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IMMEDIATE EFFECT OF INTEGRATED KINETIC CO-CONTRACTION ON YOUNG HEALTHY INDIVIDUALS WITH HAMSTRING TIGHTNESS.

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ABSTRACT

Background: Hamstring tightness is one of the most common musculoskeletal problem faced by individuals. Many studies had found out that maximum 70% of adult population was suffering with hamstring tightness and mostly it causes with the age group 20-40 years. Inadequate stretching and exercise in combination with prolonged sitting with sedentary lifestyles has been linked with hamstring tightness. The aim of the study was to determine the immediate effect of integrated kinetic co-contraction on young healthy individuals.

Methodology: 100 participants were taken in the age range of 18-25 years. All the participants were assessed with active knee extension test (AKT) before and after the intervention. The participants were divided into 2 groups, Group A 50 participants were given (HWF+ passive hamstring stretch) for 3 repetitions with 30 second hold and Group B 50 participants were given (HWF+ Integrated kinetic co-contraction) for 15 repetitions with 3 sets each.

Results: Unpaired t-test showed that there was significant difference in AKT score in Group A (19.06±1.973) and in Group B (22.96±1.678).There was statically difference found between both the groups, which showed Group B was more beneficial than Group A with (p=<0.001,t=10.647,df=98).

Conclusion: The study concluded that there was immediate effect of Integrated kinetic co-contraction on young healthy individuals with hamstring tightness.

KEYWORDS

Integrated kinetic co-contraction, Passive hamstring stretch , hamstring tightness, young healthy individuals, AKT.

1. INTRODUCTION:

Hamstring tightness is one of the most common musculoskeletal problem faced by individuals. Many studies had found out that maximum 70% of adult population was suffering with hamstring tightness and mostly it causes with the age group 20-40 years. Tightness in hamstring muscles leads to hamstring injuries and hamstring injuries are the most common type of injury among individuals. These injuries are slow to recover, make high health expenditure and decrease the performance level of the individual.[2]

Many of the etiologies have found that hamstring tightness gives rises to numerous numbers of musculoskeletal problem. Incapacity to extend the knee totally when the hip is flexed along with distress or pain along the posterior thigh and/or knee is generally attributed to hamstring muscle tightness. Clinically hamstring muscle length is not measured straight but as an alternative it is specified indirectly by angular measurements of unilateral hip flexion with the knee extended. Hamstring muscle tightness is defined as Knee Extension Angle (KEA) lesser than 20 degrees where KEA is the degree of knee flexion from terminal knee extension.[2,3]

The hamstrings are a group of three muscles: the semitendinosus, semimembranosus, and biceps femoris; located on the posterior portion of the thigh. They collectively originate from the ischial tuberosity and insert on the tibia or fibula .The semitendinosus and semimembranosus are both located medially and insert on the superomedial tibial shaft and posteromedial aspect of the tibial condyle respectively. The biceps femoris is situated laterally and inserts on the head of fibula. Hamstring contraction mainly causes knee flexion and hip extension and also contributes in rotation. The biceps femoris which inserts laterally acts in lateral rotation, while the medial attached muscles assist in medial rotation of the knee.[4]

Inadequate stretching and exercise in combination with prolonged sitting with sedentary lifestyles has been linked with hamstring tightness. Because of the hamstrings origin on the ischial tuberosity, tightness in the hamstrings may cause the pelvis to tilt posteriorly.[4]

Muscular flexibility is significant feature of regular human function. Restricted flexibility has been exposed to predispose a person to numerous musculoskeletal overdoing injuries and significantly disturb a person's level of function. Musculoskeletal overdoing injuries ensuing from reduced lower extremity flexibility range as of stress fractures and shin splints to patellofemoral pain syndrome and muscle straining. Muscle strains are particularly common in multi joint muscles, which have a greater functional excursion and tend to have a higher concentration of fast-twitch muscle fibers . The hamstring muscles are reported to be the most commonly injured multi joint muscle group in the body . Keeping usual muscle length needs regular stretching to avoid muscle stiffness and benefit from the decreased danger of musculoskeletal injuries and enhanced physical performance .[5]

2. METHODOLOGY:

2.1 Participants: An approval for the study was obtained from the Institutional Ethical Committee (Ref no-PIMS/DR.APJAKCOPT/IEC/2019/463).The study was conducted in OPD setting of Dr. APJ Abdul Kalam College of Physiotherapy.100 participants aged between 18-25 years, both males and females willing to participate were included. Exclusion consisted participant with previous hamstring injury , participant who exercise regularly , having open

wound on posterior aspect of thigh, having acute and chronic hamstring strain.The written consent was obtained prior to the study.100 participants were divided randomly into 2 groups respectively . Pre-treatment assessment and Post-treatment assessment was recorded. Group A included 50 participant who were given Hot water fermentation (HWF) along with passive stretching for hamstring muscle,3 set each with a hold of 30 seconds for each extremity. Group B included 50 participants who were the given Hot water fermentation (HWF) along with integrated kinetic co -contraction for 15 repetition , 3 set. Pre-treatment and Post treatment assessment were taken with the help of outcome measure of Active Knee Extension Test(AKT).

2.2 Measurements and outcome measures: Demographic data was collected, and the participants were evaluated with (AKT) Active knee extension .

ACTIVE KNEE EXTENSION TEST (AKT) Active knee extension test is used to check hamstring tightness. Participants will be assessed on a plinth in the supine position with both lower extremities extended. The participants were told to flex the hip to 90 degree and the participants were asked to extend the leg as much as possible while keeping their foot relaxed and to grasp the position for approximately 5 seconds. A standard universal goniometer was placed over the previously marked joint axis, and the goniometer arms were aligned along the femur and fibula .The AKE measurement was defined as the degree of knee flexion after terminal knee extension. Each knee was measured thrice, and the mean angle of the AKE test was used for analysis .[6] The participant showing angle less than<20 degree were selected.

2.3 Intervention:-100partcipant were selected Then this participant were divided randomly into 2 groups respectively . Pre-treatment assessment and Post-treatment assessment was recorded. Group A included 50 participant who were given Hot water fermentation (HWF) along with passive stretching for hamstring muscle,3 set each with a hold of 30 seconds for each extremity. Group B included 50 participants who were given Hot water fermentation (HWF) along with integrated kinetic co -contraction for 15 repetition 3 set. Pre-treatment and Post treatment assessment were taken with the help of outcome measure of Active Knee Extension Test(AKT).

3. DATA ANALYSIS AND RESULT:

	Group A		Group B	
	Mean	**SD**	**Mean**	**SD**
BMI	22.078	2.789	22.01	3.682
Age	20.06	1.284	20.98	1.684
AKT	15.26	2.008	15.5	1.940

Table 1 Table Comparing the Baseline measurements of both the groups, using Unpaired t test.

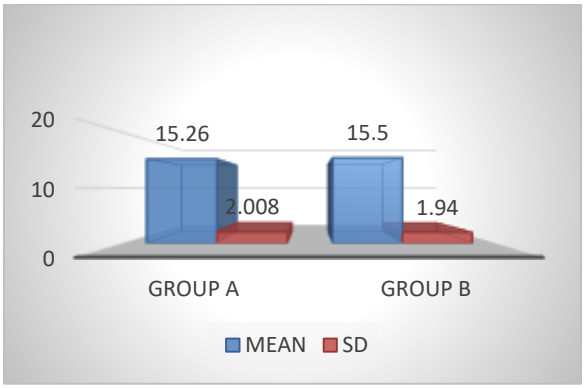

Figure 1: Graph showing pre intervention AKT scores.

3.2: RESULT: Severity of hamstring tightness was measured using Active knee extension test. paired t-test was done between pre and post interventional data coolected in group A (HWF&Passive hamstring stretch) (t=26.083, P=<0.0001& df=49) and group B (HWF& Integreted kinetic co-contraction) (t=33.742, P=<0.0001, df=48) Result showed that there was significant difference in Active knee extension test (AKT).

However there was greater improvement in Active knee extension test (AKT) scores of group B reciving HWF& Integreted kinetic co-contraction.When comparison was done between both the groups by Unpaired t-test(t=10.647, p=<0.0001& df=98) .

4. DISCUSSION: The present study aimed to find out the effectiveness Integrated kinetic co-contraction in young individuals .This comparative study of Conventional treatment & Integrated kinetic co-contraction led to the finding that group A and group B improved significantly in AKT score.

100 participants were included in the study according to inclusion and exclusion criteria then the participant were screened using Active knee extension (AKT). The participant were divided into two group respectively in which group A were having 50 participants receiving hot water fermentation (HWF) along with passive stretch and group B were having 50 participants receiving hot water fermentation (HWF) along with Integrated kinetic co-contraction . Combination of hot water fermentation along Integrated kinetic co-contraction showed much improvement in improving hamstring flexibility Results of present study showed that there was greater improvement in Active knee extension test (AKT) scores in group B by Unpaired t-test (t=10.647, p=<0.0001& df=98) .

The present study showed that there was effectiveness of Integrated kinetic co-contraction in healthy young individuals. This result was in accordance with study of Ninad Karandikar, Oscar O. Ortiz Vargas concluded that The principle of kinetic chains has been extensively used in biomechanical engineering for decades. The application of this concept to musculoskeletal medicine, sports injuries and amputee rehabilitation enables the prescription of individualized exercise programs.[1] Participant who received hot water fermentation (HWF) also showed improvement in flexibility, The reason for this might be increase in extensibility of collagen tissues, decreasing joint stiffness, relieving muscle spasms and increasing blood flow. Another study aimed that Inadequate flexibility is a contributing factor to muscle injury, especially with respect to the hamstring muscle group. This study associated 30 seconds of static stretching with 20 minutes of heat application on hamstring flexibility. A secondary purpose was to regulate the relationship between the subject's attitude toward each treatment and the efficacy of treatment. Thirty undergraduate student athletes who were current members of a Midwestern collegiate football team participated in a 2 (treatment: heat vs. stretching) by 2 (counterbalanced order: heat first vs. stretching first) repeated-measures design. Results indicated that significant benefits to increase hamstring flexibility could be gained by using moist heat packs in comparison with static stretching .[7]

Result analysis showed significant improvement in hamstring flexibility of young individuals using Hot water fermentation along with integrated kinetic co-contraction (group B) then using Hot water fermentation along with Passive hamstring stretch (group A) (t=10.647, p=<0.0001& df=98) .

5. CONCLUSION: The study concluded that Integrated kinetic co-contraction showed significant improvement in flexibility of Young healthy individuals with hamstring tightness.

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