, especially for elderly that cannot lift high loads during rehabilitation on during exercise in general (13:64).

Abo Elella (2003) (2) stated that there are three regulatory systems: the biological chemical one, the pulmonary regulatory and the biological regulatory of the kidneys, and the increase efficiency of the player depend mainly on positive biochemical changes which enable him to attempt the fatigue resulting from exercise or competition, here come the role of the biological regulators to maintain PH balance of the blood for the longest duration through get rid of H^+ ions in case of acidity or alkalinity, thus the chemical reaction can be maintained during training or rehabilitation after sport injury (2:54) (21:76).

Jeremy et al, (2009) reported that the low intensity occlusion training provide a training method that is beneficial due to different reasons, as it induces a positive physiological adaptation when using 10-30% intensities of the maximal work, with 3-5 sets, and 30-60s rest between sets. The decreased blood

flow occurs by using a cuff that presses around the arm as in case of measuring blood pressure. The simple exercises are suitable for rehabilitation program of elderly and some cases of sport injuries.

The PH maintenance around (7.4) normal, with CO_2 concentration in plasma as bicarbonate sodium or potassium is (20) time more than the melted CO_2 as a solution of carbonic acid (1:74) (5:33).

Sabah (2014) ⁽⁵⁾ stated the body maintain the chemical balance by:

- 1) chemical buffers
- 2) a steady H_2CO_3 in the blood by Respiration
- 3) get rid of (H^+ , HCO_3) through the kidneys.

So as to prepare the suitable environment for sport training or rehabilitation in general (10:35) Guyton and Hall (1997) stated that the mechanism of muscle contraction may be through the sliding theory, as the actin filament slide over the myocin with a steady length of loth actin and myocin filaments, and the r, and Z lines become closer, with disappearance of H zone and the light band, which lead to shorten the sarcomere and the muscle length, while in case of relaxation the sarcomere return to its length and Z lines apart to each other. The cause of contraction may be due to release of Ca^+ ions and the cross bridges of myocin attach active point in actin leading to move actin filaments to the center of sarcomere (H zone), and hence the contraction occur.

Acetyl choline is the neurotransmitter which stimulate release of Ca^+ ions in the cell walls leading to Na^+ penetration of cell membrane to inside and K^+ to outside the cell membrane to induce a negative charges and the inside become positive charged due to Na^+ ions leading to muscle contraction (12:330) katsu usage is one of the best method to devease pain in case of muscle injuries or the joints, katsu was spreaded in the last two decades due to its simplicity and its methods to cure injured athletes in sports. This attracts researchers in sport medicine and sport biology and physiology and sport injuries, kaatzu is used as manual massage as a substitutes of the pharmacological method, the manual massage complement physiotherapy in medical centers and sport centers to be used in cases of injury curing and rehabilitation Jerrilyn et al (2006) stated that the purpose of katsu massage is to improve the functions of the skin and to increase blood flow through the circulary system and lymphatic system, and bring the blood from the internal organs and stimulate the nerves and get rid of the catabolic products from the nutrients after sports injuries 91:12) (14:66) (21:24).

The chronic muscle contraction consume a lot amount of the nutrients and oxygen which increase metabolism, so kaetsu massage improve the circulation and decrease congestion which in turn lead

to decrease the pain that affects the muscles and joints (13:65) (23:33) (24:34).

Takashi et al (2006) agree that the low intensity resistance training with occlusion of the blood in muscles led to hypertrophy of the muscles and its strength as recommended by the American college of sport medicine these effects is through the use of low intensity training (20%), which may be equivalent to the intensity of the physical activity of usual life, so, it is suitable for elderly and injured athletes during rehabilitation as it is a safe and effective method to improve the increase of muscle strength in case of rehabilitation and training during sport injuries (17:177).

Through the work of the study researchers in the field of rehabilitation and sport injuries, they noticed that the injured athletes that participate to the international rehabilitation center in gisa, that were injured with elbow joint pains in the proximal or dextral muscles of the elbow, during loads training that object the athletes of continuing training and the intend to continue training, not pensioner due to the severe pains, that let the researchers to use collagen (Kaatsu) training and determine their effect on elbow joint pains on the participants of the research, as it was possible to train with high weights.

Aims of study:

1- The aim of the study is to determine the effect of collagen training plus katsu on the elbow joint pain (pain level, range of motion, strength of the muscles around elbow joint, arm circumference fore arm circumference).

2- The aim of the study is to deter mine the relation slip of the improvement of the degree of pain and potassium level as an indicator of the improvement of the pain degree.

Study hypothesis:

1- There are significant statistical differences between pre-post variables of the experimental group.

2- There are significant statistical differences between pre-post variables of the experimental group of study of the degree of pain and potassium level as an indicator of the deceased degree of the injured elbow for the sake of the post variables of the experimental group.

The study terminology: .

1- Katsu training (collagen) .

It is an updated innovated method of training in the field of rehabilitation and sport training, induced by blocking the artery of the active muscle for a period of 10-15 minutes, with an intensity load not more than 20%, and maximal sets of three, and rest interval of 30-60s and frequencies of 15-30 one (14:10).

2- Therapeutic Massage

By therapeutic Massage it is meant the action of hands on the body tissue through steady scientific

pressure to curing or improving the functions of the muscles, tissues, and bones and the different movement of massage occurs to obtain an improvement of the skin function and speeding both blood and by mph (8:33).

3- Elbow joint pain:

The injury of elbow due to extreme of the anterior or the posterior muscles attached to elbow as a result of the muscles that move the wrist anteriorly or posteriorly of tennis players and weight lifters.

Mechanical pain

It is the pain induced by motion causes by surprises or extensively using the skeletal system wrongly, that is not related to clinical causes, it may be acute or chronic during physical activities, normally the external effect is induces by surprises and severe, especially in sports which depend on the use of the anterior extremity and other activities or due to some clerical (paper) work.

Previous studies

1- Takarada et al (2002), Effects of resistance exercise combined with vascular occlusion on muscle function in athletes, The aim of the study is to assess the effects resistance exercise combined with vascular occlusion on muscle function of athletes. The researchers used the experiment method on a sample of athletes, the results indicated that there are statistic significant difference for the favor of post exercise (18).

2- Takano et al (2005), hemodynamic and hormonal response to a short term low intensity resistance exercise with the reduction of muscle blood flow. The aim of the research was to assess the hemodynamic and hormonal response to a short term low intensity resistance exercise with the reduction of muscle blood flow the sample was composed of 20 player, subjected to low intensity resistance exercise with muscle occlusion, the results indicated a statistical significant changes of hemodynamic and hormonal response for the favor of post assessment.

3- No kajimectal (2007) the effect of katsu training on blood clot of healthy persons. The sample comprised on (13) person divided to control (7) and experimental group (6) persons, mean a ged 48 years, Exercise katsu plus pressure band (160 mm/ mercury) on the muscle of the thigh results indicated non-significant increase in clothing factors (prothrombin time, plasminogen activator) of experimental group compared to control, which indicated that katsu training may induce clothing of blood.

4- Abo El Ella and Hazem (2011), the effect of swimming training by occlusion of blow glow on some physiological variables and performance level of swim. The sample was composed of (20) swimmers of elite level, they were divided to equal two groups, experimental and control, the training program lasted

(12) weeks, the main results showed that there are a significal in provement for the factor of the experimental group in lactic acid and muscle mass and performance time of swim compared with the control group (3)

5- Khaled Abdel Maksoud (2012), The effect of weights training and water training on the prevention of muscle inflammation (rhomboid) of shoulder joint and improvement of some physical, physiological variables of swimmers. The sample comprised of (24) swimmers, the results showed a significant improvement of the study variables (optimal strength, strength endupance, flexibility, vital capacity, pulserate at rest), also an improvement of the upper extremity, that indicates the efficiency of the proposed program f weights training and water training (8).

6- mahmoudfarag (2016), the effect of weights training plus occlusion an some biochemical variables of healthy practitioners,.

The sample comprised (30) pracctioners visiting health clubs in Dokki, the results showed that there are significant improvement of the study fariables (weight, fat %, musculmass, water volume, protein, shoulder circumference, chest, arm, fore arm.

Waist, pelvis, thigh, leg), indicating the Efficieng of the proposed program using occlusion exercises (14).

7- Sahar, A (2014), Effect of bicarlionate sodium as biological regulator on fatigue and performanve level of swim, 20 female swimmers divided to two groups, control and experimental, execute a program of 8 weeks, 3 unit straining /week, the results indicated an improve biochemical voriabiles as markers of fatigue (PH and LA) and increased speed, and skill.

8- Ahmed Elsherif (2014) Effect of therapeutic program on low lack pain of athletes and its relation to IGF, the sample was composed of (5) injured with low back pain. The results revealed decreased pain, muscle strength and IGF.

9- As a D, A (2016) Effect of aerobics endurance on biologic reguleters and fatigue of volley ball & layers, (16) players were used, the results revealed develop of biologic regulators due to buffers, and LA increase due to anaerobic effort of valley ball players.

Study procedures:

Research cufficulum

The researchers used the experimental method (pre- post) assessment of one experimental group due to the suitability of the nature of study research sample.

(7) injured athletes were the sample of stuey, they visited Alyaseen clinic in Cairo, they were injured by elbowjoint pain du to practicing tennis and

some exhaustion due to weights training that was wrong aged 20-30 years.

Conditions of the samples

- Injured with simple tense of elbow joint or mechanical pain due to wrong movement or training, not related to disease or posture.
- The physician proceeded clinical test of the elbow joint for precise diagnosis.
- A written consent for the will to participate to the study.
- No medication was used.

Clinical diagnoses

By the physician (Appendix)

- Personal meeting: by asking about injured history of the elbow joint pain and the density of muscles and eliminate the chronic cases.
- Clinical assessment by a specialist, of the elbow joint anteriorly and posteriorly, and the shape of the arms and joint circumference, to observe any redness or swelling and local palpation, the main posture that elicit pain.
- Proposed training program was designed after studying the English and Arabic researches in the field of joking injuries and rehabilitation considering elbow joint pain, and after specialist opinion to design the program on the right principles related to science and anatomy.
- The aim of the program of the injured elbow was to decrease pain
 - Normalise the range of motion of the joint.
 - Improving the muscle strength of surrounding muscle of the joint.
 - Increase the circumference of the muscle related to the arm and forearm.
 - Administration procedure.
 - Explain the purpose of the study to the sample of participants and the desire to accomplish the program and perform the exercises and daily life style.
 - Dating the time of assessment of variables and timing of performing the program.
 - Determine the opinion of the specialist in physical education, sport medicine and physiotherapy together with scientific references Tools and equipments.
- Measuring tape: for height in a form the upper most part of the body.
- Medical scale: for weight (9Kg) without shows and steady posture.
- Assessment of the muscle strength according to the severity of pain, which was (2, 5, 7) kg through the different motion of the joint.
- Dynamometer to assess grip strength.
- Goniometer to assess range of motion.

- Assessment of the muscle strength of the muscles of elbow joint by inducing movement similar to performance through contraction, relaxation, inner rotation and outer one, lift the weight more than 90 according to the pain limitation.

Principles of the program design:

- To be able to realize the aims of study.
- Caring about functional, anatomical principles.
- Graduation for simple to complex, easy to difficult.
- Perform warming up and cooling down.
- Isometric contraction of the muscles.
- Negative movement.
- Workout of rehabilitation exercise.
- Gradual free exercises.
- Gradual weight lifting.
- Cooling down 5 minutes.
- Session duration (20min) in the leg and gradually to (45min)

Functional tests:

These tests are performed after the program of rehabilitation, and the injured player must be completely free of pain so as to have the ability to execute the tests which are:

- 1- Stand, abduction of arms to side and up.
- 2- Stand, put the injured hand on the sound shoulder.
- 3- Throw the tennis ball in a circle of (1 meter), then trap with same arm.
- 4- Throw basketball with one hand to the forest distance.
- 5- Perform movement of the joint [contraction, relaxation, inner and outer rotation].
- 6- Throw through substitution of the matter.
- 7- Raise a weight up the level of shoulder and lead

Pilot study:

This was performed using a sample of (3) injured of the same study society, outside the main sample during the period 15/1/2017 to 17/1/2017.

- To learn about different difficulties in assessment process, and performing the program.
- To learn about the suitable abilities tools of gather the content of the program.
- To detect the simplicity or complexity of exercise.
- The limit of understanding the exercises by the participants.
- Register the assessment of variables (Appendix 4).
- To predict the possible period of the program.
- The pilot study help the researchers in modifying the program in its end shape.

The main study:

This was performed from 22/1/2017 to 13/3/2017.

- The measurements were performed on all participant with the same method.
- Using the same equipment for all participant.
- Using the same series in performing the measurements during different time of occurrence of injuries.

Pre- Measurements

- Assessment of the height, weight, degree of pain, grip strength gradual assessment, range of motion to the side and raise the two arms injured or healthy each alone, strength of the muscles of injured joint in case of raising the weight.

The procedure of the proposed program:

It was determined on the injured sample (n=7) the duration of 6 weeks each case, 3 sessions weekly, the session begin by (20min) and end of the program lasted (45 min), using occlusion exercises, by putting the cuff for pressure over the injured joint during the rehabilitation exercises, in the presence of the specialist the AL Yasin clinic, Cairo.

Post measurement:

After the end of the program, for individual case:

- 1- Assessment of pain degree.

2- Range of Motion of the injured elbow by raising the arm to the front, standing position then to the side, over shoulder and head.

- 3- Grip strength for the injured and healthy one.

Post program functional tests:

1- Stand, abduction the arm to the side and up.
2- Stand, both arms directed behind the back in the middle.

3- Stand and put the injured hand over the healthy shoulder.

4- Stand, perform movement of the joint [contraction, relaxation, rotation to inner and outer side)

5- Degree of contraction, relaxation of the joint [zero- 150 degree], assessment while stand or sit position.

6- Supination and pronation [zero – 80 degree] in sit position.

Statistical Analyses by suing:

- Arithmetic mean.
- Percentage of improvement.
- Test the difference of means.
- Wilcoxon test, non-parametric for Z value execution.

Table (1) indicated that skewness were (I3) meaning the homogeneity of the sample.

Table (1) Arithmetic mean, standard deviation, skewness of the sample M=7

Variables	Units asses M	SD	Skewness
Age	Years		
Height	Cm		
Weight	Kg		
Injured arm			
Flexibility	Degree		
Grip strength	Kg		
Elbow muscle strength	kg		
Healthy arm Flexibility	degree		
Grip strength	Kg		
Elbow Muscle strength			

Table (2) revealed there are significant changes for the favor of post measurements of elbow joint injuries for all variables.

Table (2) Pre-post assessment of study variables of elbow joint injuries

Variables	Unit	Mean pre	Mean Post	Diff. of Means	Positive (+)	Negative (-)	Z	sig	Im Pra %
1) pain degree	Degree to								
2) potassium	Mmol/L								
3) muscles strength Contraction (weight)	Degree								
4) muscle strength Relaxation (weight)	Degree								
5) Range motion contraction	Degree zero-150								
6) Range of Motion Relaxation	Degree Zero -150								
7) Range of Motion inner rotation	Degree Zero -80								
8) Range of Motion outer Rotation	Degree Zero-80								
9) Muscle strength elbow Raise weight -90°	Degree dumdel								
10) fore arm circumference	Cm								
11) arm circumference	cm								

(Z) value tabulated $P < 0.05 = 1.96$

Discussion

1- Discussion of the 1st hypothesis [Pain Degree] from table (2) there are differences of pre-post measurements of pain degree, and the percentage improvement of pre-post measurements for the sake of post measurements, the percentage decrease of pain degree was (88,23%). This result agrees with the study of Ahmed Sherif (2015), Mahmoud Farag (2016), that the rehabilitation exercises share in reducing the pain, this is also in accordance with the decreased potassium, as rehabilitation leads to decreased its blood concentration, this indicated that potassium might decrease pain sensation.

2- Discussion and explanation of the results of the 2nd hypothesis (muscle strength of elbow joint) table (2) There are difference between means of pre-post measurements of working muscle strength on elbow joint by strength tests, contraction, relaxation, raising the injured arm up and highest weight lift indicated by the percent of improvement pre-post measure for the sake of post one (300y).

these results are in accordance with Ahmed El Sherif (2015) and Nakajim et al (2007) and Takarada et al (2002), they all reported that rehabilitation exercises share in back return of the strength of muscles of injured joint.

3- Discussion and explanation of the results of the third hypothesis (Range of motion of elbow joint) Table (2) indicated a differences of means of pre-post

measurement of range of motion, Revealed by percent improvement for the sake of post measure of all variables, (210%) for relaxation of the injured elbow joint, and the least percent improvement in case of inner rotation of the injured joint (90,47%). These results are in accordance with Mahmoud Farag (2016), Ahmed El Sherif (2015), Esam (2000).

Conclusions:

These researchers reach the following conclusions:

1- The proposed program induced a positive effect of rehabilitation of the injured elbow through decreasing pain level and decreasing potassium concentration of the blood.

2- The proposed program induced an increased percent of improvement of muscle strength of the injured elbow joint.

3- The improvement of the range of motion together with muscle strength which indicated the potential effect of the proposed program in affecting the return of the principal function of the elbow joint.

4- The proposed program induced an increased percent of improvement of stretching the elbow joint muscle, range of motion of contraction, relaxation and rotation of the injured elbow.

5- The proposed program induced speed of treatment of the muscles, decreased pain and the return of the injured athlete to sport as soon as possible.

Recommendations:

It is recommended to:

- 1- The use of the proposed rehabilitation program for the rehabilitation of the injured elbow joint with mechanical pain.
- 2- Concentration on the use of occlusion and kaatsu training and weight lifting in the program of rehabilitation of the injured elbow joint in particular and the other joints in general.
- 3- The use of the balance training of muscles in the rehabilitation of the injured joints and muscles.
- 4- It is of importance to assess physical and functional tests of the injured athletes pre-during and post return to physical activity.
- 5- Providing the clinics with the updated equipments for diagnosis and rehabilitation the injured joint and muscles with high precision.
- 6- The use of the results of the study in other researches for prevention of injuries.
- 7- Perform more researches in improving diagnosis of the injuries.
- 8- Search the new scientific methods in injury and rehab.

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