Optimising Hip and Knee Joint Mobility in College Women Students: Assessing the Influence of Hydraulic Resistance Training with Self-Myofascial Release

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Article

Optimising Hip and Knee Joint Mobility in College Women Students: Assessing the Influence of Hydraulic Resistance Training with Self-Myofascial Release

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Abstract: Objective The aim of this study was to examine the impact of a modern lifestyle on college female students' health, specifically focusing on their hip and knee joint mobility. The objective of this study was to assess the influence of hydraulic resistance training with the self-myofascial release technique on improving joint mobility in female college students. The training also aimed to compare the effectiveness of hydraulic resistance exercise with and without the self-myofascial release technique on hip and knee joint mobility. **Methods** The study used a randomized controlled trial design to recruit 30 female college students aged 18-25 through campus advertisements and announcements. Medical conditions or injuries that might have affected participation was screened. Participants were indiscriminately allocated to Group A (Hydraulic Resistance Training with Self-Myofascial Technique) or Group B (Hydraulic Resistance Training without Self-Myofascial Technique). The baseline assessments included joint range of motion (ROM) measurements using a goniometer. Certified trainers supervised the training sessions, and the data were analyzed using SD and mean using SPSS. **Results** This study aimed to evaluate the impact of hydraulic resistance training with self-myofascial release on hip and knee joint mobility in female college students. The results showed that both groups showed improved hip and knee flexion with and without the self-myofascial release technique. However, the Group A using the self-myofascial release technique (Group A) showed a more significant enhancement, as indicated by the smaller p value compared to Group B. It has been suggested that the self-myofascial release technique may improve hip and knee joint mobility. **Conclusion** This study concluded that Hydraulic Resistance Training with Self-Myofascial Release (HSMR) could improve hip and knee joint mobility among female college students. These findings suggest that integrating the self-myofascial release technique into training regimens can improve joint mobility. However, further research with larger sample sizes and extended intervention periods was needed to understand the long-term effects and sustainability of these improvements.

Keywords: hydraulic resistance training; self-myofascial release; hip and knee joint mobility; female college students

INTRODUCTION

The dynamic and multifaceted nature of college women students' lifestyle emphasises its pivotal role in shaping their well-being and personal growth. The Characterized was a transitional phase of newfound freedom, exploration, and self-discovery, and it brings a unique blend of academic pursuits, social interactions, and personal responsibilities. The influence of diverse cultural, societal, and technological factors on their choices is acknowledged. Especially the impact of COVID-19 on college women students' lifestyles, considering the disruptions it has introduced to their routines, learning formats, and overall well-being. The subsequent sections will delve into specific components of their lifestyle, such as sleep, diet, physical activity, stress management, social interactions, and digital engagement. The goal is to comprehensively understand their lives, identify influencing factors, and explore opportunities for interventions to promote their overall health and well-being.

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The study aims to observe the influence of modern lifestyle on medical students' health through a literature review and a questionnaire. Findings reveal high percentages of sedentary lifestyles, breakfast skipping, and unhealthy diets among participants. The conclusion emphasises the need for individuals to be attentive to daily practices due to the potential adverse effects of modern lifestyle on quality of life(Victoire et al., 2022).

The study compares the caloric expenditure, heart rate, and perceived exertion of different exercise modalities, including treadmill, cycle, weights, and a hydraulic resistance system (HRS). The aim is to determine the most effective exercise method for energy expenditure and potential benefits for body composition and athletic performance (Falcone et al., 2015). The study comprised 60 healthy, untrained women randomly assigned to different training teams. The document provides information about the training procedures, testing procedures, statistical techniques, and results (Manosakthi & Kalimuthu, 2023a). The College women Students were lipid profile of TCL, LDL and HDL has significant change due to the influence of Hydraulic and ladder training (Manosakthi & Kalimuthu, 2023).

To determine the aimed to assess the acute effect of self-myofascial release on muscle flexibility in long-distance runners. The results showed that the self-myofascial release technique significantly improved muscle flexibility, particularly in the piriformis, adductor, and tensor fasciae late muscles. However, only the iliopsoas muscles showed improvement in the control group. These findings recommend that the self-myofascial release technique can improve muscle flexibility in long-distance runners (Sulowska-Daszyk & Skiba, 2022). This research explores the effects of an eight-week self-myofascial release regimen on the isokinetic strength ratio of hamstrings to quadriceps (H/Q Ratio) and the range of motion in the knee joint in male athletes experiencing hamstring shortness. Utilizing repeated-measure analysis of variance, the findings revealed a noteworthy augmentation in hamstring range of motion (ROM) among participants in the FOAM group (P = .001). The research suggests that employing self-myofascial release through foam rolling could be an effective method for improving hamstring ROM without negatively impacting the hamstrings-to-quadriceps (H/Q) ratio in individuals with hamstring shortness. The findings suggest that this technique could offer a valuable alternative to other stretching methods for improving flexibility while maintaining muscle strength(Hamzeh Shalamzari et al., 2022).

The aim of the study was to systematically assess and compare the impact of hydraulic training with and without self-myofascial technique on hip and knee joint mobility among college women students. The primary hypothesis proposed that hydraulic training with a self-myofascial release technique would provide similar significance in the range of motion and increase hip and knee joint mobility. Second, the hypothesis was that hip and knee joints would not be impaired after self-myofascial release invention but that decrements would be associated with hydraulic resistance training.

METHODS

Participants

Thirty college women students aged 18-25 will be recruited through campus advertisements and announcements. Screening for any medical conditions or injuries that might affect participants' participation in the study will be conducted.

Study Design

This study will service a randomised controlled trial design, randomly assigning participants to Group A (Hydraulic Resistance Training with Self-Myofascial Technique) and Group B (Hydraulic Resistance Training without Self-Myofascial Technique).

Procedure

Participants will be informed about the study's objectives and procedures. They will sign informed consent forms. For each participant, baseline assessments will be conducted, including a

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joint (ROM) hip and Knee joint mobility measures used by the goniometer. The goniometer can measure the joint angles. Participants will be unsystematically given to either Group A or Group B. Group A groups will conduct hydraulic resistance training sessions with the self-myofascial release(SMR) technique and Group B without SMR hydraulic resistance training thrice weekly for eight weeks. Certified trainers will supervise the sessions.

Hip Joint Mobility Measures

The manual measurement of hip joint flexion is crucial for assessing the hip joint's range of motion (ROM). It involves ensuring the participant's comfort in a supine position with extended and aligned legs. Reference opinions such as the anterior superior iliac spine (ASIS) and greater trochanter are identified and marked as landmarks. A neutral position is established with the goniometer to guide the opposite leg into hip flexion, eliminating lumbar curvature. During measurement, the patient is instructed to flex their hip while stabilising the opposite leg to prevent lumbar movement. The goniometer records the angle at maximum hip flexion, indicating the hip flexion ROM. Proper knee position is emphasised, as full hip flexion is accurate when the measured leg's knee is flexed, considering hamstring tension limitations.

Knee Joint Mobility Measures

Manual measurement of knee flexion utilising a goniometer is a fundamental technique for evaluating the knee joint's range of motion (ROM). The procedure involves positioning the patient supinely on an examination table with extended and aligned legs. Reference points like the lateral epicondyle of the femur and the side malleolus of the ankle are identified and marked as landmarks. The goniometer is applied by aligning its fulcrum centre over the lateral epicondyle, with one arm directed along the femur's lateral midline and the other arm along the lateral midline of the lower leg. The patient is then instructed to actively flex the knee while ensuring hip stability and opposing leg steadiness. The angle indicated on the goniometer when the knee reaches maximum flexion represents the knee flexion ROM.

STATISTICS

The data from each group were analyzed using mean and standard deviation in SPSS. A paired t-test compared pre-training and post-training scores within each group. Differences in hip and knee flexion between the left and right legs for both groups were assessed using a paired t-test. A significance level of ≤ 0.05 was employed to determine statistical significance, with a value below 0.05 indicating a significant difference between the compared values. The obtained results were discussed, and Table 1 presents paired samples t-test values for hip and knee mobility with and without the self-myofascial release technique and hydraulic resistance training.

RESULTS

All 30 participants completed the study with hydraulic resistance training with or without the self-myofascial release technique, and no participants had to drop out due to pain or other reasons. Table 1 presents the means ± SDs for all test parameters before and after eight weeks of the training schedule for groups A and B.

Table 1. PRE-TO-POST-INTERVENTION MEASURES OF THE HYDRAULIC RESISTANCE TRAINING WITH SMR (HSMR) AND HYDRAULIC RESISTANCE TRAINING WITHOUT SMR (HRT).

Group	Variables	Mean±SE	N	td. Deviation	T ratio	p-value
	Hip Flexion	**126.20± 1.13**	**15**	**4.39**	**12.77***	**.001**

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Hydraulic Resistance Training With SMR (HSMR)		**134.53± 1.29**	**15**	**5.02**		
	Knee Flexion	**130.33± 1.65**	**15**	**6.39**	**8.41***	**.001**
		139.93 ± 1.17	**15**	**4.55**		
Hydraulic Resistance Training Without SMR (HRT)	**Hip Flexion**	**127.33±1.70**	**15**	**6.61**	**3.34***	**.005**
		132.49±1.47	**15**	**5.70**		
	Knee Flexion	**129.01±1.72**	**15**	**6.68**	**3.52***	**.003**
		132.33±1.63	**15**	**6.34**		

Significant at 0.05 level of confidence Table value for df (14) at 0.05 level = 2.76.

Descriptive Analysis of Hip and Knee Flexion

A groundbreaking study unveils the contrasting impacts of Hydraulic Resistance Training with Self-Myofascial Release (HSMR) and Hydraulic Resistance Training without Self-Myofascial Release (HRT) on hip and knee flexion. The study involved two groups, each undergoing different training protocols, and measured the flexion angles of the hip and knee joints in pre- and post-test conditions.

Hydraulic Resistance Training With Self-myofascial Release (HSMR) Group

Hip Flexion: The participants in the HSMR group exhibited a mean hip flexion angle of 126.20 degrees with a standard error of 1.13 degrees. The data collected from a sample size of 15 individuals revealed a standard deviation of 4.39 degrees. A T ratio of 12.77 was calculated for the pre-post difference, and the p-value associated with this difference was found to be 0.001, indicating a statistically significant increase in hip flexion after the training program.

Knee Flexion: For knee flexion, the mean angle was 130.33 degrees, with a standard error of 1.65 degrees. The standard deviation was calculated as 6.39 degrees based on data from 15 participants. The calculated T ratio was 8.41, and the corresponding p-value was 0.001. These values indicate a statistically significant improvement in the knee flexion angle.

Hydraulic Resistance Training without SMR (HRT) Group:

Hip Flexion: The mean hip flexion angle in the HRT group was 127.33 degrees, with a standard error of 1.70. The SD, computed from an SS 15, was 6.61 degrees. A T ratio of 3.34 and a p-value of 0.005 were determined for the pre-post difference, demonstrating a statistically significant increase in hip flexion after the training.

Knee Flexion: The mean angle for knee flexion in the HRT group was 129.01 degrees, with a standard error of 1.72 degrees. The standard deviation was 6.68 degrees based on data from 15 participants. A T ratio of 3.52 and a p-value of 0.003 indicated a statistically significant improvement in knee flexion angles following the training program.

In this study, the group using hydraulic resistance training with the self-myofascial technique (Group A) shows a more significant result regarding improving hip and knee joint flexion and mobility. It is indicated by the smaller p-value compared to the group without the self-myofascial technique (Group B) with a p-value. The substantial evidence provided by the small p-value for Group A suggests that the self-myofascial technique likely contributes to the observed hip and knee flexion improvement.

The Pre and Post-test mean values graphically represented the hydraulic training group with and without self-myofascial release technique groups on hip and knee joint flexion in Figures 1 and 2.

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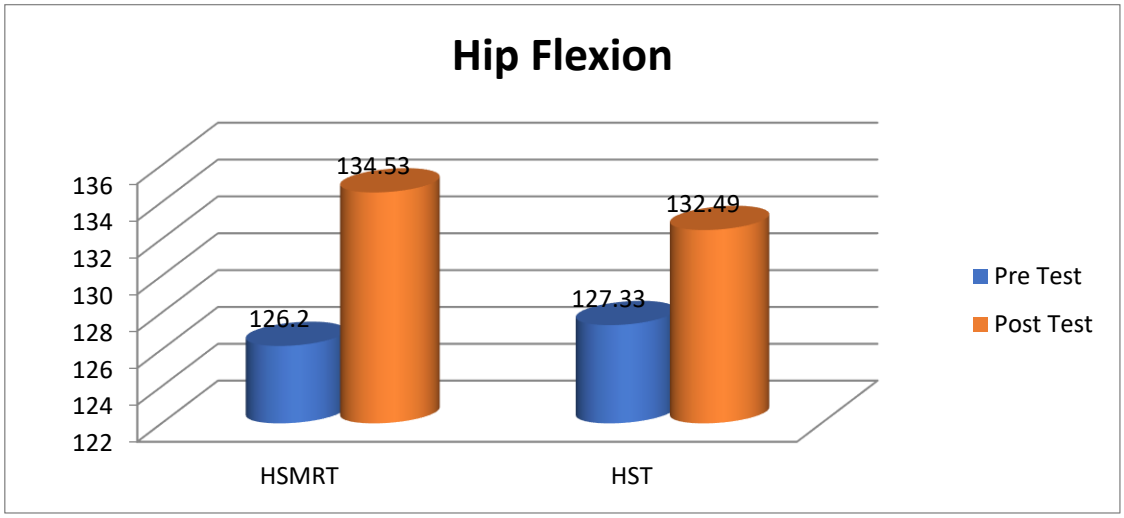

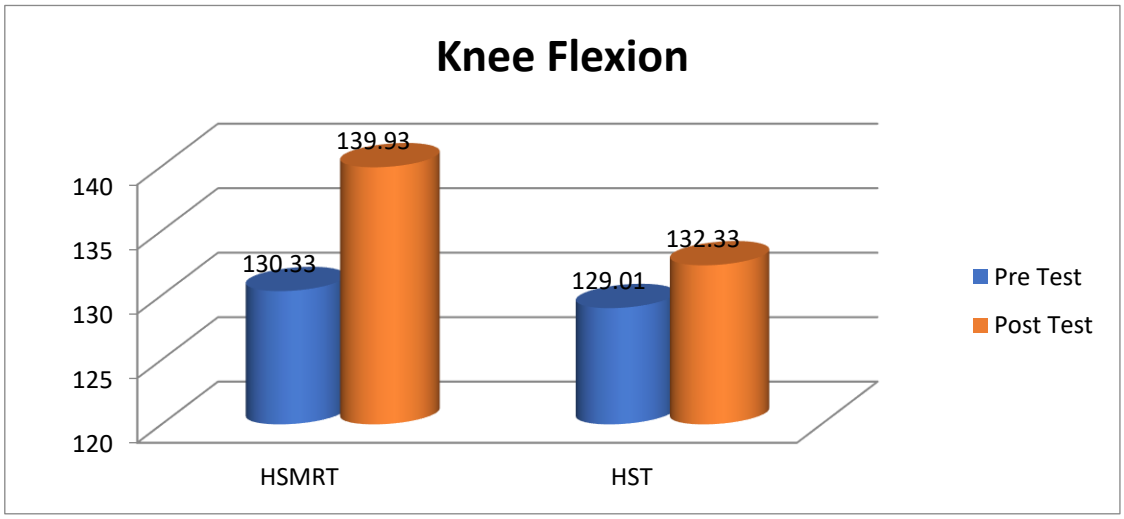

DISCUSSION

This study was conducted to assess how Hydraulic Resistance Training with Self-Myofascial Release (HSMR) compares to Hydraulic Resistance Training without Self-Myofascial Release (HRT) in terms of their effects on hip and knee joint mobility among college women students. The results offer valuable perspectives on the potential advantages of integrating the self-myofascial technique into hydraulic resistance training to improve joint mobility. The results reveal that the HSMR group generally exhibited slightly more significant joint mobility improvements than the HRT group.

This observation suggests that integrating the self-myofascial release technique may have contributed to the increased effectiveness of the training program. The technique might have facilitated muscle relaxation, reduced muscular restrictions, and improved tissue extensibility, thus enhancing joint range of motion. The statistically significant differences observed between the groups' pre and post-test measurements further support the potential benefits of self-myofascial release when combined with hydraulic resistance training. The small p-values for both groups suggest that the interventions significantly impacted hip and knee flexion, and the p-values were smaller for the HSMR group, indicating a potentially more substantial effect.

While both groups showed improvements, the HSMR group's results hint at an additional advantage associated with the self-myofascial release technique. The study focused on the effects of different stretching interventions on range of motion (ROM), dynamic angular velocity, reaction time (RT), and movement time (MT) in participants. The results showed a positive main effect for time in ROM measures, with a 3.5% improvement post-intervention. However, there was a negative main effect for time in dynamic angular velocity, with a 9.2% decrease post-intervention. MT was also

slower after the stretching protocols, with a 3.4% increase. These findings suggest that the type of stretching intervention can have varying effects on ROM, dynamic angular velocity, and MT. It would be valuable to discuss the implications of these findings for exercise physiology and potential applications in training and rehabilitation programmes(Maddigan et al., 2012). While both groups showed improvements, the HSMR group's results hint at an additional advantage associated with the self-myofascial release technique.

CONCLUSION

In conclusion, the findings of this study support the hypothesis that Hydraulic Resistance Training with Self-Myofascial Release could lead to improved hip and knee joint mobility among college women students. The outcomes underscore the potential significance of integrating the self-myofascial technique into training regimens to improve joint mobility. However, further research with larger sample sizes and extended intervention periods would provide more comprehensive insights into these improvements' long-term effects and sustainability.

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