145 - THE EFFECT OF PASSIVE STRETCHING TECHNIQUES AND MUSCLE ENERGY IN THE FLEXIBILITY OF HAMSTRING MUSCLES OF HEALTHY WOMEN

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INTRODUCTION

Flexibility is characterized by the ability of one or more joints move through a range of motion (ROM) normal, comfortable way without pain and restrictions at the same time as a set of components - connective tissue, tendon, ligaments, joint capsule, muscle and skin - stretch (POLACHINI, et al., 2005).

As the muscle tissue of the components that can influence the flexibility is extremely important that the muscles involved in the movement are in favorable condition, without contractures, injuries and adequate length for the movement to be executed in the best way possible. The hamstring muscles, located in the posterior thigh, are responsible for flexion of the knee joint. This often muscle is shortened, that is has a length less than adequate for the implementation of motion with an amplitude of motion (ROM) standard. One way of increasing the length is through the muscle elongation.

There are several muscle stretching techniques, among them we have passive stretching, which is performed without voluntary muscular effort is therefore needed an external force applied by the physiotherapist or equipment that will passively extend the elastic portion of the muscle, keeping it for sure period, and its effectiveness primarily related to the direction, speed and intensity applied (SMITH, et al., 2006). This form of stretching is described in the literature with the most used technique and safe when compared to other types of stretching (VIVOLO, ROSARIO, MARQUES, 2003).

Another technique covering the gain range of motion is the muscle energy (MET) constitutes a method of manual therapy developed by Fred Mitchell, also known as muscle-power. It is a manipulative technique in which the subject actively using your muscles from a controlled position in a specific direction against a counterforce. Can be applied to lengthen shortened muscles, strengthen weak muscles and mobilize joints with restricted mobility (ALTER, 1999). It is advised for patients with painful symptoms of the locomotor system, showing normal joint activity, but shortened muscles or spasms (CHAITOW, 2001). The TEM is based on the fact that, after a pre-stretching contractions of a muscle retracted, the muscle will relax as a result of inhibition autogenic and is elongated more easily, allowing the muscle to bring a new range of motion (FIELDS and LOZA, 2001).

Since the two techniques used to gain ROM, the objective of this study was to compare the immediate and late effects of passive stretching and muscle energy technique on hamstring muscles flexibility in healthy women and see which technique yielded better results.

MATERIALS AND METHODS

Sample:

The sample consisted of 24 women aged 20 to 30 years, students at the State University of Western Paraná (UNIOESTE), enrolled in the course in Physiotherapy.

On being invited to participate in the study, the subject was questioned about the absence of systemic diseases and chronic or acute musculoskeletal injuries in the past six months and, if not reported any such conditions not included, was targeted: a) to appear on the site assessment on day and time pre-booked, b) not to perform physical exercises in the days of the tests.

Evaluation Procedures

The volunteers were divided into two groups with one group that has been applied to passive stretching technique (GSP) and the other with the muscle energy technique (GME).

Both groups underwent a preliminary evaluation of range of motion (ROM) of knee flexors by goniometry the dominant member. The evaluation took place with the patient in the supine position with the hip flexed to 90 ° and 90 ° knee extended. The knee joint was taken to the maximum extent active and was recorded to measure this movement in degrees by goniometer. All reviews of ROM were performed by a single examiner blinded and all departed 90 ° of hip flexion and 90 ° of knee extension.

After the first evaluation, the GSP has undergone a technical session which was in stretching the hamstring muscle group passively. The subject remained in the supine position with the hip fully supported on the stretcher. The therapist then raised the patient's dominant leg, with the knee fully extended, up to the limit imposed by the patient. The limb remained in this position for thirty seconds to be lowered again, staying for another thirty seconds of rest. We carried out the same procedure three times. We adopted the holding time of 30 seconds elongation suggested by Bandy, et al, 1997, which state that this maintenance period is sufficient to gain flexibility. In this study, we determined the moment of maximum extension in which the subjects reported discomfort due to the stretching of the posterior muscles of the thighs, as suggested by Shiratsu and Coury (2001).

For the application of the technique in the hamstring muscles, the patient was positioned supine and was asked to raise the dominant leg, fully extended and with the foot in a neutral position, up to the limit of its range. The therapist positioned himself kneeling on the stretcher and patient positioned leg high on the shoulder of the therapist. The therapist asked the patient to perform a force against the resistance imposed by the therapist for 10 seconds and relax for 10 seconds. During the rest period, the therapist tried to gain more breadth, always respecting the physiological limits of voluntary. This procedure was repeated 9 times.

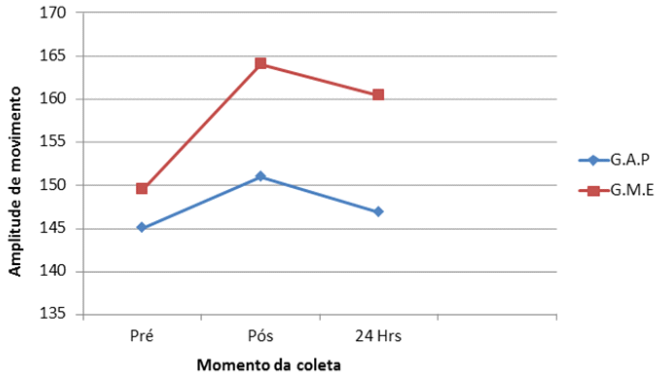
Both groups were assessed again with the extent of ROM at the time immediately after applying the technique of stretching and after 24 hours. The measurement of ROM occurred in the manner described above.

RESULTS

Statistical analysiswas usedANOVA withmixed designwithBonferroniposttestwith alphaof 0,05.BymixedANOVAwas possible to verifythe effect ofstretching techniquesand the timebefore, after and24 hours.

The Bonferroni test showed that the differences in ROM were significant ($p < 0,05$) compared every moment of collection. this indicatesthat the technique ofMEandpassive stretching techniquewere effective both inmeasured

immediatelyafter intervention as24 hourswhen comparedintra-group.



GAP-PRE: 146,8° ± 8,4; GAP-POS: 151,0° ± 7,6; GAP-24HS: 145,0° ± 7,3; GME-PRE: 149,5 ± 6,7; GME-POS: 165,1 ± 6,7; GME-24HS: 160,4 ± 7,5

When comparedtoa techniquebyanotherposttest, GAP was different fromGME(p =0.003), GME being greater than theGAP, that is, the technique ofthe musclepower wasmost effective whencompared topassive stretching.

GME was difference intra-group of according to test ANOVA. TheBonferroni testshowedthat these differenceswere significantin allpossible comparisons: thepretimewasdifferent from the post (p<0,001), the postbeinggreater than thepre. Thepre-interventiontimewas different from the24 hours (p=0.006),24 hoursbeinggreater than thepre. And the post time was different24 hours, the postbeinggreater than 24hours. Theseresults show that the energy muscle techniquewas effective ingainROMsoonafter the intervention, and that the resultsdiminisha littleafter 24 hours, but does not returnROMfoundin the prestretching.

DISCUSSION

It is important to emphasize that the board goniometry used here is similar to that developed by Brazilian et al, (2007), and is responsible for assessing hamstring muscle extensibility. The choice of hamstrings muscle is explained by using large findings in the literature (TIRLONI, et al., 2008.; AFONSO et al. 2,001.; SALVADOR et al., 2005.; MALLMAN et al., 2011.; CABRAL et al., 2007) .

The results of this study demonstrated that muscle energy technique was effective both in amplitude gain immediate as 24 hours after the intervention. This result corroborates similar studies conducted by Salvador et al. (2005), and Alcantara et al. (2010).

Regarding passive stretching, obtained significant results only at the moment after stretching. The time of stretch was used according to reports in the literature. According to Knight et al, (2001) stretching does not become effective when used for less than 6 seconds, but is effective when used in 15 to 30 seconds, with a larger number of repetitions. Bandy et al (1997) found that a sustained stretch for 30 seconds is enough time for a maximum gain from ROM.

According to the results of this study it can be stated that the results were positive for the technique of muscle power, and this was capable of providing greater flexibility in the short term before this result and this technique continues to be a considered effective among the many forms of stretching. This higher gain may be due to the difference in the performance of technical procedures. Whereas the neurophysiological properties of muscles vary with the time of stretching, the stretching technique passive was probably lower because during the performance of the technique, no increase in distensibility of the hamstring muscles continuously by the evaluator.

The reduction of ROM after 24 hours of elongation may be explained by being viscoelastic component, which promotes a transient increase in muscle length, but which is readily recoverable, returning to the pre-intervention after a short period of time (MALLMANN, et al, 2011).

Future research could examine the difference between these stretches changing the time and frequency of stretching, and the age of participants and assess the permanence of the effects of stretching for a longer period.

CONCLUSION

The immediate effect of stretching was increased joint flexibility and extensibility muscle but not remained after 24 hours, which is applied to both techniques, with the largest increase occurred in the group of ROM muscle energy. This result suggests that muscle technique is more energy efficient as compared to passive stretch.

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THE EFFECT OF PASSIVE STRETCHING TECHNIQUES AND MUSCLE ENERGY IN THE FLEXIBILITY OF HAMSTRING MUSCLES OF HEALTHY WOMEN

ABSTRACT

Introduction: As the muscle tissue component that influences the flexibility, it is important that the musculature is not compromised. One way that this is possible muscle stretching, which can be achieved by techniques such as passive stretching technique and energy muscle. Objective: To compare the immediate and late effects of passive stretching and energy muscle technique on flexibility in healthy women, comparing both techniques. Methods: We evaluated 24 women, age 20 to 30 years, divided into: passive stretching group (GAP) and energy muscle group (GME). We performed a preliminary assessment of range of motion (ROM) for the dominant goniometry member, and soon after the technique was applied to the corresponding group. The measurement of ROM was made shortly after the application of the technique and after 24 hours. Statistical analysis was used with mixed design ANOVA with Bonferroni post-test with an alpha of 0.05. Results: The Bonferroni test showed that the differences in ROM were significant ($p < 0,05$) at all times of collection. In GME, the Bonferroni test showed significant differences when compared with the pre-intervention (PRE) and immediately after (POST), and $p <0,001$. Comparing the measures POST and 24 hours after the intervention, it was noticed a small decrease in ROM with respect to POST, $p = 0,001$. Conclusion: The immediate effect of stretching was increased flexibility that has not remained after 24 hours. The largest increase occurred in the ROM was in the GME, suggesting a greater effectiveness of this technique.

KEYWORD: Passive stretching, muscle energy, flexibility.

L'EFFET DES TECHNIQUES D'ÉTIREMENT PASSIFS ET DE SOUPLESSE DES ÉNERGIE MUSCULAIRE DE MUSCULATURE ISQUITIBIAL DE FEMMES EN BONNE SANTÉ

RÉSUMÉ

Introduction: En tant que composante du tissu musculaire qui influe sur la flexibilité, il est important que la musculature ne soit pas compromise. Une façon que ce soit possible musculaire d'étirement, ce qui peut être réalisé grâce à des techniques passives telles que le stretching et la technique de l'énergie musculaire. Objectif: Comparer les effets immédiats et à la fin de l'étirement passif et technique de l'énergie musculaire ischio-jambiers sur la flexibilité chez les femmes en bonne santé, en comparant les deux techniques. Méthodes: Nous avons évalué 24 femmes, âgés de 20 à 30 ans, répartis en groupe passif: étirement (BPA) et le groupe de l'énergie musculaire (EMG). Nous avons effectué une évaluation préliminaire de l'amplitude de mouvement (ROM) pour la goniométrie dominante, et peu de temps après la technique a été appliquée au groupe correspondant. La mesure de la SMA a été faite peu de temps après l'application de la technique et après 24h. L'analyse statistique a été utilisée avec la conception ANOVA mixte avec correction de Bonferroni post-test avec un alpha de 0,05. Résultats: Le test de Bonferroni a montré que les différences de ROM étaient significatives ($p < 0,05$) à tout moment de la collecte, ce qui indique que les deux techniques sont efficaces par rapport intra-groupe. Lorsque l'un par rapport à l'autre art, l'écart était différente de GME ($p = 0,003$), étant supérieure à la GAP, à savoir la technique de la force musculaire est plus efficace. En GME, le test de Bonferroni a montré que les différences étaient significatives, étant supérieure à la poste avant ($p <0,001$), plus de 24 heures avant et après plus de 24 heures ($p = 0,001$), ce qui démontre que la technique la puissance musculaire est efficace pour le gain de destruction massive. Conclusion: L'effet immédiat d'étirement était une souplesse accrue qui n'a pas subsisté après 24 heures. La plus forte augmentation s'est produite dans le GME ROM, ce qui suggère une plus grande efficacité de cette technique.

MOT-CLÉS: étirement passif, la force musculaire, flexibilité.

EL EFECTO DE LAS TÉCNICAS DE ESTIRAMIENTO PASIVO Y ENERGÍA MUSCULR EN LA FLEXIBILIDAD DEL MÚSCULO ISQUITIBIAL DE MUJERES SANAS

RESUMEN

Introducción: Mientras que el componente de tejido muscular que influye en la flexibilidad, es importante que la musculatura no se vea comprometida. Una manera en que esto es posible es el estiramiento muscular, lo que puede lograrse a través de técnicas pasivas tales como estiramiento y técnica de energía muscular. Objetivo: Comparar los efectos inmediatos y tardíos del estiramiento pasivo y la técnica de energía muscular en los isquiotibiales flexibilidad en mujeres sanas, comparando ambas técnicas. Métodos: Se evaluaron 24 mujeres, edad 20 a 30 años, divididos en: grupo de estiramientos pasivos (GAP) y el grupo de energía muscular (GME). Se realizó una evaluación preliminar del rango de movimiento (ADM) para la goniometría

dominante, y poco después la técnica se aplicó al grupo correspondiente. La medición de ADM fue realizado poco después de la aplicación de la técnica y después de 24 horas. Para el análisis estadístico se utilizó Anova con diseño mixto con Bonferroni post-test con un alfa de 0,05. Resultados: La prueba de Bonferroni mostró que las diferencias en la ADM fueron significativas ($p < 0,05$) en todos los tiempos de recogida, lo que indica que ambas técnicas son eficaces en comparación intra-grupo. Cuando una técnica frente a outra, la diferencia de GME ($p = 0,003$), siendo que la GME mayor que la GAP, a saber, la técnica de la potencia muscular es más eficaz. En GME, la prueba de Bonferroni mostró que las diferencias fueron significativas, siendo mayor que el del poste pre ($p <0,001$), mayor de 24 horas antes y después de más de 24 horas ($p = 0,001$), demostrando que la técnica de músculo energia fue eficaz para la ganacia de ADM. Conclusión: El efecto inmediato de estiramiento fue mayor que la flexibilidad lo qual no se mantuvo después de 24 horas. El mayor incremento del ROM se ha producido en la GME, lo que sugiere una mayor efectividad de esta técnica.

PALABRA CLAVE: estiramiento pasivo, fuerza muscular, flexibilidad.

O EFEITO DAS TÉCNICAS DE ALONGAMENTO PASSIVO E ENERGIA MUSCULAR NA FLEXIBILIDADE DA MUSCULATURA ISQUITIBIAL DE MULHERES SAUDÁVEIS

RESUMO

Introdução: Sendo o tecido muscular um componente que influencia na flexibilidade, é importante que a musculatura não esteja comprometida. Uma das formas que possibilita isso é o alongamento muscular, o qual pode ser conseguido através de técnicas como o alongamento passivo e a técnica músculo energia.Objetivo: Comparar o efeito imediato e tardio do alongamento passivo e da técnica músculo energia na flexibilidade dos músculos isquiotibiais em mulheres saudáveis, comparando ambas as técnicas. Metodologia: Foram avaliadas 24 mulheres, idade 20 a 30 anos, divididas em: grupo alongamento passivo (GAP) e grupo músculo energia (GME). Foi realizada a avaliação prévia de amplitude de movimento (ADM) por goniometria do membro dominante, e logo após foi aplicada a técnica correspondente ao grupo. A mensuração da ADM foi feita logo após a aplicação da técnica e após 24hs. Para análise estatística foi usado o Anova com delineamento misto com pós teste de Bonferroni com alfa de 0,05. Resultados:O teste de Bonferroni mostrou que as diferenças na ADM foram significativas ($p< 0,05$) em todos os momentos da coleta, indicando que ambas as técnicas foram eficazes, quando comparado intra-grupo. Quando comparada uma técnica a outra, o GAP foi diferente de GME ($p=0,003$), sendo o GME maior que o GAP, ou seja, a técnicade músculo energia se mostrou mais eficaz. No GME, o teste de Bonferroni constatou que as diferenças foram significativas, sendo o pós maior que o pré ($p<0,001$), o 24hs maior que o pré, e o pós maior que o 24hs ($p=0,001$), demonstrando que a técnica de músculo energia foi eficaz para o ganho de ADM.Conclusão: O efeito imediato do alongamento foi o aumento da flexibilidade, que não permaneceu após 24 horas. O maior aumento da ADM ocorreu no GME, sugerindo uma maior eficácia desta técnica.

PALAVRAS-CHAVE: alongamento passivo, músculo energia, flexibilidade.