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THE EFFECT OF MUSCLE ENERGY TECHNIQUE VERSES MYOFASCIAL RELEASE ON LOWER LIMB MUSCLE TIGHTNESS IN BADMINTON PLAYERS

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ABSTRACT

Introduction: In the life of a normal human function or in doing activity of daily living, muscular flexibility plays an important role. Flexibility is the ability of a joint or series of joints to move through an unrestricted, pain free range of motion. A limitation in the muscular flexibility leads to several musculoskeletal overuse injuries in players life and remarkably affect a person's level of function. Myofascial Release (MFR) is a manual soft tissue technique that is frequently used in physical therapy for the flexibility purpose.

Materials and Methods: This was an intervantional study design total 60 recreational badminton players were recruited for the study during 2024. All the subject were assigned into three groups as per the selected muscle like quadriceps, hamstring and calf muscle. Vertical jump height, Knee flexion angle, Popliteal Angle (PA) and distance from the wall (Lunge test) was measured preintervention and postintervention. The MFR technique was applied as an intervention. Paired sample t-test was used to find out the immediate effect.

Results: Quadriceps and hamstring play a significant effect in vertical jump height and the flexibility of the muscles increases after the administration of MFR. Vertical jump height for quadriceps group ($p<0.029$) showed extremely significant improvement. Flexibility of quadriceps ($p<0.001$), hamstring ($p<0.001$) and calf ($p<0.001$) also showed significant differences.

Conclusion: The study concluded that MFR has immediate effect on increasing muscle flexibility and muscle power
Keywords: Lunges, Massage, Muscle flexibility, Physiotherapy, Sports

INTRODUCTION

Badminton is among the most popular racquet sports worldwide [1, 2]. It has been reported that badminton frequently result in joint injuries, which suggests that the joint loads during play may be extremely high [3]. Injury in the lower limb is the most common in badminton, with an increased injury risk when the level of playing skills increases [4, 5]. Ankles, knees, and hips have been recognized as the most prevalent locations of sport-related injuries like sprains, strains, and tears [6]. Furthermore, a previous study showed that the incidence of sport-related injuries might be different between professional and non-professional badminton players [6]. This may be due to different movement patterns performed while training by athletes.

In badminton, the lunge is a crucial move that allows players to quickly move into the ideal situation for the next shot, return to the starting position, or go off in another direction for the next movement [7–9]. The lunge accounted for more than 15% of all movements during a competitive singles match [9]. Badminton has a higher risk of injury than other sports due to the unbalanced loading patterns and impact stress placed on the ankle, knee, and hip joints during right-forward lunging step actions.

REVIEW OF LITERATURE

Payal G Rathod (2019), Badminton is a high agility sport which requires lunges, Jumping, rapid arm movement and quick change of direction from various positions during the racket swing. It requires players to cross the badminton court to both sides from mid-court to forward and backward to execute the shots. Badminton match requires high intensity intermittent actions within short resting period. Fatigue may affect the neuromuscular control of lower limb, which is susceptible to increase the risk of injuries.3 Hamstring Strain are classified into Grade 1-3 strains depending on severity. Muscle Energy Technique (MET) is a form of a manual therapy which uses a muscle’s own energy in the form of gentle isometric contractions to relax the muscles via autogenic or reciprocal inhibition, and lengthen the muscle.

Dr. Anand Patel1 (2022), Most often, attention is focused on management of pain and injuries and decreased muscle strength in football players while little attention is given to flexibility. The objective of this study was Immediate Effects of Muscle Energy Technique (MET) Versus Myofascial Release Techniques (MFR) on Hamstring Flexibility in Footballers aged 18 - 25 years. MET is used to lengthen a tight muscle, strengthen weak muscles, reduce localised oedema or mobilize an articulation with adhesion or restriction MET consists of different techniques, one of which is Post Isometric Relaxation Technique (PIR). Cross hand release methods are by a far the main, major and normally utilized strategies in the MFR approach and structure the premise of each other MFR procedure.

Yann Kerautret (2021), Self-myofascial release is an emerging technique in strength and conditioning. Yet, there is no consensus regarding optimal practice guidelines. Here, we investigated the acute effects of various foam rolling interventions targeting quadriceps muscles, with or without sliding pressures. The conducted a blinded randomized control pilot trial in 42 healthy weightlifting athletes over 4 weeks. Participants were randomly allocated to one of the four intervention (120 s massage routine) groups: foam rolling, roller massager, foam rolling with axial sliding pressures, foam rolling with transverse sliding pressures.

Lazar Toskić(2023), A massage is a tool that is frequently used in sports and exercise in general for recovery and increased performance. In this review paper, we aimed to search and systemize current literature findings relating to massages’ effects on sports and exercise performance concerning its effects on motor abilities and neurophysiological and psychological mechanisms. Methods: The review has been written following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analysis) guidelines. One hundred and fourteen articles were included in this review. Results: The data revealed that massages, in general, do not affect motor abilities, except flexibility.

Shweta Agarwal (2024), Myofascial pain syndrome (MPS) is a muscle pain disorder characterized by the presence of Myofascial Trigger Point (MTrP) within a taut band, local tenderness, referral of pain to a distant site, restricted range of motion, and autonomic phenomena. The upper trapezius is the muscle most often affected by MTrPs. Manual myofascial release (MFR) and Instrument-Assisted Soft Tissue Mobilization (IASTM) are techniques of soft tissue release that are used to resolve MPS. Fifty six percent of physiotherapists complain of pain in multiple areas due to the massage and manual therapy that they have to perform.

Erik Witvrouw (2003), Muscular tightness is frequently postulated as an intrinsic risk factor for the development of a muscle injury. However, very little prospective data exist to prove this. It is examined 146 male professional soccer players before the 1999–2000 Belgian soccer competition. None of the players had a history of muscle injury in the lower extremities in the previous 2 years. The flexibility of the hamstring, quadriceps, adductor, and calf muscles of these players was measured goniometrically before the start of the season. All of the examined players were monitored throughout the season to register subsequent injuries.

MATERIALS AND METHODS

STUDY DESIGN:
Interventional study

STUDY SETTING
Negi Pro Badmonton Academy, Sahastradhara Road, Dehadun, Uttarakhand. And Tehri House IAS Colony, Rajpur Road, Dehradun, Uttarakhand.

SETTING SIZE: 60

GENDER: MALE AND FEMLE

SELECTION CRITERIA

INCLUSION CRITERIA: AGE: 20 TO 30
YEARS
Played at least once in a month (1-2 hours per month) for last 2 months were recruited.

EXCLUSION CRITERIA:

- Subjects with any recent injury, neuromuscular disorder • Recent trauma to the lower limb, any type of breathing problem
- Any psychological dysfunctions were excluded from the study.

RESULTS AND DISCCUSSION

Table 1 displays the demographic information for the people who were enrolled. Age, body mass, height, and BMI were not significantly different between the two groups.

Table 1Participant demographics

Variable	(N = 60) Mean ± SD	P-value
Age (years)	20.1 ± 0.9	0.250
Height(cm)	165.2 ± 5.4	0.769
Body Mass (kg)	58.0 ± 2.6	0.256
BMI (kg.m2)	21.3 ± 1.5	0.507

At the same time, there was only a statistically significant difference between ankles MET in maximal knee flexion angle (Table 2).Figure 3 illustrates the differences exist among professional and amateur athletes at initial contact and maximal knee flexion angle time points.

For this study, 60 participants were selected, from which 20 people were included in quadriceps, 20 in hamstring group and rest 20 in calf group. The MFR was administered to the appropriate muscles. Demographic data shows mean age for quadriceps (20.8±1.17 years), mean age for hamstring (21.25±1.60 years) and mean age for calf (20.7±1.14 years) [Table/Fig-6].

Groups	**Age (mean±SD) years**	**Male**	**Female**
Quadriceps	20.8±1.17	16	4
Hamstring	21.25±1.60	15	5
Calf	20.7±1.14	13	7

[Table 2]: Demographic data.

Quadriceps (Group A)/				
mean±SD	Pre	Post	t-value	p-value
Vertical jump height (cm)	32.65±9.93	34.18±10.37	2.362	0.029
Knee flexion angle left (°)	26.00±8.82	20.00±6.68	5.339	<0.001
Knee flexion angle right (°)	24.50±7.93	18.70±6.26	4.833	<0.001

[Table 3}: Paired sample t-test within quadriceps group.

Hamstring (Group B)/				
mean±SD	Pre	Post	t-value	p-value
Vertical jump height (cm)	35.93±7.71	39.01±7.14	4.691	<0.001
Popliteal angle left (°)	20.75±10.16	11.80±9.60	7.734	<0.001
Popliteal angle right (°)	21.90±10.76	13.35±8.45	7.140	<0.001

[Table-4]: Paired sample t-test within hamstring group.

Calf (Group C)/mean±SD	**Pre**	**Post**	**t-value**	**p-value**
Vertical jump height (cm)	28.07±9.56	27.55±8.18	0.763	0.455
Distance (cm) from the wall left	9.87±1.89	11.34±1.29	5.252	<0.001
Distance (cm) from the wall right	10.07±1.95	11.48±1.90	4.228	<0.001

[Table 5: Paired sample t-test within calf group.

			mean±SD			
		Quadriceps	**Hamstring**			
Variables		**group**	**group**	**Calf group**	**t-value**	**value**
Vertical jump height (cm)	**Pre**	32.65±9.93	35.93±7.71	28.07±9.56	3.746	0.030
	Post	34.18±10.37	39.01±7.14	27.55±8.18	8.797	<0.001
Flexibility left	**Pre**	26.00±8.82	20.75±10.16	9.87±1.89	21.971	<0.001
	Post	20.00±6.68	11.80±9.60	11.34±1.29	10.273	<0.001
Flexibility right	**Pre**	24.50±7.93	21.90±10.76	10.07±1.95	19.438	<0.001
	Post	18.70±6.26	13.35±8.45	11.48±1.90	7.361	<0.001

[Table 6]: ANOVA between the groups.

DISCUSSION

The present study was designed in order to investigate the immediate effects of MFR technique on muscle flexibility, vertical jump height in recreational badminton players. The results of the present study showed statistically significant differences between the three groups of post intervention vertical jump height after the application of MFR.

This study is similar to the study by Barlow A et al., in which the rectus femoris, hamstring, and the gastrocnemius muscle are found to be active during the early take off phase while jumping the proximal gluteus maximus concentrically contract [14], resulting not only in the hip extension but also knee extension due to the pull of stiff cable (Rectus femoris) acting on femur distally, thus transferring the mechanical energy generated by Gluteus maximus to Quadriceps through Rectus femoris [15]. In addition to this report, it is revealed that the functional capacity of two joint muscles depends on the stronger contraction proximal muscle (gluteus maximus). The stronger the proximal muscle contracts, the maximal mechanical energy is redistributed to the distal two joint muscles to generate explosive leg extension during vertical jump [16]. Each muscle tendon complexes was represented by a Hill-type muscle model, comprised of a Contractile Element (CE), Series-Elastic Element (SE) and Parallel-Elastic Element (PE) [17]. Forces of series elastic element and parallel elastic element scaled quadratically with elongation, while CE force depended on fibre length of the muscle, the time-derivative of fibre length, and active state of the muscle [23]. Maximum muscle fibre contraction velocity is proportional to the optimum length of muscle fibre. Active state has first order dynamics defined by the neural stimulation to the muscle, which during jumping varies according to a single onset time per muscle [24].

CONCLUSION AND SUGGESTIONS Conclusion

In conclusion, we have shown that the mechanical energy efficiency of the right-forward lunge is skill-related. It seems that altered lunge landing biomechanics may increase the risk of ankle and knee injuries and muscular damages in amateur athletes. It is recommended for amateur players to follow a injury prevention training program that promotes proper lunging technique.

It can be concluded from the present study that there is immediate effect of MFR on increasing the muscle flexibility during vertical jump. The quadriceps and hamstring flexibility also increases during the vertical jump after the administration of MFR.

Limitations

Various limitations should be considered, given the main findings of this study. Only collegeaged females were included in this study, and we did not take a more extensive age range for either gender into account. Moreover, it is suggested to conduct another study for men players to clarify the issue. On the other hand, the study participants had no musculoskeletal disorders, so athletes with musculoskeletal disorders like low back pain or knee injuries may present different mechanical energy transfer mechanisms. Moreover, another limitation is that in this study the athletes examined just when players are out of a fatigued state. When playing, it is not known what fatigue influence and results. Other study limitation may arise from the fact that in the current study the forward lunge movement examined in the laboratory setting that may be not similar to players' on-court movements and contextual variables in badminton. So our findings may not be generalizable to on-court forward lunge or movements.

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