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Effects of Therapeutic Ultrasound with and without Trigger Point Release of Hamstring on Knee Pain, Range of Motion and Quality of Life in Patients with Hamstring Tightness - RCT

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A B S T R A C T

Background: Hamstring muscles defined as the three distinct components which collectively are situated in the rear of the knee regions make up the muscles known as the hamstrings.

Objective: To associate the special properties of therapeutic ultrasound with and without trigger point release of hamstring on knee pain, range of motion and quality of life in patients with Hamstring tightness.

Methodology: In the Physiotherapy Department of the University of Lahore Teaching Hospital, 36 patients were split into two equal groups for a randomized clinical trial. Group A received conventional physiotherapy whereas Group B received Therapeutic Ultrasonography along with conventional physiotherapy.. Data was gathered using a universal goniometer, timed up and go test, and visual analog scale at baseline, eight weeks, and twelve weeks utilizing non-probability sampling technique. SPSS version 24 was used for data analysis.

Result: Following eight and twelve weeks, an independent sample t-test revealed a significant difference among both teams, Group B which received Therapeutic Ultrasound with conventional therapy showed significant results.. Additionally, a significant difference between periods was shown by repeated measures ANOVA among every group receiving treatment.

Conclusion: The study concluded that Therapeutic Ultrasound with physiotherapy is more effective for improving knee pain, Range of Motion and Quality of Life as compared to conventional physiotherapy in subjects with Hamstring tightness.

Keywords: Therapeutic Ultrasound, Joint range of motion, Trigger points, Hamstring muscles

Introduction

Hamstring muscles are defined as the three distinct muscle components which collectively are situated in the rear of the knee regions, these constitute the elongated base of the muscles of the biceps longitudinally, semitendinosus, or semimembranosus diagonally. The hamstring muscle incorporates both hip and knee joint as it is a two joint muscle.[1] Tightness in the hamstring muscle complex can restrict knees motion or increase the possibility of injury.[2]

Knee pain is defined as discomfort felt within or around the area of the knee which could be indicative of a problem damaging the joint or the connective tissues surrounding the kneecap. [3 4] Being unable to achieve a maximum of 160∘ of extending the knee while keeping the hips at 90∘ of flexion is referred to as hamstring tightness. Hamstring tightness is frequently treated with stretches. Static or dynamic stretching has also been shown in multiple investigations to be effective in easing hamstrings stiffness. Prolong tightness in the hamstrings may result in additional complications since it may trigger thigh or backache.[5]

Using Therapeutic Ultrasound to treat symptoms of osteoarthritis is meant to improve blood flow and hasten the course of inflammatory repair. TUS converts electric energy to sound energy, that travels across variously resistant cells with a capability to generate heat a. By utilizing its heat generating ability, US treatment can cause physiological outcomes such as an increase in discomfort thresholds, changes in neural activity that result in relaxed muscles, initiation of regeneration of tissues, or reduced swelling.[6]

Physiotherapy must be performed for recovery as well as to lower the possibility of another injury because of the elevated incidences of repeated ruptured hamstrings. This is particularly crucial for individuals who have persistent hamstrings tendinitis, since their shortened hamstring tendons thickness is a consequence of its healing. .[7]

MTrPs can be linked to a number of musculoskeletal conditions, including fibromyalgia disorder, shoulder impingement, persistent tension-type migraines, or neck discomfort. One can characterize the MTrPs as dormant and functional. A dormant MTrP, in stimulation/digital tension, fails to replicate symptoms encountered earlier by the individual being treated, as well as have the indications which are generated similar In contrast, active MTrPs may generate symptoms the individual is acquainted with or recognizes such as referred pain, deep or dull painful sensations and paresthesia. .[8]

The rationale of this study was to find out the effects of Therapeutic ultrasound with and without trigger point release of hamstring on knee pain, range of motion and quality of life in patients with hamstring tightness. It will add choice for selection of appropriate treatment for better results. Many studies have been conducted to evaluate the various forms of ultrasound therapy for knee pain with trigger point release, Moreover, few placebo- controlled trials have examined the effectiveness of therapeutic ultrasound. The impact of US however has been observed to produce significant effects. However, there is limited evidence on combined effects of US and trigger point release on Hamstring tightness.[9]

Methodology

This Study was a Randomized Control Trial conducted at the physiotherapy department of University of Lahore teaching hospital, Lahore after the 9 months approval of synopsis with ethical approval reference no. REC-UOL-/370/08/24. Outcome measures used were universal goniometer for ROM, Visual Analog Scale for pain and WHO Quality of Life scale brief used for Quality of life. The non-probability purposive sampling technique was applied. Open epitool was used to determine sample size which was calculated to be 36. Each group had 18 randomly assigned subjects. Participants were randomized by using computer generated method. Single blind protocol was used to ensure that patients were not aware of treatment plan administered to other group..[9]

The study included age range between 19 to 47 years., Both male and female patients, who were unable to accomplish higher than 160 degrees of knee extension and 90 degree of hip flexion due to hamstrings stiffness, experiencing pain that lasts longer than three weeks, having hamstring muscle with a single trigger point On diagnosis were included. The diagnosis involved making contact with a tense muscular stretch underneath. If the taut band contained a highly reactive spot, a Pain scored of at least three on the original assessment's Visual Analog Scale, and a well- known painful jump sign that happened whenever a taut band is stimulated. [9] Subjects with a previous experience of acute or chronic illnesses, including physiological, cognitive, or cardiovascular conditions; cutaneous sores; viruses; and irritation around the triggers point, past experiences with severe injuries to the knee, including sprains of PCL and ACL ligaments of knee,, muscle strain , or disruption to the leg's lining tissues, ankle surgical histories., acute or long-term strained hamstrings, Damagto soft tissues near the region of the knee, recurrent lower extremity trauma with stiffening (knees fractures) were excluded from the study.[9]

Interventional protocol: Both Group A and B were given routine physical therapy as a baseline treatment. Group A only received the routine physical therapy for hamstring which included stretching, strengthening and range of motion exercises 4 times a week, exercise session to comprised of 30 minutes according to patient choice of days and without using the ultrasound for knee pain and trigger point release.[9]**:** The Experimental Group i.e Group B received routine Physiotherapy along with Ultrasound for knee pain with trigger point release For this the patient was put in a

prone state, with arms adjacent to their bodies, and the head in a neutral position for the trigger point. The MTrP was covered with the ultrasound probe (Model: Ultrasound 620 p, Novin business). The intensity was raised from 0.5 to 2 w/cm2 and the frequency was adjusted to 1 MHz until the patient complained of an uncomfortable feeling. After holding the probe for four seconds, the level of stimulation was lowered by fifty percent, and the probe was relocated all throughout the MTrPfor three minutes. This technique was repeated multiple times. The active knee extension test was used to determine whether or not the subject had tight hamstrings. The individual was lying supine with his knee flexed and his hip flexed ninety degrees. Pelvis, which regulates the movement of the accessories, was fastened down to the table for stability. Next, the participant was instructed to extend their knee until they felt a slight stretch. The final reading was determined by calculating average of the readings of the three repetitions.[9]

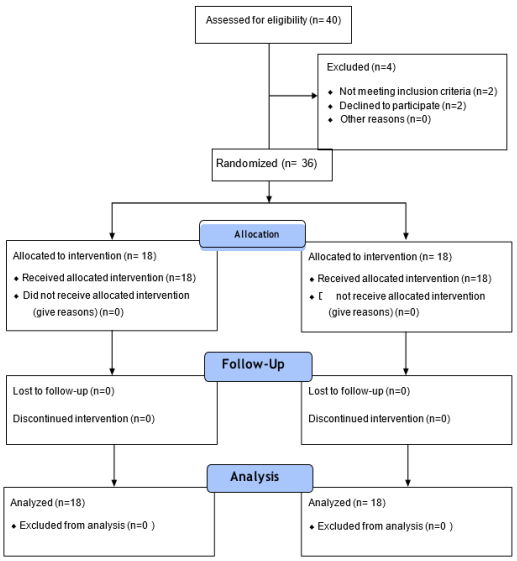

Figure 1: CONSORT Diagram

Results

Descriptive Statistics of Demographics in Both Groups

The mean value of age of participants for Group A was found to be 37.05±6.53 and Group B 32.61±8.98.In control group males were 13 (72.2%) and females 5 (27.8%). Likewise, the males and females in experimental group were 17 (66.7%) and 43 (93.3%) respectively.

TABLE 1: Test of Normality for Visual Analog Scale, Range of Motion, Time up And Go Test, Quality of Life

Kolmogorov Smirnov test		
Variables	**Statistics**	**Sig.**
VAS at baseline	.869	0.06
ROM at baseline	.988	0.95
TUG at baseline	.966	0.32
QOL at baseline	.945	0.07

Table 2: Independent Sample T Test For Visual Analog Scale, Range Of Motion, Time Up And Go And Quality Of Life

	Study Groups			
VAS	**Control Group**	**Experimental Group**	**Sig.**	**t**
Baseline	6.77±0.95	7.00±0.97	0.39	-0.86
At 8 weeks	5.83±0.78	4.16±.0.98	<0.001	5.61
At 16 weeks	5.16±0.92	1.72±0.82	<0.001	11.97
ROM	**Control Group**	**Experimental Group**	**Sig.**	**t**
Baseline	90.72±4.08	91.38±3.83	0.61	-0.50
At 8 weeks	94.66±4.10	109.72±4.62	<0.001	-10.41
At 16 weeks	97.27±3.98	129.05±3.53	<0.001	-25.30
TUG	**Control Group**	**Experimental Group**	**Sig.**	**t**
Baseline	39.72±3.13	39.38±3.16	0.75	0.31
At 8 weeks	37.38±3.18	35.50±2.99	0.03	2.26
At 16 weeks	36.05±3.36	25.00±3.59	<0.001	9.51
QOL	**Control Group**	**Experimental Group**	**Sig.**	**t**
Baseline	61.77±7.59	60.33±6.28	0.53	0.62
At 8 weeks	66.83±7.78	67.16±6.67	0.89	-1.38
At 16 weeks	69.88±8.05	73.88±7.27	0.12	-1.56

Table 3: Repeated Measure ANOVA For VAS, ROM, TUG And QOL Test Of Within Subjects Effects

		Type III sum of square	Mean square	F	Sig.
VAS	**Sphericity assumed**	210.68	105.34	92.19	<0.001
	Greenhouse-Geisser	0.57	183.25	92.19	<0.001
ROM	**Sphericity assumed**	8800.38	4400.19	66.19	<0.001
	Greenhouse-Geisser	0.51	8557.27	66.19	<0.001
TUG	**Sphericity assumed**	1530.38	765.19	77.00	<0.001
	Greenhouse-Geisser	0.50	1511.79	77.00	<0.001
QOL	**Sphericity assumed**	2119.15	1059.59	279.38	<0.001
	Greenhouse-Geisser	0.59	1788.17	279.38	<0.001

Discussion

In this study, we demonstrated the effects of Therapeutic ultrasound with and without trigger point release of Hamstring on knee pain, range of motion and quality of life in patients with hamstring tightness. The study involving 36 participants divided into two groups showed significant improvement in various aspects compared to the control group using tests like TUG, VAS, and Quality of Life, at 8th week and at 16th week. There were noteworthy decreases in pain as assessed by the Visual Analog Scale (VAS), major improvements in Range of Motion (ROM), and faster timings in the Timed Up and Go (TUG) test. No discernible variations existed comparing the control and experiment groups over all in the given periods when assessing Quality of Life (QOL) levels.

In previous research the impact of static stretches was demonstrated in combining muscle energy technique and ultrasound on the hamstrings flexibility of participants with the hamstrings tightness. The study aimed to investigate if Muscle Energy Technique approach or ultrasound combined with static exercise could enhance hamstring flexibility in 30 healthy patients with stiffness. For those suffering from hamstrings stiffness, muscle energy technique was more successful method to increase flexibility in the hamstrings then ultrasound treatments paired with static stretches. A larger number of participants and a more diverse range of individuals in future studies could assist and confirm these results and investigate the beneficial effects over time of Muscle Energy Technique in contrast to other therapeutic techniques.[9]

The purpose of the previous research was to assess the way Range of Motion (ROM) in patients with Osteoarthritis Genu of the health care physiotherapy clinics at Immanuel Hospital Bandung were affected by the provision of Ultrasound Therapy with Muscle Energy Technique. Twenty individuals suffering from osteoarthritis genu were included in the previous investigation. The mean range of motion (ROM) in Group 1 was 120 before Ultrasound Therapy and Muscle Energy Technique, while in Group 2 it was 123.05 post-treatment. This combined therapy probably helped participants' general quality of life by lowering stiffness in the joints or discomfort. Research indicates muscle-energy techniques and ultrasound treatment can alter the range of motion in osteoarthritis patients, with future studies requiring more samples and follow-ups for generalization.[10]

The Previous study studied the impact of dry needling for trigger points on discomfort and impairment in patients with knee arthritis, either alone or in combination with other therapies. A meta-analysis of 10 studies found that dry needling had modest effects on pain reduction and functional improvement in short-term outcomes compared to the control group.[11]. In view of discomfort in the knee, our research found that both treatment modalities were effective for people with hamstrings tightness; however, the combination of physiotherapy and therapeutic ultrasound alongside a trigger point relief procedure yielded a noticeably better outcome than the straightforward physiotherapy regimen.

The previous research assessed that the two techniques Open kinetic chain exercise and Close kinetic chain exercise are useful in lowering knee discomfort and rigidity as well as enhancing isokinetic strength of muscles, WOMAC, and SF-36 ratings in individuals having knees Osteoarthritis. Three groups of recipients had been assigned: twenty for open kinetic chain activities, twenty for closed kinetic chain activities, or twenty for the placebo group Additionally, it showed that the advantages of consistent, closely monitored close kinetic chain exercises or open kinetic chain exercises are superior to people who have unattended personal training regimens. It is advised that further researches look into the impacts of the close kinetic chain exercises or activities with more extended frame.[12]

. The intervention of Ultrasound along with trigger point release in hamstring tightness significantly improved participants' quality of life scores, indicating a positive impact on their overall well-being and demonstrating its effectiveness in various health and function dimensions

Conclusion

The study found that both therapeutic ultrasound and trigger point release were effective for hamstring tightness, improving knee pain, mobility, and function. However, combining therapeutic ultrasound with trigger point release and physical therapy showed significantly better results than physical therapy alone. Pain reduction (VAS), improved range of motion (ROM), and faster Timed Up and Go (TUG) test performance were observed. No significant differences in Quality of Life (QOL) were noted between control and experimental groups. Overall, the combined approach proved more beneficial for knee pain management.

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