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Effects of Myofascial Mobilization on Flexibility in Young Men Adults

Efeito da Mobilização Miofascial na Flexibilidade em Homens Adultos Jovens

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Abstract

The aim of the study is to control the effect of myofascial mobilization on flexibility values in young men. 23 young adult men, aged between 18 and 30 years (74.8 ± 9.8 kg; 1.74 ± 0.06 cm; 24.7 ± 3.0 kg/m2), participated in the study, separated into experimental and control groups. Participants of the experimental group received an instrument assisted soft-tissue mobilization (IASTM) session, bilateral, in the muscular region of the quadriceps femoris, hamstrings and triceps surae. The rectus femoris, vastus lateralis and medial, biceps femoris, semitendinosus, semimembranosus, gastrocnemius and soleus muscles were mobilized for a period of 60 seconds. In the control session, participants remained at rest for a period of 15 minutes. The flexibility assessments were performed pre- and- immediately, 24 hours, and 48 hours post-sessions of both groups. The myofascial mobilization session promoted percentage increases in flexibility significantly higher at 24 hours when compared to values immediately after, 24 hours and 48 hours after the control session ($P < 0.05$). The percentage increases in flexibility 48 hours after the myofascial mobilization session were significantly greater when compared to values immediately post and 24 hours after the control session ($P < 0.05$). The findings of the present study suggest that an instrument assisted soft-tissue mobilization (IASTM) session promotes increases in flexibility in young adults one and two days after the intervention.

Keywords: Joint Range. *Wells* Bench. Myofascial Release. Instrument Assisted Soft-Tissue Mobilization.

Resumo

O objetivo do presente estudo foi verificar o efeito da mobilização miofascial nos valores da flexibilidade em homens jovens. Participaram do estudo 23 homens adultos jovens, com idade entre 18 e 30 anos (74,8 ± 9,8 kg; 1,74 ± 0,06 cm; 24,7 ± 3,0 kg/m²), separados em grupo experimental e controle. Os participantes do grupo experimental receberam uma sessão mobilização miofascial assistida por instrumento (IASTM), bilateralmente, na região muscular do quadríceps femural, isquiotibiais e tríceps sural. Os músculos reto femural, vasto lateral e medial, bíceps femoral, semitendinoso, semimembranoso, gastrocnêmio e sóleo foram mobilizados por um período de 60 segundos. Na sessão controle, os participantes permaneceram em repouso por um período de 15 minutos. As avaliações da flexiblidade foram realizadas pré, imediatamente após, 24 horas e 48 horas após as sessões de ambos os grupos. A sessão de mobilização miofascial promoveu aumentos percentuais da flexibilidade 24 horas significativamente maiores quando comparado aos valores imediatamente pós, 24 horas e 48 horas da sessão controle ($P < 0,05$). Os aumentos percentuais da flexibilidade 48 horas após a sessão mobilização miofascial foram significativamente maiores quando comparado aos valores imediatamente pós e 24 horas da sessão controle ($P < 0,05$). Os achados do presente estudo sugerem que uma sessão de mobilização miofascial assistida por instrumento promove aumentos da flexibilidade em adultos jovens após um e dois dias à intervenção.

Palavras-chave: *Amplitude Articular. Banco de Wells. Liberação Miosfascial. Mobilização Miofascial Assistida por Instrument.*

1 Introduction

Fascia is a sheath of connective tissue, containing collagen, which forms under the skin to fix, wrap and separate organs, muscles, bones and nerve fibers, allowing the body systems to function in an integrated manner.[1-3] According to Laimi et al.[4] repeatable microtraumas or acute damage can cause tension, stiffness and reductions in fascial tissue slip, resulting in the emergence of muscle spasms, pain and decreases of functional capacity components (e.g., different manifestations of muscle strength, agility and flexibility). Under these conditions, the use of myofascial mobilization can be an additional strategy to prevent and restore the fascia functions.

The myofascial mobilization is a technique performed by specialists and trainers in the science of exercise through the application of pressures in the soft tissue, using manual or instrumental procedures (e.g. suction cups, crocheting and instruments).[5-8] Specifically instrument assisted myofascial mobilization (IASTM) is an intervention that includes the use of specialized tools to manipulate the skin, fascias, muscles and tendons using direct compression techniques.[9] There are currently several IASTM companies with different treatment, material and instrument format approaches, such as RockTape®, HawkGrips®, Graston®, Técnica Gavilán®, FAKTR®, Adhesion Breakers®, ASTYM® and Fascial

Abrasion Technique™.[99]

Some reviews have indicated that IASTM is an alternative to promote increases in flexibility when assessed by range of motion.[5,10-11] Cheatham et al.[5] observed in two studies that the intervention of IASTM promotes significant gains in the range of motion in healthy individuals. Similarly, Seffrin et al.[11] observed that an IASTM intervention causes increases in the range of motion, especially in the complex of the shoulder joint. The findings of this review also found that only one study observed that IASTM promotes greater increases in hip and knee joint amplitude, immediately and 24 hours after intervention, when compared to *foam rolling* in soccer players.[12] Together, these findings indicate that this technique seems to be an interesting strategy to cause increases in joint amplitude in the shoulder joint in healthy individuals, as well as hip and knee in soccer players.

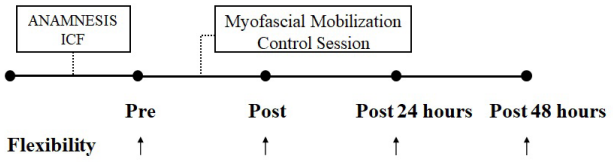
However, there is still a gap in knowledge about the effects of lower limb IASTM on the values of flexibility of the posterior region of the body (e.g., lumbar region, hamstrings, hip flexors, quadriceps and calf) of healthy individuals who do not practice sports continuously. In this sense, the objective of the present study was to verify the effect of myofascial mobilization of lower limbs using IASTM on the values of flexibility in young men.

2 Material and Methods

Twenty-four young adult men were initially recruited. For personal reasons, a participant did not perform all the flexibility measures and, consequently, was excluded from the analysis of the study. Therefore, 23 participants concluded the study aged between 18 and 30 years (74.8 ± 9.8 kg; 1.74 ± 0.06 cm; 24.7 ± 3.0 kg/m^2). The participants were physically active and did not have bone, joint and muscular contraindications of the lower limbs. The work was forwarded and approved by the Local Ethics Committee and the participants signed a Free and Informed Consent Form (TCLE) (CAAE: 18356619.0.0000.5430).

A controlled design was used to compare the effects of myofascial mobilization on flexibility values. The participants visited the laboratory four consecutive days, with intervals of 24 hours (Figure 1). At the first visit, the participants answered a questionnaire with the inclusion criteria (ANAMNESIS), signed the Free and Informed Consent Form. On day two, the participants performed the experimental sessions (myofascial mobilization or control). In the myofascial mobilization session, each portion of the quadriceps muscle region, ischiotibials (Biceps femoris, semi tendinous/semi-membranous) and triceps surae mobilized for a period of 60 seconds. In the control session, participants remained at rest for a period of 15 minutes. The flexibility evaluations were performed pre, immediately after, 24 hours (day 3) and 48 hours (day 4) after the experimental sessions. All participants held the sessions at the same time of the day.

Figure 1 - Experimental design of the study. ICF = Informed Consent Form



Source: research data.

The participants were submitted to an instrumental myofascial mobilization session, using an instrument of the Myotools Edge® brand. The myofascial mobilization technique was performed bilaterally in the lower limbs in the muscular region of the quadriceps (femural rectum, lateral and medial vast), ischiotibials (biceps femoris, semi tendinous/ semi membranous) and triceps surae (gastrocnemius and soleus). The participants were positioned in a dorsal decubitus position for the mobilization of the quadriceps muscles and in ventral decubitus for the intervention in the triceps surae and ischiotibial. The myofascial mobilization procedure was performed for a period of 60 seconds in each muscle portion. The time of the procedure was recorded by a hand stopwatch (Vollo®, Model VL-1809; Cotia/SP, Brazil). A water-based gel was used in order to reduce friction and facilitate the instrument sliding on the participants' skin. The myofascial mobilization was performed by two professionals with previous experience of the technique of at least two years. Immediately after the myofascial mobilization session, the participants reported the level of pain perceived during the intervention on a visual analog scale ranging from zero (no pain) to 10 (worst pain possible).

The flexibility was evaluated by the linear method using the Wells bank (Instant Flex Sanny, São Bernando do Campo/ SP, Brazil), as proposed by Wells and Dillon.[13] Initially, the participants sat with their legs fully extended and their feet slightly apart and fully supported on a wooden bulkhead. In this bulkhead, at right angle, a ruler graduated in centimeters is used to determine the maximum distance reached by the evaluated individual. During the test, the participants were instructed to perform the trunk flexion, with the arms extended and the parallel hands in the wooden bulkhead as far as possible for two seconds. The participants were evaluated barefoot so that no addition to the size of the lower limbs occurred. A total of three attempts, with recovery intervals of one minute, were performed at the moments pre, immediately after, 24 and 48 hours after both experimental sessions. The highest value obtained in the attempts was used in the analyzes. All the evaluations were performed and monitored by only one Physical Education Professional. The coefficient of variation of the sit and reach test of our laboratory is 2.8%.

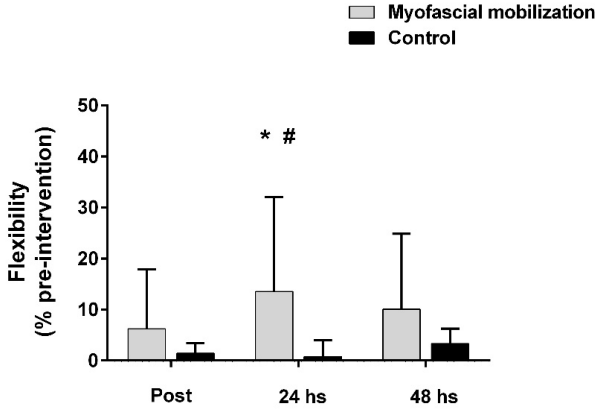
The data homogeneity was tested using the *Levene* test and the distribution of data normality through of *the Shapiro-Wilk* test. The data are presented with mean and standard deviation. The percentage changes (i.e. Δ = post-pre, Δ = 24hours - pre and Δ = 48 hours - pre) of flexibility were compared between

the different conditions and moments using a *two-way* analysis of variance (ANOVA)for repeated measures in the second factor. *Fisher's post hoc* test for multiple comparisons was used when necessary. The significance level adopted in the analyzes was $P < 0.05$. The statistical procedures were performed in the *Statistica*™program, version 7.0.

3 Results and Discussion

The percentage increases in flexibility obtained in the different experimental sessions are presented in Figure 2. No major effect of significant condition and timing were observed ($P > 0.05$). However, significant condition X-moment interaction was observed (F = 3.29; *effect size* = 0.13; *power* = 0.59; $P < 0.05$). The percentage increases in flexibility 24 hours after the myofascial mobilization session were significantly higher when compared to values immediately post, 24 hours and 48 hours after the control session (P < 0.05). The percentage increases in flexibility 48 hours after the myofascial mobilization session were significantly greater when compared to values immediately post and 24 hours after the control session (P < 0.05). The mean and standard deviation of perceived pain of the participants during the IASTM session was 6.31 ± 0.85.

Figure 2 - Percentage changes in the flexibility values obtained in the different experimental sessions (n = 23). Values expressed as mean ± SD. *Percentage increases in flexibility significantly higher when compared to the values immediately after, 24 hours and 48 hours of the control session (P < 0.05). #Percentage increases of flexibility significantly higher when compared to the values immediately after post and 24 hours of the control session (P < 0.05)



Source: Research data.

The findings of the present study showed that a session of IASTM promoted significant percentage increases in flexibility values 24 hours after the intervention compared to the values immediately post, 24 hours and 48 hours of the control session in this population. In addition, the percentage increases observed in flexibility 48 hours after the mobilization session were significantly higher when compared to the values immediately post and 24 hours of the control session.

Corroborating with the results of this research, different reviews have shown that an IASTM intervention causes increases in flexibility.[5,10-11] Cheatham et al.[5] through a review in *PubMed, PEDro, Science Direct, and the EBSCOhost collection* databases , found seven manuscripts on the subject (men and women aged 28.6 ± 4.2 years). Five of the studies measured the use of IASTM in changes in flexibility in individuals with musculoskeletal pathologies (i.e., lateral epicondylitis, carpal tunnel syndrome, myofascial trigger points, chronic ankle instability and patellofemoral pain syndrome) and only two in healthy adults.[12.14] The findings of this study indicated that a session of IASTM promotes increased flexibility in healthy adults, however, these benefits were not observed in patients diagnosed with musculoskeletal pathologies.

In a recent systematic review, Seffrin et al.[11] found 13 articles on the effects of IASTM in the following data basis: *Academic Search Premier, Alt Healthwatch, CINAHL, Cochrane Library, MEDLINE, NLM PubMed, Physical Education Index, Physiotherapy Evidence Database (PEDro), SPORTDiscus,* e *Web of Science*. Among the manuscripts, only six articles evaluated the use of IASTM in the values of joint amplitude in participants without lesions[12,14-18]. The groups that received the IASTM session showed increases in flexibility, with size of the trivial effect to large (*effect size*: 0.04 to 2.48). The effects sizes of the comparison groups ranged from -0.23 to 1.51. It is important to note that most studies evaluated the effects of IASTM on the shoulder joint complex. In summary, the findings observed in these reviews indicate that the use of IASTM seems to be an interesting strategy to cause increases in joint amplitude, especially in the shoulder joint in healthy individuals.

Specifically in knee and hip joint amplitude, Markovic[12] compared the effects of an IASTM session with a *foam rolling* session in soccer players. The findings of this study showed that a session of IASTM promotes greater increases in knee and hip joint amplitude (10% and 19%, respectively) compared as *foam rolling* (5% and 9%, respectively). In addition, only the session that performed the IASTM showed high values of knee and hip joint amplitude (7 and 13%) after 24 hours of the interventions. In the present investigation, the IASTM session promoted average percentage increases in flexibility immediately, 24 and 48 hours after the intervention (6.2%, 13.5% and 10.1%, respectively). Together, these findings indicate that a session of IASTM may be an interesting intervention to promote increases in flexibility in different joints of the body.

A myofascial mobilization session using IASTM seems to promote changes in numerous physiological mechanisms. Some studies have indicated that IASTM can increase the recruitment and proliferation of fibroblasts, along with fibronectin and, consequently, promote collagen repair.[19-21] In addition, this technique seems to increase vascular response and blood flow in soft tissues with previous damage.[22-23] In turn, the use of IASTM can result in the removal of scar tissues and fascial adhesions and, consequently, promote the

return of functional capacity.[20-24]

The absence of the analysis of possible mechanisms associated with the benefits of the intervention of IASTM is a limiting factor of this investigation. Analysis of the mechanisms associated with the intervention of IASTM mentioned above would have provided more support on the use of this intervention in healthy adults. The flexibility evaluation was performed using the linear method, using the Wells bank, however familiarization procedures were not adopted. This fact can promote underestimated values in pre-intervention evaluations and, consequently, overestimate the values in subsequent evaluations (immediately post, 24 and 48 hours). However, it is important to highlight that the coefficient of variation of our laboratory for the Wells bank is 2.8%, which presents lower values than those observed in the magnitude of percentage increase in the flexibility of the session that received the intervention of myofascial mobilization through the IASTM. The limited number of participants in the sample of the present investigation may reduce the power of the study and increase likelihood of making a type II error (i.e., do not reject the null hypothesis if this is false). However, the findings of the present study have important practical implications, suggesting that a session of myofascial mobilization using IASTM can promote acute increases flexibility and possibly assist in the activities carried out involving this physical component during a period of 24 hours.

4 Conclusion

The findings of the present study indicate that a session of myofascial mobilization may promote increases in flexibility 24 and 48 hours after intervention in healthy adults. Future studies with controlled randomized designs should investigate the effects of myofascial mobilization using different volumes, pressure, in different populations and in the long term. In addition, the effects of myofascial mobilization should be investigated in the responses of other components of physical fitness, for example, muscle strength and power, balance and speed.

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