



The Effect Of A Course Of Corrective Exercises And Manual Therapy On Hamstring Shortness, Pain And Step Speed Of Rhythmic Movements In Women With Non-Specific Chronic Knee Pain

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ABSTRACT

Introduction and purpose: Rhythmic movements are general activities, mixed with art and movement, and include extensive leaping and jumping movements, which are the most common injuries related to this field of the knee joint. Therefore, the purpose of this research is to investigate the effect of a course of manual therapy corrective exercises on hamstring shortness, pain and speed. Women's steps are rhythmic movements with non-specific chronic knee pain.

Materials and methods: The current research is semi-experimental (pre-test and post-test). The current research was conducted by the rhythmic movement women of Alborz province, among whom 30 people were selected based on the entry and exit criteria in a targeted manner and were randomly divided into two experimental groups and one control group. The first group consisted of 6 weeks Corrective exercises and 3 sessions every week. The second group included manual therapy for 6 weeks and 3 sessions every week. The control group did normal exercises. During the pre-test and post-test, dependent variables including hamstring shortness, pain, and step speed were measured with goniometer, questionnaire (vas), meter, and chronometer, respectively. And for the statistical analysis of the current research, the dependent t test, covariance analysis and spss software version 22 were used .

Results: The findings of the research showed that the effect of a course of corrective exercises and manual therapy on pain ($p < 0.001$), hamstring shortening ($p < 0.001$) in women with rhythmic movements with non-specific chronic knee pain had a significant effect, but the effect of corrective exercises and manual therapy After 6 weeks, no significant effect was observed on the walking index variable ($p < 0.06$).

Discussion and Conclusion: The research results show that it is possible to use corrective exercise protocol and manual therapy protocol as a targeted method to reduce pain and eliminate symptoms of hamstring shortening in the knee joint in women with non-specific chronic knee pain with rhythmic movements in the knee. In order to prevent secondary damage and improve performance. used.

Keywords: manual therapy, hamstring shortness, knee pain

1. Introduction

Rhythmic movements are actually general activities that are a mixture of art and movement and are shown in the form of movement along with music, and due to performing jumping movements and heavy jumping and

performing repetitive techniques and skills, they are prone to injury in the knee joint, which are the most common injuries. Related to this field is the knee joint. The knee is the largest joint in the body and has a complex structure. It is under more pressure than other parts for various reasons, and it plays a key role in body movement and may have a great impact on people's daily activities. Knee pain is a chronic and debilitating condition, this condition is one of the most common joint diseases in athletes, and it has symptoms such as dryness, joint pain and limited range of motion, muscle-skeletal pains that cause loss of mobility and disability. it is one of the most important reasons for staying away from society and work in the western world [1] Chronic knee pain has affected a large number of athletes in various sports fields, in addition to the elderly, who due to repetitive and long-term training and heavy jumping techniques and Jumping and double pressure on the knee joint cause acute and chronic injuries in this area, which include the complaints of dancers and rhythmic movements, knee problems are one of the most widespread causes of injury in these people. Examining the knee pain of different dancers in the field of rhythmic movements, 90.07% of knee injuries were evaluated due to excessive use (overwork) in dancers, and about 5.53% were common complications related to patella tracking disorders, including patellofemoral pain syndrome. External factors that can cause knee joint pain include intense and disproportionate exercises, non-standard sports equipment and tools, and incorrect techniques [2] Patients with chronic knee pain usually suffer from weakness in the muscles of the lower limbs, especially the hamstrings and quadriceps. that the degree of muscle weakness and imbalance usually has a direct relationship with pain in the joint [3] Another reason that is effective in the process of producing anterior knee pain is the hamstring muscle, the shortness of the hamstring means the inability of these muscles to lengthen, and this problem is caused by The limitation of elasticity is in the intramuscular connective tissue and the formation of inelastic and hard tissues in the muscle that can be touched and in addition to the effects it has on other links of the structural chain of the lower limb, the movements will not be effective in the full range. Any imbalance in these muscles may have negative effects on the function and biomechanics of the knee and hip joints and walking. It is believed that many extensive therapeutic interventions including corrective exercises, manual therapy, physical therapy, medicine Burning and... corrects the hamstring and its natural length. [4] Another cause of chronic knee pain is the presence of muscle imbalance in the joint structure, any imbalance between the main muscles of the knee joint (quadriceps and hamstrings) will change the structure of the joint and cause a change in its function, and the use of corrective exercises in such a situation It balances the muscles in the state of shortening and stretching and increases stability and function in the knee joint.[5] Since sufficient strength and fitness of the muscle is vital to protect the joint, weakness in the muscle that covers an affected joint makes the joint more susceptible to subsequent injury and pain, and the severity of weakness has a strong correlation with the severity of pain and physical limitation in a joint, and the findings of Recently, it has been shown that exercise therapy has played a very important role in improving the function of the knee joint.[6] The reduction of pain in manual therapy is due to the activation of the endogenous pain inhibition system, which has an inhibitory effect on the nerve roots connected to the spinal cord as well as the nerve roots in the damaged area and prevents the spread of pain to other parts of the body. It prevents and is one of the ways to remove waste materials from muscle tissue. When menolotherapy is performed, due to the increase in blood flow in the muscle, more nutrients and oxygen reach the tissue, and other treatment approaches of menolotherapy are to eliminate spasm and adhesion created after injury, which improves the movement and function of the joint and its effects. maintains it for a long time after the intervention [7].

Massage therapy and monoaltherapy in this condition reduces the intensity of pain, maintains mobility and improves joint function, according to the condition of the athlete and the course of the disease. And regular exercise is done. [8][9] Research has shown that athletes who are injured in the lower region have less ability to maintain balance while walking, which is due to limitations in the length and speed of walking. In case of imbalance, sometimes people respond by taking faster and bigger steps while walking, and the person should be able to return a balance imbalance from step time and step length and a sequence of slow implementation of large step. Do it with a small quick step. Therefore, the ability of a person to take a step has a direct relationship with both the length and width of the step and the step time. As it was said, the ability to take steps during daily and sports activities is a very important factor in preventing injury, and any disturbance in the walking pattern can increase the possibility of body injuries.[10] Chronic knee pain in the advanced state prevents a person from exercising and incapacitates the athlete for a long time, and in addition to the physical aspects and impairment in exercise, including the inability to perform the correct technique and slowing down the person due to the presence of pain, it causes a decrease in people's life satisfaction in aspects Mental disorders include discomfort, depression, self-confidence reduction, etc. [11] According to the research done on knee injury in women, rhythmic movements are an important and vital issue, and many dancers do not seek full treatment until the injury is completely caused, because resting or changing the routine of exercises is very difficult and annoying. For this reason, prevention and treatment of chronic injuries caused by techniques are very important. As it can be seen from the background of the research, so far few researches have been done regarding the simultaneous effect of two therapeutic methods of corrective exercises and menolotherapy on hamstring shortness, pain and step speed on women with rhythmic movements with non-specific chronic knee pain and since there is a special internal research with similar characteristics. The present research aims to answer the question of whether a course of corrective exercises and menolotherapy can be effective on hamstring shortness, pain and step speed of women.

2) research method

This research was carried out using a pre-test and post-test design in a purposeful and accessible manner with a control group in a double-blind and counterbalanced manner. The sample of this research includes 30 female athletes (20 in two experimental groups and 10 in the control group) in the field of rhythmic movements with chronic knee pain and hamstring muscle shortening (the sample size was obtained based on G*Power software) They were randomly divided into three groups of 10 people. The criteria for entering the research included: age range from 18 to 35 years, performing sports exercises for at least two years, regular exercise history, and the exit criteria also included: disability and pain during the test and unwillingness of the subjects to The test was continued. The control group also continued with their rhythmic movements exercises in parallel. All the athletes from the rhythmic movements field with symptoms of chronic knee pain and shortness of hamstring muscles entered the research. The ethics approval of this research was obtained from the Ethics Committee of Raja Qazvin University (code of ethics approval number).

Test protocol

The participants were requested to hold a meeting before the start of the research in order to familiarize the subjects with the method of performing corrective exercises, monotherapy treatment and filling in the consent forms and individual specifications, and after the researcher's explanations, in order to further examine the analog questionnaire. It was done visually to measure pain level (vas: Visual Analog Scale) and knee function. The first and second groups (remedial exercises and treatment group of menolotherapy) performed stretching and strength exercises and menolotherapy protocol, and the control group continued with their rhythmic movements. Before and after the application of corrective exercises and the treatment method of monoaltherapy and rhythmic movements, the desired variables with tools For hamstring shortness, SLR (Straight Leg Raising Test) was used with goniometer, VAS questionnaire was used to measure pain, and meter and cornometer were used for step speed, and the results before and after applying the variables were examined. which will be explained later.

2-1) How to perform corrective exercises

The first warm-up is 5 to 15 minutes, which includes jogging and invigorating exercises. Cool down exercises include 5 to 10 minutes of light stretching exercises. And 35 to 40 minutes of corrective exercises have been performed and the exercises have been performed in a period of 6 weeks (three days a week and 1 hour each day) along with increasing the intensity and repeating the movements.[11]

Table 1: Corrective exercise protocol

The number of repetitions	Strength training
10 x 3	Squat with the wall
10 x 3	Stepping on a single leg step
10 x 3	Lounge
10 x 3	Low-range squat with bosoball
Time in seconds	Stretching exercises
3x30	1) hamstring stretch, bending the trunk forward while standing with touching the toes
3x30	2) Hamstring stretching, bending the trunk forward while touching the toes
3x30	3) Lying hamstring stretch with raising one leg
3x30	(single leg standing hamstring stretch)



Figure 1: Implementation of the corrective exercise protocol

Monoaltherapy protocol

It includes 6 weeks of monoaltherapy protocol (3 days each week and 15 to 30 minutes each day), which includes performing 4 techniques (compression, flat hand pressure, pincer technique, manual cylinder) along with repetition [12, 8]

Hamstring length measurement

In this case, while the person is lying on his back, the researcher places the center of the goniometer on the hip joint from the side of the body, and its fixed arm is placed on the trunk line and the stimulating arm is placed on the thigh line, then the person raises his leg as far as he can. The researcher moves the moving arm of the goniometer at the same time and in line with the patient's leg, and the range of motion of the hip joint in this state can be calculated up to 135 degrees, but on average, for ordinary people, this value is below 100 degrees. After repeating three times, the best record is obtained. It is registered. [5] A universal goniometer with an international standard was used to measure the range of motion of the length of the hamstring muscles.



Figure 2: Measuring the length of the hamstring muscle with a goniometer

Visual analog scale measurement of pain

This scale is for measuring the intensity of pain, which consists of a 10 cm line printed on paper with markers at each end, at one end (no pain) and at the other end (indescribable pain), and the subject is marked with a cross. He marks the intensity of his pain and finally the researcher records the number of pain by counting the number.[13]

Step speed measurement method

First, a 20-meter path is measured with a tape measure, and the subject stands at the starting line while the researcher sets the time to zero. The time starts when the subject begins to move, and the subject starts walking at the maximum possible speed until the finish line, where the researcher sets the time. stops and the number is registered by hand.[14]

The method of statistical data analysis

In order to analyze the statistical data of this research, descriptive and inferential statistics were used and Shapiro-Wilk test was used to check the normal distribution of the data and descriptive statistics were used to determine the mean, standard deviation, committee and maximum of the data. In the inferential statistics section, the Lone test and two-way analysis of variance were used to examine the changes in the measured parameters before and after corrective exercises and monoaltherapy, and a significance level of (0.05) was considered for all statistical tests.

findings

The research findings have been done in two parts, the first part includes descriptive information about central and dispersion indicators such as mean, standard deviation, and in the second part, the inferential methods of data analysis are mentioned. A description has been used to present the individual characteristics of the subjects as well as the research variables. Demographic information in the form of standard deviation and average is given in Table 2.

Table 2: Descriptive characteristics of subjects

Measurement index	group of subjects	Average The standard deviation
age (years)	Control	26.4 ± 1.91
	Corrective exercises	26.7 ± 1.88
	manual therapy	27.5 ± 2.1
height (cm)	Control	1.65 ± 0.06
	Corrective exercises	1.64 ± 0.04
	manual therapy	1.67 ± 0.09
weight (kg)	Control	60.3 ± 6.62
	Corrective exercises	63.1± 3.42
	manual therapy	69.2± 4.61
BMI	Control	22.33± 3.26
	Corrective exercises	23.37±1.89
	manual therapy	24.71± 2.42

Table 3: The results of covariance analysis using t-test to compare the variables in the post-test between the groups

p	T	post-test	pre-test	group	Variable
0.27	1.15	63.2 ± 7.96	64.6 ± 8.08	Control	Right hamstring shortness (by degree)
0.001*	12.93	70.5 ± 0.64	65.1 ± 0.60	Corrective exercises	
0.001*	14.4	72.1 ± 5.69	63.7 ± 0.95	manual therapy	
0.05	2.44	67.9 ± 7.53	67.8 ± 7.40	Control	Hamstring shortness Left (in degrees)
0.001*	9.68	71.2 ± 5.69	67.2 ± 6.68	Corrective exercises	
0.001*	8.2	73.1 ± 5.78	66.9 ± 6.02	manual therapy	walking index (step speed in meters per second)
0.067	---	9.2 ± 1.87	9.6 ± 1.49	Control	
		11 ± 1.66	11.87 ± 1.69	Corrective exercises	
		11.55 ± 1.82	10.56 ± 1.87	manual therapy	
0.05	7.59	7.57± 0.46	8.20 ± 0.46	Control	pain (according to points)
0.001*	25.09	3.30 ± 0.64	8.48± 0.60	Corrective exercises	
0.001*	19.98	2.33 ± 1.32	6.02 ± 1.31	manual therapy	

The shortness of the hamstring muscles causes mechanical pressure on pain-sensitive structures such as the stretching of ligaments, capsule, or the compression of blood vessels, and the expansion or compression of nerve endings and the feeling of pain.[15] This type of irritation occurs without inflammatory reactions, so it is a mechanical problem, and decompression by performing a variety of therapeutic methods can remove the pressure from the pain-sensitive structures and eliminate the irritation. As a result, muscle weakness or muscle imbalance causes abnormal movement in different parts of the body and changes the normal function of the body and can also cause damage to different organs of the body. Changing the angle of the knee causes pressure on increase on the knee joint because the kinematics and arthrokinematics of the knee have changed, and when there is a change in the joint and the human movement system is out of alignment, it creates a series of predictable patterns of dysfunction and tissue overload. This leads to the reduction of neuromuscular control and the creation of microtrauma and starts the cycle of cumulative damage. The cumulative cycle of injury causes the reduction of myofascial components and adhesion, which subsequently leads to longitudinal tension and the arthrokinematics of the joint changes. (23) Menolotherapy can release the fascia around the knee joint.[16] And the myofascial strengthening of the muscles from spasm increases the blood supply and range of motion of the joint, and the pressure on the reduced joint reduces the pain.[17]

According to the above problems, the purpose of this research was to investigate the effect of a course of corrective exercises and menolotherapy on hamstring shortness, pain and step speed, and based on the findings and the test of the research hypotheses, the results of the analysis of covariance show that there is a significant difference between the average There is pain in the joint and the length of the hamstring muscle before and after applying a 6-week combined program of corrective exercises and selected monotherapy in the two experimental groups compared to the control group, which is the average difference in the pre-test and post-test stages in the amount of pain and muscle length detection results. There is a significant difference, but the

hypothesis of the effect of a course of corrective exercises and menolotherapy on the step speed of women with rhythmic movements with non-specific chronic knee pain does not have a significant effect. And the research results show a significant difference between the mean and analysis of covariance on the step speed variable after applying the combined program. 6 weeks of corrective exercises and monotherapy in three control groups, corrective exercises and monotherapy did not show significant results.

The general results show that corrective exercises and monotherapy can be a suitable treatment method to improve the symptoms of hamstring shortness and pain in women with non-specific rhythmic movements with chronic knee pain, but it does not have a significant effect on the step speed variable. According to the above research, Jin Hyuk Lee et al.(2021) conducted a study on the effects of static and dynamic stretching with strengthening exercises in patients with patellofemoral pain who had inflexible hamstrings. The results show that in patients with PFP, Inflexible hamstrings, dynamic and static stretching of hamstrings along with strengthening exercises have been effective in increasing muscle length and strength. [13] In line with the results of this research, Golpaigani et al. (1400) investigated the effect of trunk stability exercises and knee strengthening exercises to improve the pain of female athletes with patellofemoral pain syndrome. The results of their study were that a course of knee strengthening exercises and central trunk stability exercises could affect the pain of women with patellofemoral pain syndrome.[18] In line with the present research, Etsami et al.(1401) also concluded in their study that the comparison of eight weeks of therapeutic exercises in land and water on the functional activities of women with knee osteoarthritis can affect the performance and pain intensity in affected women. section [19]. Raquel Vaquero et al. (2020) conducted a research aimed at the differences in hamstring expansion among young and adolescent elite dancers with different dance styles. They concluded that systematic dance training regardless of style had an effect on hamstring muscle length.[20] Fagmin et al. (2016) conducted a study titled the effect of massage on the isokinetic muscle strength of patients with knee osteoarthritis. The result shows that massage therapy has significantly reduced pain and improved muscle strength in patients with knee osteoarthritis, but had no effect on muscle ROM.[21] The results obtained in the research of Aqil M. Al-Nazi (2020) with the aim of investigating the effect of exercise therapy on the association of diabetes with knee pain, pain while walking and walking speed in the data of the knee osteoarthritis initiative, the results of this research show that knee pain while walking (whatever If the intensity of the pain is greater, the walking speed decreases in patients with knee osteoarthritis) The results of this research are not consistent with the research done. [14]

and the reasons for the lack of significant effect of two factors of corrective exercises on the step speed of women, rhythmic movements with non-specific chronic knee pain, in comparison in the above parallel and similar researches, the results have been significantly positive in the step speed variable, and most of the corrective exercises and menolotherapy and massage have an effect It has a significance in the walking speed of people, but in this research, women athletes with rhythmic movements suffering from non-specific chronic knee pain, according to the vas questionnaire, which was seen again after the results, shows that most of the subjects felt pain while walking and resting. They did not have discomfort in the knee joint, and most of the pain and discomfort was felt during moderate to heavy exercise and in the mornings after sleep, and these results show that due to the absence of pain, most of the subjects had a significant effect on walking speed. Subjects have not been observed after 6 weeks of training and manual therapy. According to the conducted research, it shows that most of the research related to step speed was conducted on the elderly and the elderly were disturbed in the step speed due to the decrease in muscle strength and range of motion and balance, and by performing exercises related to increasing physical fitness, it caused a significant impact on on their walking index, but professional and semi-professional athletes are engaged in training, due to the high physical fitness factors and lack of severe muscle atrophy, and a severe decrease in range of motion in step speed and no pain while walking, the results after 6 weeks of exercises Correction and manual treatment has not been significant.

summary and Conclusion

The aim of the current research is the effect of a course of monoaltherapy protocol on hamstring shortness, pain and step speed of rhythmic movements of women with non-specific chronic knee pain according to the research and the results of similar research and the result of the present research on two experimental groups and the control group as follows. The effect of a course Corrective exercises and monotherapy have a significant effect on the shortness of the hamstrings of women with rhythmic movements with non-specific chronic knee pain, $p \leq 0.05$. The effect of a course of corrective exercises and monotherapy on the pain of women with rhythmic movements with chronic non-specific knee pain has a significant effect. $p \leq 0.05$. The effect of a course of corrective exercises and manual therapy on the step speed of rhythmic movements of women with non-specific chronic knee pain has no significant effect, $p > 0/05$.

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