



THE IMPACT OF 8 WEEKS BODY BALANCE EXERCISE ON Q ANGLE IN 20-35 YEARS OLD WOMEN

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Abstract :-

Introduction: The angle of Q or the angle of quadriceps has been known as an important factor in the evaluation of the performance of the knee joint. The aim of performance this research is the review of the impact of 8 weeks body balance exercise on Q angle in 20- 35 years old women in the west area of the Ahvaz city.

Materials and methods: 30 women with the age range of 20-35 years with an average of Q angle for participation in the present study were selected targeted. The subjects randomly were divided in the experimental (n = 15) and control (n =15) groups. Experimental group 3 days a week for one day in the midst for 8 weeks paid to body sport and the second group in the same period did not do any sports activity. The body balance sports, in the present study are includes Tai Chi, yoga and Pilates exercise. All the exercises have been set to reduce the angle Q. Before and after 8 weeks body balance sports body weight height and angle Q were measured. To measure of angle Q was used of bevel.

Results: after 8 weeks of body balance sports the angle Q of subjects in the experimental group was significantly reduced (p = 0 . 05) in the practice group body weight and body mass index of the subjects showed a significant decrease (p = 0 . 05) .

Conclusion: body balance sport with strengthening lower limb muscles and media trunk and great reduction of weight and body mass index decreases the angle Q.

Key Words:- The Body Balance, Angle Q, Weight, Bmi

INTRODUCTION

One of the important internal risk factors in the incidence of lower limb injuries, is direction of the natural anatomical of knee joint and the patella femoral joint .The angle of quadriceps angles or(Q angle) is a suitable criteria to measure the direction of the natural anatomical structures of skeletal hip, thigh and leg and is an acceptable estimates of applied force vector on the patella in any muscle contraction of the quadriceps (Lubowitz. Bernardini. Reid 2008).

The Q angle is the intersection produce of two lines that one the center of the patella connects to saliency of tibia and the other line an upper-anterior iliac spur connects to the center of the patella. The normal size of this angle is 10-20 degree. The women's natural angle Q is about 15 and for men is 10 degrees (Mousavi and Norasteh, 1390).

Increasing the angle of the quadriceps beyond the usual is considered as the sign of disorder in the muscle mechanism that is come along with the patellofemoral pain syndrome, an excessive increasing the range of motion the knee joint and instability of patella. In addition, increasing the angle of the quadriceps in the lower limb injuries in various sports and the military population has registered (Raveendranath. V et al, 2011). Clinical signs of deviation of the angle Q are release of pain in the anterior area of knee, the aggravation of knee pain with up or down

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stairs or height, knee cryptation, knee swelling and gathering fluid in it, creating the tenderness in knee, when coming pressure on the internal and external sides of the patella, the quadriceps muscle atrophy, deviation of the patella to the outside when the patient has sat and the knee was bent up to 90 degrees.

Since these problems are caused by an imbalance of muscle strength in the lower limbs, because of the increasing strength and flexibility of muscles affecting the knee joint the exercise can be a therapeutic strategy.

The size of the Q angle of women due to the thick hip is more than men (Dadgar and et al, 1390). The cause of difference of size in the average of the quadriceps angle in men and women are various causes that from the most important causes can be named the effects of estrogen on the tendons. In this case, that estrogen causes general relaxation the tendons of body and a group of these tendons are the tendons of the strength of the knee. One of the important issues available in the Khuzestan are high parity in women that this issue is caused the women of this area in long time stay in touch with estrogen and this issue is caused that in statutory limitation the size of the angle of the quadriceps in them is become more to the European women have less parity. As the result of the prevalence of deviation in the angle of the quadriceps more than normal size in Khuzestan province, it increases in women and in result in the general population and is more than the European countries. Improper feeding in this province can be caused that calcium and vitamin D, and necessary proteins to build and repair the bones do not put enough for the body that this issue is caused to osteoporosis and osteomalacy and behind it the destruction and deforming of bone tissue and thus increasing the angle of the quadriceps . As well as their poor physical activity like: sit for two knees and climb the heights as an unsuitable can be named. These inappropriate activities are caused to atrophy and disorder in the proper functioning of the quadriceps muscle and followed that the increasing the angle of quadriceps . Of course, other causes like genetics can also be effective in this difference of size in the angle of quadriceps (Arti and Fakour, 1391).

One of the new sports that has a lot of bystander among women, is the body balance sport. The body balance is a brand name of a 60-minute program with setting the rhythmical movements which are a fusion of yoga, tai chi and Pilates sports. Carried out research in the field of yoga, Tai Chi and Pilates sports have shown that these exercises have significant influence on reducing disorders musculoskeletal such as osteoarthritis, back pain, the reduction of pain intensity, significant reduction of body fat and abdominal perimeter and the significant increasing of muscle strength of the back and flexibility and improve of the mental profile in adult men and women. (Rabia et al, 2008). Given that women due to cultural and social restrictions, don't have the possibility of participating in many of the sports and have more incline to participate in the new indoor sports such as aerobics, yoga, Pilates, Tai Chi and body balance and like these, the aim of the present study has been the effect of these sports, especially body balance sport on angle Q.

MATERIALS AND METHODS

In a half experimental tentative work the number of 30 inactive women (age: $27/96 \pm 4/86$) with an average Q angle of the right foot $22/53$ and the left foot $22/56$ as the model, were selected targeted. To select the subjects, the first goals and methods of implementation research were been described to people. The criterion for choosing the subjects was angle Q above 15 degrees, lack of affection to Orthopedic diseases such as erosion of the knee joint ,arthritis ,osteoarthritis and metabolic diseases as well as the lack of affection to flat foot. Qualified individuals who wanted to participate in the study, completed a written consent form and the individual specifications questionnaire were completely divided by chance in two groups of body balance sport (15n) and control (= 15n). The experimental group for 8 weeks did body balance sport and the second group at the same period did not do any sport activity.

MEASUREMENT OF ANGLE Q

The amount of their angle Q they were measured by using bevel. The subjects without clothes and with shorts as supine lied down. In this case, the three points of the body subjects (land mark) on both sides were marked that consists: the upper-anterior iliac spur, the center of the patella and tibia prominence. With a long ruler, a short line from the center of the patella to the upper and anterior iliac spur and also the line from the center of the patella to tibia prominence were drawn. Bevel fixed arm was been placed on the line connects center of the patella to the iliac upper - anterior spur and moving arm on a line connects the center of the patella to the tibia prominence. The resulting angle between the two arms of bevel was recorded on the evaluation form as the angle of Q. These measurements as well as for the other foot was repeated and average 3 times measurement with 5 seconds of rest between each time the measurement was calculated.

MEASURING OF WEIGHT AND BMI

The weight of the subjects before starting an athletic program and 48 hours after completion of the training period was measured. The subject without shoes and at least of clothes (sport shorts and t-shirt) on Seca digital scale (Seca) made in Germany stood without moving.

MEASURING HEIGHT

The subject was asked to stand without shoes in front of the height measuring so that the heel, the scapula and hips have been stuck to the wall then the subject has kept his head up and looking at opposite the distance of marker of the height measuring that is at the top of the subject head and tangent to it was measured up to the Earth and size of the height in cm was registered in the corresponding form.

TRACKS	ORIGINS	Time (minutes)
1- tai chi warm-up	Tai chi, Martial Arts	6
2-sun salutations	Yoga	5:40
3-standing strength	Yoga, Tai chi	5
4-balance	Yoga, Tai chi, Dance	4:33
5-Hip openers	Yoga	6:18
6-Core-Abdominals	Pilates/ Yoga	3:42
7-Core-Back	Pilates/ Yoga	3:50
8-Twists	Yoga/Tai chi	3:43
9-Forward Bends-Hamstrings	Yoga/Tai chi	5
10-Relaxation Meditation	Yoga/meditation	9:42

EXERCISING PROTOCOL

Warm up for 5-7 minutes with gentle stretching and Tai Chi exercises was performed in the form of gentle and rhythmical movements. After the warm up it was paid to the original and targeted exercises for 50-45 minutes. These exercises were included of a combination of Pilates, yoga and Tai Chi exercises, respectively. On the basis of the principle of exercise feature, exercises were set up with the goal of reducing the angle Q. Keep stretching time of 8 seconds was started and in the last week it reach to 15 seconds and amount of using joint range of motion as well as increased gradually. The number of reps strength training of high (10 repetitions) to low (6 reps) and the number of cycles of low (1 round) to high (3 rounds) were set up. The exercises advanced from Simple to difficult and in order to observe the principle of diversity, the exercises were designed various and it was prevented to monotony of exercises that in addition to increasing useful rehearsal compatibilities ,the psychological satisfaction of athletes as well as was increased . Return to the initial mode for 5-7 minutes with the use of static stretching movements and kinetic movements and gentle of Tai Chi was done. In some meetings, meditation was also conducted.

8weeks,three meetings in a week	Duration of training cycle
60 minutes	Time of training meeting
mean	Intensity of exercises
115 stroke in a minute	BPM music during warm up
128-130 stroke in a minute	BPM music during main activity of class
5-7 minute	Time of warm up
45-50 minute	Time of main activity of class
5-7 minute	Time of return to initial condition

STATISTICAL ANALYSIS

From the indicators of descriptive statistic such as the average and the standard deviation were used for the categories and data display. Since the study is performed on the two groups in the inferential data analysis part, the correlated t test and independent t were used to study of the effect of the independent variable on the dependent variable and comparison between groups and the relevant tables and charts were presented. To this end, the research variables with SPSS16 software and Excel2007 with significant level ($p = 0.05$) analyzed.

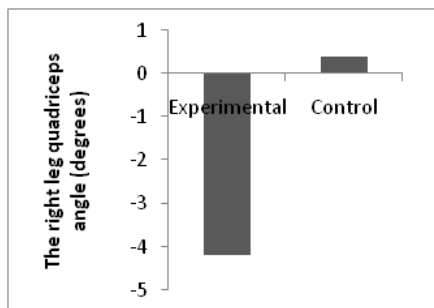
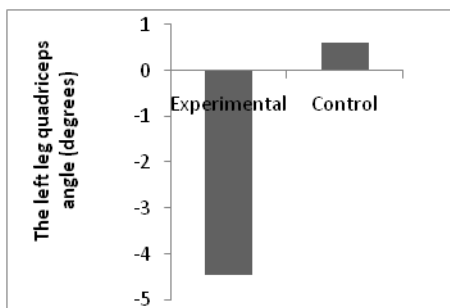
RESULTS

As shown in table 3, there is no significant difference between variables in the base-level did not exist. After 8 weeks the angle of quadriceps right and left feet in training group significantly decreased ($P < 0/05$). As well as the amount of weight and body mass index were significantly decreased ($P < 0/05$). (Table 3)

As can be inferred from table 3, the average angle Q on right foot in experimental group before body balance exercises was 23 /40 degrees and on left foot was 24/13 that after 8 weeks training which was contain 24 meetings this quantity decreased in the right leg to 19/20 degrees and in the left foot to 19/7 ($p = 0.05$).

Table3-average and standard deviation of variables before and after 8 weeks in body balance and control groups

P	Control group	P	Body balance group	variable
0/009	21/67±2/55	0/00	23/40±2/03	Angle Q of the right foot before 8weeks
	22/07±2/58		19/20±2/27	Angle Q of the left foot after 8 weeks
0/003	21/00±2/30	0/00	24/13±2/36	Angle Q of the left foot before 8 weeks
	21/60±2/41		19/67±2/66	Angle Q of the left foot after 8 weeks
0/00	59/53±5/46	0/00	67/33±10/08	Weight before 8 weeks
	62/00±6/27		63/20±9/04	Weight after 8 weeks
0/00	21/86±1/91	0/00	25/53±4/04	BMI before 8 weeks
	22/77±2/21		23/95±3/61	BMI after 8 weeks



DISCUSSION

According to the results obtained from this research, body balance exercises on the quantity of the angle Q in both feet have a significant impact. These findings have similarity with the results of Mazidi and et al (1390), Sarkar and et al. (2009), Tramel and Letinghoos(2000). They in manner showed strengthen the quadriceps muscles with resistance exercises isometric exercises, pedaling on the work measuring bike, reduces the angle Q. By the same direction Khayamebashi & et al (1389) reported that the simultaneously-stretching exercises the flexor plantar muscles and the strength trainings of internal widescreen muscle significantly decrease the angle Q that verifies the results of the present study. Studies have reported that the muscle weakness of internal widescreen was caused to damage and abnormalities such as increasing of the angle Q, cross knee and patellofemoral pain syndrome. Increasing the angle Q, has effect on the Biomechanics of the knee joint, especially the patellofemoral joint surface. On the other hand also larger the Q angle, increases the side tension of the quadriceps muscle and strengthen the

patellofemoral disorders (Emami M, 2007). Hence strengthen the muscles of the lower limb by preventing the occurrence or progression of deformities such as increasing the angle Q and the knee valgus, can be associated to reduction of the amount of affection to patellofemoral pain syndrome. It has been reported that the initial source of a lot of anomalies and skeletal injuries of the lower limb, especially the feet is the overweight and obesity (Rahmani niya and Daneshmandi, 1386). So in this research one of the factors of reducing angle Q is a significant reduction of weight. Given that the body balance sport is a compilation of yoga, Tai Chi and Pilates sports, the researches carried out in the context of these exercises have shown that these exercises have the significant influence on weight loss and some factors of fitness. In this regard, Rabiya and et al. (2008) viewed that 12 weeks body balance exercise is caused to significant decreasing of body fat and the size of the round of breast, waist, basin, thigh, triceps of arm, under the scapula and increasing of the muscle strength. As well as the researches of Bahatkar and et al. (2011), Omid ali and et al. (1391), Kakmesi (2012) and Len and et al (1998), in order have shown the performance of Yoga, Pilates and Tai Chi exercises in the reduction of weight and fat, body mass index, and improving of fitness in men and women that confirm the results of the present study. As well as the carried out researches in the field of yoga, Tai Chi and Pilates sports have shown that these exercises have significant influence on reducing musculoskeletal disorders such as the knee osteoarthritis, back pain and reducing of the pain severity. The problems caused by non- correct direction of patella have also been attributed partly to the lack of proper functioning of the Central trunk muscles ((Bolga et al, 2011) that the body balance exercise and specially Pilates exercise are caused to strengthen the Central trunk muscles and thus improving of the situation of the lower limb and reduction of the abnormalities associated with it. Ghaffari Nejad and Associates (1391) concluded that in the treatment of patients with patellafemoral pain syndrome in addition to the usual sports, taking care of strength and endurance of the trunk muscle seems essential. Barati and Associates (1391) also noted that the central stabilized exercises have significant impact on recovery of pain and knee joint function. Studies have shown that reducing the strength of trunk muscles and pelvis increases the chance of knee injury (Bakaie and et al., 1389) and strengthening of the muscles of the trunk and lower limb compared to strengthen the quadriceps muscles help to improve of the pain, motor function, mobility and muscles strength related to the hip joints and the knee (Balden, et al., 2014). Erfani & Associates (1390), Ghassemi et al. (2013) and abnezer et al. (2012) respectively showed the impact of Yoga and Pilates exercises to improve motor function, quality of life, reducing pain and symptoms of the disease in patients with knee osteoarthritis. Also Jaing et al. (2009) reported that the Tai Chi exercises because of strengthen the bend muscles of knee to improve the biomechanical characteristics of the muscles of the lower limb are suitable for older people. But Vertelli and Associates (2013) and Ebhainandan ((2011) concluded that resistance exercises to improve the mobility of joints and signs of knee osteoarthritis are more effective than Tai Chi exercises. One of the other causes of decreasing angle Q in this research is because of doing the body balance trainings in the form of closed motor chain. In recent years, the use of the motor chain exercises depending on the cause of more benefits and fewer risks of these exercises (especially in rehabilitation) has increased. These exercises in injuries of lower limb are non separable component of rehabilitation programs. These findings have similarity with the results of Fahr, et al. (2006), Vitro and belmanes (2000) and Stein, et al. (1996). Activities in the closed motor chain in return of motor function of the patients affected to depending with patellofemoral pain syndrome is more effective than activity in open motor chain.

RESULTS

In short the results of this study showed that the body balance exercise is caused to improve angle Q in women that this improvement can be caused by doing strength and stretching trainings of the body balance on the muscles of the lower and middle body through in the biomechanical changes in direction of the knee joint as well as weight loss that makes angle Q to be changes.

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