

Analysis of the some EMG variables for measured agonist and antagonist muscles(Rectus femoris ,biceps femoris) for to identify the relationship between the proportion of antagonist and injury through some muscle strength exercises.

A research on a sample of team for football

The Researchers

Asst.prof.dr Zdzislaw kolaczowski

University of Poznan/ Poland

Adnan Radhi Faraj

University of Missan,College of Physical Education (Iraq)

Ph.D student at the University of Szczecin (Poland2014)

Dr.mohammed mijad mohammed salh

University of Missan,College of Physical Education (Iraq)

تحليل بعض متغيرات EMG لقياس العضلات الرئيسية والمضادة المستقيمة الفخذية وذات الرأسين الفخذية) لتحديد العلاقة بين نسبة العضلات المضادة والإصابة باستخدام بعض تمارين القوة العضلية.

استاذ دكتور جيسلاف كولاجوفسكي / جامعة بوزنان / بولندا

عدنان راضي فرج / جامعة ميسان ، كلية التربية الرياضية (العراق) – طالب دكتوراه في جامعة شججين (بولندا ٢٠١٤)

م.د محمد ماجد محمد صالح / جامعة ميسان ، كلية التربية الرياضية (العراق)

الملخص باللغة العربية

أهمية البحث:

أهمية هذه الدراسة هي استخدام EMG للتعرف على أماكن الضعف في العضلات المضادة

من خلال المقارنة بين العضلات العاملة والعضلات المضادة وتوجيه الاختصاصيين في المجال الرياضي التوجيه الأمثل لكيفية

التعامل مع الإصابات الرياضية بأسلوب علمي وفقا لقواعد مدروسة ، وبالتالي السلامة والكفاءة البدنية للرياضي الممارس للنشاط الرياضي .

أهداف البحث:

1. التعرف على النسبة المئوية لعمل العضلات المضادة في بعض متغيرات جهاز EMG من خلال بعض التمارين المقترحة.
2. استخدام جهاز EMG للمقارنة بين العضلات الرئيسية والعضلات المضادة في الأداء الرياضي.
2. التعرف على الفروق بين العضلات الرئيسية والعضلات المضادة في بعض متغيرات جهاز EMG بالنسبة للتمارين قيد الدراسة.

المنهجية:

احتوى هذا الباب على منهجية البحث وإجراءاته الميدانية ، إذ استخدم الباحث المنهج الوصفي بأسلوب المسح والعلاقات الارتباطية ، وقد اختيرت عينة البحث بالطريقة العمدية والتي شملت (30) لاعباً في لعبة كرة القدم ، بالإضافة إلى توصيف لعينة البحث والأدوات والأجهزة المستخدمة مع إجراء التجارب الاستطلاعية ، كذلك تصميم وتحديد أهم متغيرات البحث من خلال استخدام استبيان ثم تضمن إعطاء شرح وافٍ للتمارين الخاصة في قوة العضلات وكيف يعمل جهاز EMG ، فضلاً عن ذلك تضمن أهم المعالجات الإحصائية المناسبة للبحث .

الاستنتاجات:

- 1- وجود نسب مئوية متباينة ومقبولة للعضلات المضادة بالنسبة للعضلات العاملة في الأداء الرياضي .
 - 2- نتائج الفروق بين عضلات لاعبي كرة القدم العاملة والمضادة سوف تساعد على تأكيد أهمية طبيعة ونوعية النشاط في الوصول إلى درجة مناسبة من التوازن العضلي .
- إما أهم التوصيات فكانت:
- 1- التأكيد على مفهوم التوازن العضلي أو نسبة القوة العضلية بين العضلات الرئيسية والعضلات المضادة بين حركات المد والثني للمفاصل وأطراف الجسم المختلفة ، لكل المهتمين بمجال الطب الرياضي وصحة اللاعب من مدربين ، ولاعبين ، وأخصائيي العلاج الطبيعي ، وأطباء .
 - 2- الاهتمام بقياس نسب التوازن العضلي بين العضلات الرئيسية والعضلات العاملة لدى الرياضيين بصورة دورية ومنظمة ، والعمل على أن لا تقل هذه النسبة عن (60%) وخاصة عند لاعبي كرة القدم .

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Abstract English

The importance of this study in using (EMG) to find the places of weakness in the counter muscles , by comparison between the agonist and antagonist muscle and guide the specialist in sport to the best way to protect them from sport injuries by scientific way according to studied riles and by that we can get the safety and full ability in physical practices during the sport activity.

The objectives of the research:

- 1- Using EMG apparatus to compare the main muscles and the antagonist muscles in the sport performance.
- 2- To know the difference among the agonist muscles and the antagonist muscles in some changes of EMG apparatus in exercises which they are studied.
- 3- To know the percentage of the antagonist muscles action in the changes of the EMG apparatus through some suggested exercises.

The Methodology:

The researcher used the descriptive curriculum with style of scanning and Correlations . the sample of this study had been selected which included (30) players in the foot ball game . besides , tools which is used in the research , with doing experiment . it also designs and limits the most important elements of research using questionnaire forms which concerns enough statement for the special exercises of

performance in power of muscular and how EMG device works , besides included the most important things of statistical means .

The Conclusions :

1. Existence of different and a accepted percentages for the antagonist muscles in comparison with the agonist muscles in sport performance .
2. The result of differences among the agonist muscles of football players and the antagonist muscles will help to assure the importance of nature and quality of the activity in reaching to the suitable muscular balance.□

The Most Important Recommendation Were :

1. Stress on the understanding of muscular balance or the proportion of the muscular power among the agonist muscles and the antagonist muscles among the movement of stretching and bending of joint and the limbs of the human body , to all the interested persons in the sport medical filed , health of players ,coaches, specialists in physical therapy and doctors.
- 2- Interest in measurement of proportions of muscular balance amp among the agonist muscles and the antagonist muscles with the athletes in general, in regulated periods in condition that this proportion is not less than 60% especially with the football players .

1. The research definition:

1.1 Introduction and literature review:

The muscles are the sources of motion in the human body, because they are the source of power which causes the motion. The special studies of anatomy and motion explained the way in which the motion happens according to the anatomic properties and the mechanical laws. 30,pp66 Because of their importance in physical education a lot of people consider them the subject of their studies and researches.

Some scientists pointed that the muscular power is the base on which the person or the athlete reaches to top degrees in championships, it is also affects greatly on the physical figure as speed, endurance and elegance specially to the kinds

of sport activities which have relation with the muscular power beside the physical characteristics.^{21,pp152} □

The term Electromyography is used to describe the electrical signs which result from contraction ,it is also a way to store this sign and the data which appear.□

The organized sport training in creases the ability of emasculation and that appears in the ability of muscle to produce the different kinds of the muscular power . then the known recent facts there is a comprehensive positive affect makes a benefit to the person who practices the sport activities, not only physically but socially, psychologic and mentally. Some of studies hinted to the probability of injuries through sport practices, so the care of protection became necessary matter .□

When the muscles contracts (are many muscles contracts) many adverse muscles relax in order not to deter the motion (dual action of muscles)^{12,pp7} □

The results of a lot of scientific researches referred that the affect of the practiced body activity on the power of muscular groups (the main muscles that make the motion) on account of facing muscles^{3,pp230} .□

The importance of this study in using (EMG) to find the places of weakness in the counter muscles , by comparison between the agonist and antagonist muscle and guide the specialist in sport to the best way to protect them from sport injuries by scientific way according to studied riles and by that we can get the safety and full ability in physical practices during the sport activities.□

The muscular power is an element of preparatory and competitive elements in sport and it is one of the most important aspects in technical and artistic sufficiency , for this cause it play a decisive role in sport phases. To improve the level which make it fulfill the best performances links with importance of having some properties and characteristics (physical and healthy) and others , by which we can predict what will reach in future , the care of injury in sport as a result concluded by many

researches which explained the danger of injury in sport and its harmful effect on the athlete. □

The problem of the unbalanced muscular state between the agonist muscles and antagonist muscles struck the attention of a lot of researchers recently , because it has a relation to the sport injuries. □

The researcher felt through his interest in the filed of sport injuries that many players of different ages at all the levels which caused negative results ether in sport performance or in training or competition . This represents a great economical and moral loss at the time that the researcher noticed the rarity f interest to do scientific studies to help limit the volume of the problem it quality and the cause of its happening especially about the phenomenon of the reduction of muscular balance among the agonist muscles and the antagonist muscles that the researcher agreed that it has a strong linkage with the happening of the injury.

2.1 The Aims of the research. □

1. Using EMG apparatus to compare the main muscles and the antagonist muscles in the sport performance. □
2. To identify the difference among the agonist muscles and the antagonist muscles in some changes of EMG apparatus in exercises which were studied.
3. To identify the percentage of the antagonist muscles action in the changes of the EMG apparatus through some suggested exercises. □

1.4 Hypotheses the research : □

The recent study attempts to compare the agonist muscles with the antagonist muscles to support or refute the following hypothesis at the level of statistical indication (0.05). □

1. Existence of differences of changes of the EMG apparatus among the agonist muscles and antagonist muscles in some suggested exercises. □

2. Existence of different and accepted proportions in the action of the antagonist muscles in comparison with the agonist muscles in exercises which are being studied and to the changes of EMG apparatus. □

1.5 Scopes of the research :

1.5.1 The human frame : This study was carried out on (30) from football players. □

1.5.2 The time frame: from 01 /0 3 / 2012 to 01 /03 / 20 13. □

1.5.3 The Space frame: physiology laboratory at the Faculty of Physical Education in University of Maissan ; University of Babble ;University of Karbala.

2. Review of Literature:

2.1 Introduction:

Electromyography is the only method of objectively assessing when a muscle is active. It has been used to establish the roles that muscles fulfill both individually and in group actions. The EMG provides information on the timing, or sequencing, of the activity of various muscles in sports movements. By studying the sequencing of muscle activation, such as any overlap of agonist and antagonist activity and the onset of antagonist activity at the end of a movement. □

2.1.1 EMG Technique:

It is a device used to study the electrical signals of muscle, detecting, recording and storing the Electromyography signals, in which the biological signal represented as electrical currents generated inside muscle throughout the contraction operation (action.) A recording of the external electrical activity of a muscle is called an EMG, or Electromyogram. EMG also refers to electromyography,

the recording technique used to obtain an Electromyogram (Basmajian J.V., and C.J.De Luka 1985)^{5,pp516} (Loeb and Gans, 1986)^{20,pp573} (Cram and Kasman, 1998)^{11,pp408}. EMG recordings from human skeletal muscle offer a simple and reliable educational tool .Student interest and learning in biology and physiology Full appreciation of EMG recordings classrooms (Oakley and Schafer, 1978)^{23,pp367}

2.1.3 Relation between EMG signal and power: □

* The kinetic activated unit and number. * Contraction the kinetic unit and power.

* Reaction mechanism between muscle fibbers. * Kinetic unit and aggravation average.

*Picker and kinetic unit number detected. * Kinetic unit action potential, forms, period and amplitude. * Kinetic unit aggravation continuous^{13,pp134}.

2-1-4 Muscular Power :□

Modern field research proved that the change is happening in the muscular power level of training, in fact, the muscular power is more performance changeable effecting by training , moreover the mechanism of increasing still unclear, needed for more studies and researching. However , there is a relation between muscle size and power, but the power increasing won't necessary meant muscle size increasing or muscular magnifying phenomena happening, for example , ballasts lifters with the performance advanced levels haven't magnification muscles like builders bodies players.

Then, muscle power is considered of importance corporal fitness ingredients, because it led important role in common life, but with sportsmen is more

important , it considered a basic factor to develop the performance level arriving to high levels ^{22,pp258}

2.1.6.11.3 Muscles of the lower limb:□

2.1.6.11.3.1 Rectus Femoris: ^{8,pp337}

Attachments:

• Ilium, anterior inferior iliac spine (AIIS) and upper rim of acetabulum! Tibia, tibial tuberosity via the patellar tendon.

Actions:

• Flexes the hip. • Extends the knee.

Innervation:

Functional Anatomy:

Rectus femoris bisects the front of thigh between the Sartorius and tensor fasciae latae. It is the only quadriceps muscle that crosses the hip joint. The fibres of rectus femoris are bipennate and function as a prime mover for hip flexion and knee extension. During walking and running the rectus femoris pulls the femur forward while kicking out the lower leg. This places the foot in a position to contact the ground and accept the weight of the body. This muscle is stronger in knee extension than hip flexion but still assists muscles like psoas, iliacus, Sartorius, and tensor fasciae late in moving the hip. Because of its origin at the anterior inferior iliac spine, the rectus femoris also has some ability to tilt the pelvis anteriorly. The rectus femoris, vastus lateralis, vastus intermedius, and vastus medialis form the quadriceps group and straighten the knee during standing and lifting with the legs. The vastus muscles are much more powerful than rectus femoris in this action. The strength of the vastus muscles is generated by their large cross-sectional area, increased leverage created by the patella, and single purpose of extending the knee.

Tightness in the rectus femoris is a common problem and can lead to knee pain. This pain is caused by compression of the articular surface of the patella into the femoral groove. Prolonged compression can wear away the articular cartilage,

causing chronic knee problems. Adequate flexibility in the rectus femoris can help prevent this type of knee pathology.^{8,pp337} Looking figure 1.



Figure 1-a: Rectus Femoris.

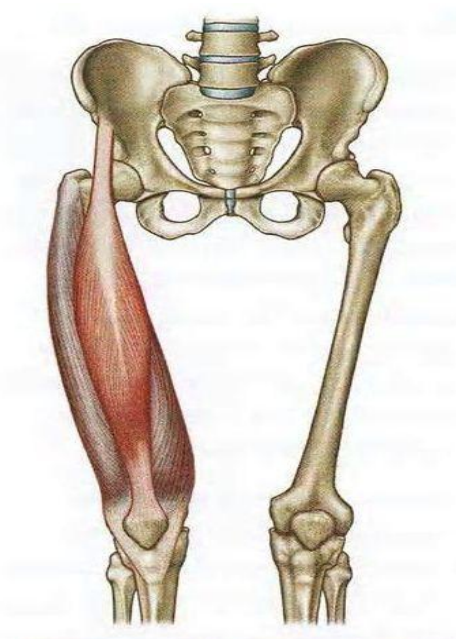


Figure 1 Rectus Femoris –b.^{18,pp231}

2.1.6.11.3.2 Biceps femoris:

Attachments:

Caput longum: Insertion: Head of fibula.

Function: Extension, adduction and external rotation of hip. Knee flexion. External rotation of the knee, when the knee is flexed.

Biceps femoris:

Caput breve: Insertion: Head of fibula.

Function: Flexion of knee. External rotation of the knee, when the knee is flexed.

^{18,pp239,242}

Functional Anatomy:

Biceps femoris is the most lateral of the hamstring muscles. It is superficial on the posterior thigh, except where it dives under the gluteus Maximus just distal to its origin on the ischial tuberosity. The hamstring group also includes the semimembranosus and semitendinosus. These muscles act as postural stabilizers more than the antagonist quadriceps muscles. They help the gluteus Maximus and rectus abdominus maintain a posterior tilt on the pelvis. Like rectus femoris, biceps femoris is a two-joint muscle, crossing both the hip and the knee.

Biceps femoris, along with semimembranosus and semitendinosus, extends the hip and pulls the femur back when the lower extremity is not fixed. This action is used when we swing the leg back during walking and running. The hamstring muscles contract eccentrically to decelerate these movements. When the quadriceps group is excessively strong or the hamstrings are excessively tight, deceleration can end in injury to the hamstring muscles.^{8,pp360} When the lower extremity is fixed, the hamstring muscles, along with the powerful gluteus Maximus, straighten the body, pulling the pelvis back over the knee and foot. This "hip-hinging" function is critical during movements like standing, lifting, and pushing with the legs, such as with jumping. The hamstrings also flex the knee and biceps femoris externally rotates it as well. Rotation at the knee is possible only when the knee is slightly flexed. Full extension locks the tibiofemoral joint and prevents rotation. Rotation on a flexed knee is practical when weight bearing to change the direction of movement in the lower body. This movement, commonly known as a plant and pivot, is critical in sports such as tennis, soccer, football, and basketball. Looking figure 2(a,b,c).^{8,pp360}

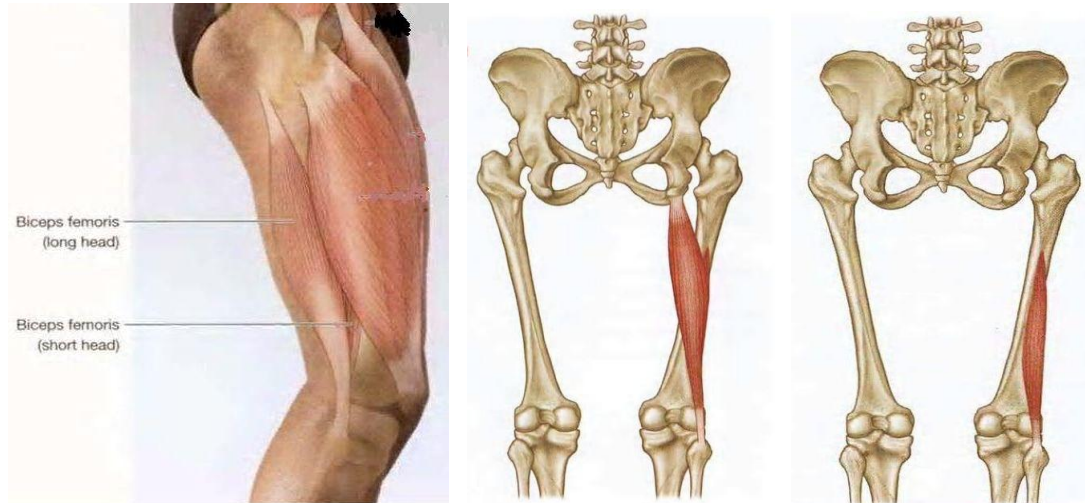


Figure 2-a. Biceps femoris. ^{8,pp322} b- Biceps femoris - Caput longum. ^{18,pp239} c- Biceps femoris - Caput breve. ^{85,pp242}

Figure3: Example Participation in working locomotor muscles of the body (Running, Lifting , Throwing , Kicking). ^{8,pp366}

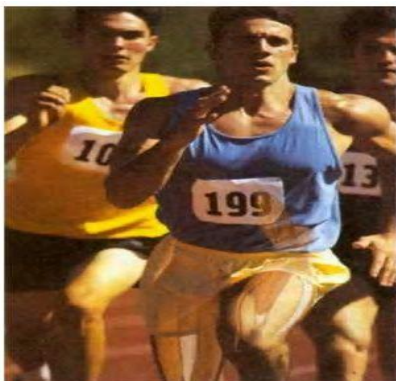
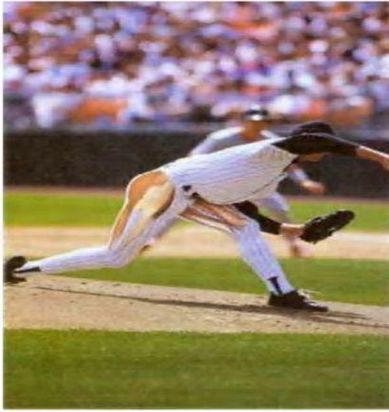


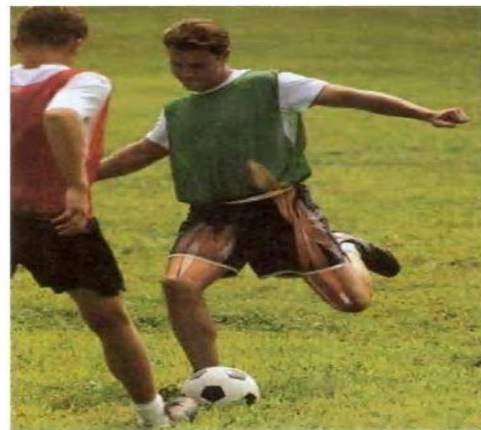
Figure3 Running .



Lifting .□



Throwing.



Kicking .

2.1.7.2 The balance between muscles (Agonist) and (Antagonist):

The secret of most of the muscles of the body is working in groups of two or whether the muscles of the legs or the muscles of the fingers or the six muscles that move the eyeball, there is no muscle works in private, no matter the work done by muscle, there are other muscle works the opposite of work. And even more so, the simplest movement requires the activity of entire groups of muscles, and may be some movement away from the place. □

Virtually all body movements involve the action of more than one muscle. The muscle most directly involved in bringing about a movement is called the prime mover, or agonist. A muscle that can slow down or stop the movement is called the antagonist. The antagonist assists in joint stabilization and in braking the limb toward the end of a fast movement, thereby protecting ligaments and cartilaginous joint structures from potentially destructive forces.

During throwing, for example, the triceps act as an agonist, extending the elbow to accelerate the ball. As the elbow approaches full extension, the biceps act as an antagonist to slow down elbow extension and bring it to a stop, thereby protecting elbow structures from internal impact. A muscle is called a synergist when it assists indirectly in a movement. For example, the muscles that stabilize the

scapula act as a synergist during upper arm movement. Without these synergists, the muscles that move the upper arm (many of which originate on the scapula) would not be effective in bringing about this movement. Synergists are also required to control body motion when the agonist is a muscle that crosses two joints. For example, the rectus femoris muscle crosses the hip and knee, acting to flex the hip and extend the knee when contracting. Rising from a low squat involves both hip and knee extension. If the rectus femoris is to act to extend the knee as a person rises without inclining the trunk forward, then hip extensor muscles such as the gluteus Maximus must act synergistically to counteract the hip flexion that would otherwise result from tension in the rectus femoris ^{7,pp178}. A balance in strength between agonists and antagonists is present under normal circumstances, when muscles are weakened , excessively strengthened, or injured . This balance is upset . When we find a problem of any kind in a muscle , we are very likely to find a problem in its antagonist As he says. Karl H.E. Kroemer And Others.. In the human body, the usual arrangement of muscles is in a “functional pair” where an opponent counteracts the contracting muscle. One muscle, or a group of synergistic muscles, flexes around an articulation while the other extends, as shown in Fig.(4- a,b) . The active muscle is called an agonist (or protagonist) and the opposing one antagonist. Co-contraction is the simultaneous contraction of two or more muscles, often of agonist and antagonist. Co-contraction serves to control the magnitude of a strength exertion or the speed of motion of limbs. Another kind of co-contraction occurs when muscle activates that are not directly involved in a task. This happens, for example, when we tighten muscles in the left arm when those in the right arm execute a strong effort; this is called bilateral co-contraction. ^{19,pp29}□

Muscle balance is a vital component to injury prevention. Whether you chose to lift weights or use exercises to maintain muscle strength and endurance, we need to focus on muscle balance. The major muscle groups work in pairs and those muscle pairs need to be balanced in terms of strength and flexibility. For example,

we bend our elbow by using the biceps muscle. It's pair is the triceps muscle. The triceps muscle must be willing to stretch for the bicep muscle to contract and bend the elbow fully.□

If you are going to do bicep curls, for example, you also need to do triceps extensions in order to work both muscle pairs and keep them balanced. When you maintain balanced muscles, you have better body symmetry and better posture. Weight lifters who only work the chest muscles (pectorals) and neglect the upper back muscles (Trapezius) will have forward stoop to their shoulders. This is the appearance of unbalanced body symmetry which could later cause upper back pain.

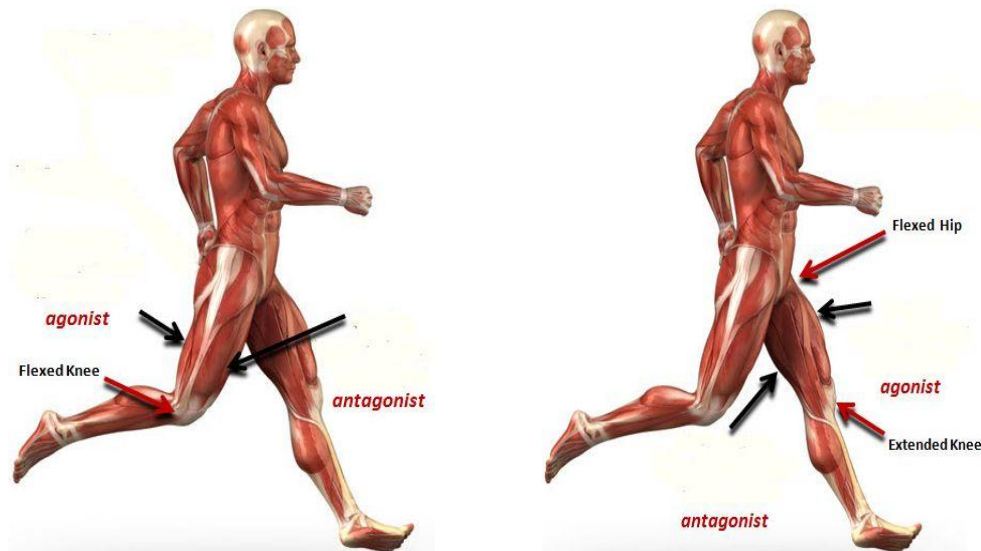


Figure 4³².

a

b□

Our daily routines can cause muscle imbalance. We use more pectoral muscles than we do Trapezius muscle because we do so much lifting of groceries, children, and other items. We have more range of motion in front of us and so we do more things where we can easily see what we are doing. We use more the iliopsoas more than we use the gluteals because we walk forward and upstairs more than we walk backwards. We use our biceps more than our triceps due to lifting against gravity. As a result of these naturally occurring muscle imbalances, we need to work the other half of the pair to maintain muscle balance.

3. The Research Methodology and Procedures of Field:

3.1 Research Methodology:

Requires a methodology used in scientific research and a test analysis of the problem addressed by the researcher, and that the nature of the problem are determined by the selection of one of the methods to be adopted in the scientific research to achieve accurate and reliable results. On the basis of it felt researcher use descriptive method being fit and solve the research problem, since it is the most efficient means of access to reliable knowledge, when it can be used in solving problems^{14,pp375}. And to give a more comprehensive and accurate in the development of the facts.

3.2 The Study Sample:

This study was carried out on (30) players from team football from A University, and players who have been exposed to infection during the previous months of the test or were involved in any program of strength training. □

3-3 Devices and Tools used

A. Surface receptors :

The researcher out cleaning [hair removal mediated by a razor blade and wipe with alcohol to remove the secretions secreted by the skin as well as skin to the surface of the skin [where to place the detector] to get the skinless resistant to signal power enables us to get the signal [EMG] good, it was put the detector surface above the middle of the top of each of the muscles of the upper and lower sides.

B . Additional detector:

Each device in the pickup there is one additional and remove any electrical job, the body of picked them up around [the ocean] and is called ground and that the place and put it on your device to study in any part of the body parts.

C . The work of the detector:

The detector surface label at the tops of the muscles and in the midst of his work is to detect the electrical low-lying or signal power of the muscles that have been activated and then transferred to the computer screen to show the signal strength as well as the shape, and then through the program [software program] is an analysis of the data stored and processed different types of analyses to be after the issuance of reports on the active muscle ^{27,pp14}. Often the signal EMG to determine the quantum mechanical muscle, a style of direct measurement measures the muscle activity and under different circumstances, the device EMG has the potential special session in the detection of muscle action at any moment during body movement and persistence as well as a situation where the nervous system supplying the muscle, and that objectivity to show the compatibility and interaction and coordination between the muscles is not possible to investigate other methods other. ^{4,pp22}

3.4 Program Myo Research xp 1.06.67: 3.5 Program Myo Research xp 1.06.67:

This should be a program existed within the software and its features is the display and storage of reference [EMG] so as to be in the form of reference crude and is above the name of the muscle, also has other features which can make multiple processors for signal [EMG] later RMS and Packaging linear format , another advantage program, a map that contains all the muscles of the body front and rear and the location of the muscle as well as where to place the detector on the surface of the muscle, so that the program registers the name of the muscle when you put the cursor on the muscle and pressure it shows the channel number that will show the signal [EMG], extension shows that .

3.5 Signal analysis of muscle under study :

The researcher analyzed the signals and all the muscles under study according to their time and capacity [peak] and an area, and then around to the data for statistical operations. Through the correspondence between the movement or exercise performed by the laboratory and the reference device EMG that result from the action of the muscles of the study, which we observe during the filming, and then analyze the relationship between space and capacity and the time of muscle activity for the study and during contraction and extraversion and using the program May

3.6 Speed of wave propagation :

The speed of wave propagation and along the muscle means the period in which the effort to do the muscle between the detector, where he found the people sick and that there is rapid spread of the wavelength of [4 m / s], i.e., the meaning is as the duration of effort to do the muscle shorter as the speed high.

Detection of amplitude and duration of the effort to do the muscle in the laboratory:

Through contractions involuntary, we disclose in the laboratory for the duration of effort to do the muscle and the amplitude directly from the signal EMG device, where we use the computer to be able to see the change in the direction of signal EMG device or analysis of succession in an effort to do the muscle and all this is produced by analyzing the signals athletic movements

3.7 Amplify the signal of EMG device:

In order to get a clear signal found in all organs of the EMG amplifiers of the signal, where there is no need to amplify the signal of biological and represents the sum of the effort to do muscle accumulated, and that any such reference must be free of the reference synthetic, noise and undistorted.

3.8 Exercises used in the study:

This chapter discusses for strength training exercises. The exercises are grouped into those that target the torso from body

Before you get started strength training, you should review several safety issues. at no time should you compromise safety.

1.13.3 Lower Body Exercises:

The muscles of the lower body and the movements perform .

1.13.3.1 .Front Squat:

*Starting Position

1. Using a squat rack, adjust the height of the rack to a level where you can remove and replace the bar without rising up on the toes.□
2. Hold the bar with a grip slightly wider than shoulder width, and let the shoulders come forward to make a “shelf” to support the bar in front of the body.□
3. Lift the bar off the rack, with the feet directly below the bar, then take one step back, and place the feet about shoulder-width apart, with the toes pointed slightly outward. Use the elbows to support the bar.□
4. Keeping the back neutral and the chest up throughout the movement, let the hips move backward, then immediately bend at the knees.
5. Lower until the crease formed at the hips is horizontally aligned with the top of the knees. Keep the knees over, but not beyond, the toes.
6. For each repetition, return to the starting position by following the same path used for the downward movement. Prevent the hips from moving backward or rising faster than the bar during the upward movement phase figure (5,6) (a,b) .^{31,pp212-213}



Figure 5 a



b

We can also perform this lift using : Back Squat: ^{30,pp115}



Figure 6 a

b

3.14 Statistical analysis:

The researcher used All statistical analyses through the use of a statistical software package (SPSS, Version 19.0, SPSS Inc., Chicago, Illinois, USA. Statistical significance was set at $p < 0.05$.

4 . Finding:

EMG can be used to validate assumptions about muscle activity that are made when calculating the internal forces in the human musculoskeletal system.

And therefore, when used researcher wanted to find raw scores on the performance of muscle strength exercises. In order to access the researcher to whom aim the objectives of this thesis, and by converting the findings of the ore grades to standard grades, as crude grades must be converted to standard scores can even evaluate their results and their interpretation .

Decision :

4.1 Presentation & Discussion of T-Test, Between agonist muscles and antagonist muscle an Exercises.

Table (1)

4.1.6 .Presentation and discussion of T. test, Between agonist muscles and antagonist muscle an exercise knee for variables device EMG :Top, RMS, Area, Time .

Var	Mean	Std. Deviation	Std.Error Mean	T. Test	T. Test	df	Result
Top	210.83	15.93	8.38	25.13	1.69	30-1=29	Moral
RMS	93.43	16.72	6.70	13.93			Moral
Area	70.33	12.52	9.58	7.33			Moral
Time	0.356	0.212	0.038	0.91			non significant that

Under freedom degree $30-1 = 29$, and offset error of $0.05 = 1.69$

The imbalance problem of muscular has attracted the between the muscles the attention of many researchers in recent so as to relate the occurrence sports injury, especially among players in games of football, volleyball and other games, and these researchers Poulmedis In which conducted the study to identify the relationship between muscle strength and the incidence of football players especially through tensile injury muscular^{25, pp53-57}

There are a lot of previous studies that addressed the issue of the balance of power between the quadriceps muscle Home and thigh muscles countermeasures and their relationship to lower limb injuries to many of the games .

Through our notifications in the table above that there are three variables (Top , RMS, Area) which was indication that the major muscle and muscle anti was an acceptable level for the work of both this does not mean that the possibility of poor balance muscular between two muscles in this exercise is unlikely and therefore the fear of injury is a possibility .

It is also known as a specific percentage must be a balance between these two muscular two muscles within its borders. Any work harmonic two muscles.

This result is consistent with many studies including those referred to study Costain and Williams, that the determination of knee significantly greater than the determination of knee bend ^{10,pp196-200} As well as the results of this study agree with many studies including those referred to Stanford and Williams study, that the determination of the knee significantly greater than the determination of bending the knee. ^{28,pp209-211} Also as a result of this study agree with the conclusion of a Gilliam study and others, which indicated lower values determined from constriction and energizes anti thigh muscles with increased speed ^{17,pp110-113}

Further it also correspond with what indicated Roche Conger and others, and Coasten Williams, in that muscle strength affected quickly ^{26,pp448-450 , 10,pp196-200} .

While the time which is the fourth variable, the value of (T.test) calculated is non significant that and this is out of the question because the researcher attributes this because times during the performance of a single exercise and four variables are not equal and this index phenomenal to work the muscles and readout device.

So the researcher finds that the first hypothesis in the study Significant differences for variables device EMG between the major muscle and anti-muscle in

the proposed exercises had been achieved and this is main objective of the researcher

Table (2)

2.2.6 Shows the percentage of antagonist muscle an exercise (bending and extending legs from the knee elbow, for variables device EMG under study :Top, RMS, Area, Time.

T	TOP	RMS	AREA	TIME
1	28.51406	25.90113	14.92537	112.6582
2	26.29577	25.37743	23.07692	79.69543
3	16.1578	19.74156	20.79208	112.1622
4	32.22901	64.03061	54.45545	90.42553
5	38.21286	58.75943	45	98.4375
6	41.0565	48.00759	100	100
7	28.51406	25.90113	14.92537	112.6582
8	26.29577	25.37743	23.07692	79.69543
9	16.1578	19.74156	20.79208	112.1622
10	32.22901	64.03061	54.45545	90.42553
11	38.21286	58.75943	45	98.4375
12	41.0565	48.00759	100	100
13	28.51406	25.90113	14.92537	112.6582

14	26.29577	25.37743	23.07692	79.69543
15	16.1578	19.74156	20.79208	112.1622
16	32.22901	64.03061	54.45545	90.42553
17	38.21286	58.75943	45	98.4375
18	41.0565	48.00759	100	100
19	28.51406	25.90113	14.92537	112.6582
20	26.29577	25.37743	23.07692	79.69543
T	TOP	RMS	AREA	TIME
21	16.1578	19.74156	20.79208	112.1622
22	32.22901	64.03061	54.45545	90.42553
23	38.21286	58.75943	45	98.4375
24	41.0565	48.00759	100	100
25	28.51406	25.90113	14.92537	112.6582
26	26.29577	25.37743	23.07692	79.69543
27	16.1578	19.74156	20.79208	112.1622
28	32.22901	64.03061	54.45545	90.42553
29	38.21286	58.75943	45	98.4375
30	41.0565	48.00759	100	100
Total / 6	912.33	1209.089	1291.249	2966.894
The	30.411	40.30296	43.04164	98.89648

percentage

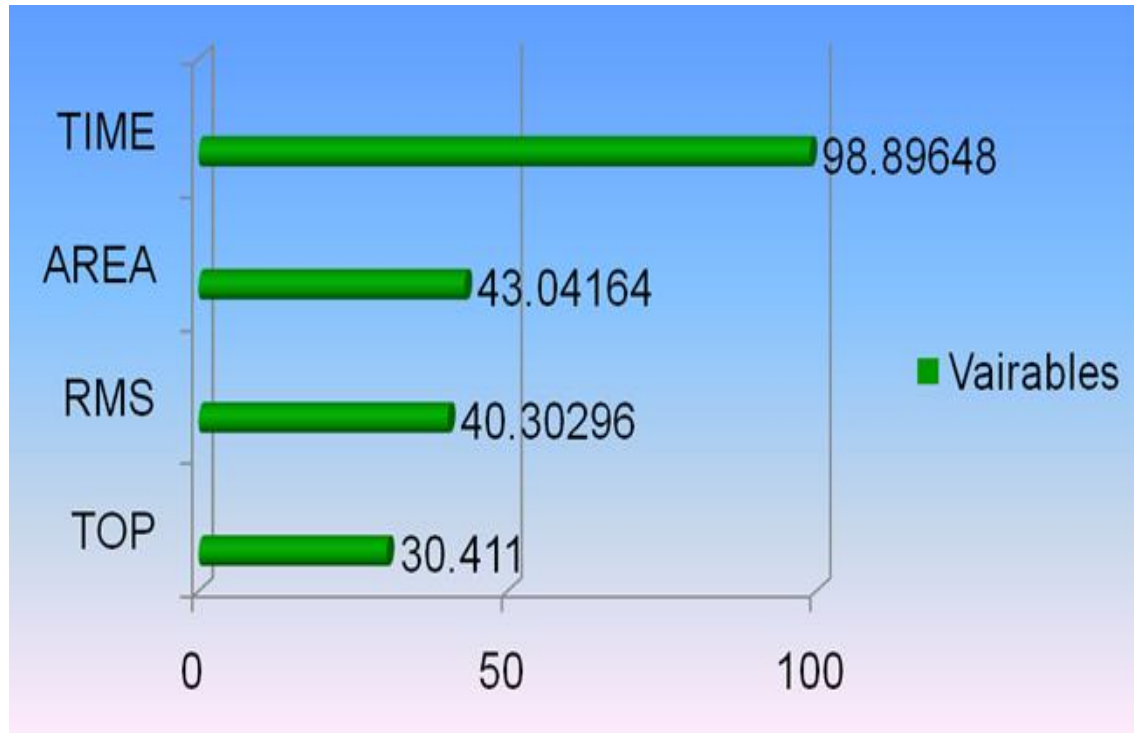


Figure (7)

The percentage of antagonist muscle an exercise (bending and extending the legs from the knees), for variables device EMG under study : Top, RMS, Area, Time.

From table (2) and Figure (7) , we note that the percentage of muscle anti in this exercise for three variables only figure was sandwiched between (30.4040-43.0416) which is not good but it is not dangerous because the researcher sees the analogy of the sample as the ratio of exceed likelihood of injury because he if we assume that this sample has put her training program for muscle strength ratio was close to a good level and recommended by experts and training physiology.

This is consistent with the results of a study Yamamoto, which indicated that muscle imbalance is one of the indicators to predict the occurrence of injury thigh, and muscle strength working on the knee joint and percentage of the important indicators of injury^{33,pp194-199}

And consistent with the study conducted by Al-Hazz'a on a sample of athletes Saudis, where the ratio was calculated quadriceps force front to rear, which amounted to (60%) among athletes Jerry short distances while the minimum rate at the weightlifting athletes (45.6%), has The results indicated the importance of not less muscle power ratio between the rear to the front (60%).

This is consistent with the results of other studies in the great disparity in muscle strength between muscular front and rear will display detailed knee injury

As some studies have indicated that poor balance leads to instability of the knee joint^{15,pp75-78}

As well as consistent with a study by Aorchad, which indicated to increase the proportion of injuries in the thigh muscles and because of the instability of knee joint resulting from a lack of balance working muscles^{24,pp21,81-85}

There are many studies performed on the knee elbow , confirm that the rate of muscler balance effected by the angular velocity and the type of work^{9,pp227-232, 2,pp231-237}

The result of the present study agree with the results of many other studies, including a study Ben Nell and others, where, they found that the percentage of muscular balance quadriceps main counter (less than 60%) in the slow speed^{6,pp309-314}

Also agrees well with what he referred to Lagarde and others in movements and skills you need to score ^{29,pp120-130, 16,pp132-138}

Here, researcher finds that the second hypothesis:

The presence of appropriate and acceptable rates of muscle action counter to the work of major muscle. Has been achieved, which purports to researcher.

The time is variable and as a researcher at the saw discussed in the previous exercises.

$$384.5 = 100\%$$

$$203.4 = X$$

$$X = \frac{100 \times 203.4}{384.5}$$

$$X = 52.89987$$

$$\text{Agonist} = 384.5 = 100\%$$

$$\text{Antagonist} = 203.4 = X$$

$$100 \times (\text{Antagonist}) 203.4$$

$$X = \underline{\hspace{2cm}}$$

$$(\text{Agonist}) 384.5$$

$$X = 52.89987 \%$$

Note that ratio was extracted anti-muscle through the following equation:

Suppose an example of how to extract a proportion of the work of agonist muscle in variable Top.

The athlete in the exercise bending and extending your arms in front of the body, and also on the all sample and the proposed exercises.

5. Conclusions and Recommendations:

Depending on the recent and previous studies , I have reached to the following results:

5.1 The Conclusions :

- 1- Existence of different and a accepted percentages for the antagonist muscles in comparison with the agonist muscles in sport performance .
2. The EMG helps to know the relation among the differences and the percentages of the agonist muscles and the antagonist muscles in sport performance.
3. Existence of differences in statistical sign at the level indication of (0.05) among the agonist muscles and the antagonist muscles in sport performance .
4. The results of the proportions of the agonist muscles and the antagonist muscles can be considered as a good sign to predict the happening of injuries.
5. The time in the acting of muscles is unsteady in every exercise and in all the EMG variables apparatus .
6. The result of differences among the agonist muscles of football players and the antagonist muscles will help to assure the importance of nature and quality of the activity in reaching to the suitable muscular balance.

5.2 The Recommendations:

Depending on the result of the study , the researcher offers many recommendations hoping to be useful to all the interested people in the health and safety of players especially ,and the athletes in general .

1. Interest in measurement of proportions of muscular balance amp among the agonist muscles and the antagonist muscles with the athletes in general, in regulated periods in condition that this proportion is not less than 60% especially with the football players .
2. Development of the muscular power among the fore muscles and the rear muscles of study especially with the football players.
3. Stress on the understanding of muscular balance or the proportion of the muscular power among the agonist muscles and the antagonist muscles among the

movement of stretching and bending of joint and the limbs of the human body , to all the interested persons in the sport medical filed , health of players ,coaches, specialists in physical therapy and doctors.

4. Issuing local Iraq standards in regard to the proportion of muscular balance of the new and progressed players .

5. It is necessary to do another studies deal with muscles and another kinds of sport activity.

6. To keep the right and balance proportions among the agonist muscles and the antagonist muscles in sport performance to protect the players from injury.

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