Research Article
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Comparison of myofascial release after passive muscle stretching and neural mobilization on ROM of the hip.

Comparação da liberação miofascial seguida de alongamento muscular passivo e da mobilização neural na ADM do quadril.

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Abstract
Introduction: The hip joint is one that has more stability, but on the other hand has less mobility with respect to the shoulder joint, due to its greater amount of muscle tissue and ligaments. This large amount of muscles can undergo changes that hinder the amplitude motion, and shortening a key, with the posterior region of the thigh among the hardest hit targets. The neural mobilization and stretching myofascial release have benefits against this change. **Objective:** To compare effects of myofascial release is followed by a passive muscle stretching relation to neural mobilization on range of motion of the hip. **Method:** The study consisted of a quantitative, prospective research, intervention, descriptive and analytical sample composed of 57 participants divided into three groups of 19 people who remained as follows: group G1 neural mobilization, intervention applied to the sciatic nerve which innervates the muscles concerned, G2 myofascial release followed by stretching passive muscle in the posterior thigh and the control group G3 which served Just for comparison and without any intervention. Participants were evaluated before the application of technical and after three days of intervention. The angulation was performed by a software program known for CorelDRAW X5. **Results:** There were statistically analyzed using the statistical software "R" and "SPSS ", and the Wilcoxon test. The G1 presented a average of 8.37 ° (p = 0.0004194), the 7.53 ° (P = 0.000003815) G2 and G3 5 (p = 0.003918). **Conclusion:** The techniques were statistically significant for obtaining improved ADM (p <0.05), with neural mobilization acquiring greater gain. Suggest studies with new protocols to new scientific evidence.
Key words: Stretching, fascia, neurodynamics and flexibility

Resumo
Introdução: A articulação do quadril é uma das que possui mais estabilidade, mas em contrapartida possui menos mobilidade em relação à articulação do ombro, devido a sua maior quantidade de tecido muscular e ligamentos. Essa grande quantidade de músculos pode sofrer alterações que dificultam a amplitude de movimento, sendo o encurtamento uma das principais, tendo a região posterior da coxa um dos alvos mais atingidos. A mobilização neural, o alongamento e a liberação miofascial trazem benefícios frente a essa alteração. **Objetivo:** Comparar efeitos da liberação miofascial seguida de alongamento muscular passivo em relação à mobilização neural na amplitude de movimento de quadril. **Método**: O estudo constituiu-se de uma pesquisa quantitativa, prospectiva, de intervenção, descritiva e analítica composto por uma amostra de 57 participantes divididos em três grupos de 19 pessoas que se manteve da seguinte forma: G1 grupo de mobilização neural, G2 grupo de liberação miofascial seguido de alongamento muscular passivo na região posterior da coxa e o G3 grupo controle o qual serviu apenas de comparação e sem nenhuma intervenção. Os participantes foram avaliados antes da aplicação das técnicas e após três dias de intervenção. A angulação foi realizada pelo software CorelDRAW X5. **Resultados:** foram analisados estatisticamente utilizando os softwares estatísticos "R" e "SPSS", e o teste Wilcoxon. O G1 apresentou uma média de 8,37º (p=0.0004194), o G2 7,53º (p=0.000003815) e o G3 5º (p=0.003918). **Conclusão:** As técnicas foram estatisticamente significante para a melhora da ADM obtendo (p<0,05), com mobilização neural adquirindo maior ganho. sugere-se estudos com novos protocolos visando novas comprovações científicas.
Palavra chaves: Alongamento, fascia, neurodinâmica e flexibilidade

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INTRODUCTION

The flexibility of a muscle can be defined as the ability of a joint to develop a range of motion (ROM) in accordance with the extensibility of the involved musculature. This means that the loss of muscle flexibility is given by their reduced ability to elongate. This decline is due to disuse but also in a ROM of small degrees of bone and muscle structures of the members.[1]

The constant and proper maintenance of the body's flexibility offers good mobility during any age, thus allowing movement throughout range and without risk of injury from muscle or joint restrictions. The ROM of the hip is of paramount importance, since it is responsible for ambulation, basic function of the human being.[1]

Increased ADM already seen as acute effect of flexibility training through different stretching techniques alternating muscle groups.[2]

The fascia is a connective tissue that surrounds each and every muscle in our body, arteries, viscera and veins, and being connected to the skull to the soles of the feet. Myofascial release is a technique that helps in improving the flexibility and elasticity of the fascia, leaving intact the body's range of motion, increasingly being used by physiotherapists to liberate the fascial layers, facilitating stretching and eliminating stress.[1]

The technique of stretching within the normal ROM allows the joint to move throughout their arc of movement and stretch the muscles completely, keeping the muscles, joints or tendons free from risk of injury.[3]

The myofascial release, passive muscle stretching and neural mobilization have in common a function, which is to improve body flexibility aiming at a better overall functioning of the body at any age, thereby allowing the movements are performed in their normal ROM.[4,5,6]

This study aimed to verify the effects of myofascial release after passive muscle stretching in relation to neural mobilization on range of motion of hip flexion.

METHOD

It was realized a quantitative, prospective, of intervention, descriptive and analytical analysis which followed the Rules of Conducting Research with Human Beings, Resolution No. 196/96 of the National Health Council (CNS) and was approved by the Research Ethics UFPI under the Opinion No. 384 172.

Study participants were 57 students from a HEI, of both sexes, with a mean age of 22 (± 4) years. The subjects were divided into 3 groups by drawing lots, consisting of 19 members each. The inclusion criteria of the study participants were between 18 and 32 years, sedentary and who agreed to participate spontaneously, since the exclusion criteria were participants who presented hip surgery prior of the research, absent in one session and presented hip neuromusculoskeletal changes. All subjects signed a informed consent.

Before the procedure, all participants underwent an evaluation by means of a record produced by the authors containing identification, BMI and goniometry. The subjects were divided into 3 groups (G1 neural mobilization, G2 myofascial release followed by passive muscle stretching and G3 control group) by lot, with 19 members each. Each group had a week of intervention and three alternate days: Monday, Wednesday and Friday. Subjects were evaluated before application of the techniques and after of the three days of intervention.

In the myofascial release group followed by passive muscle stretching, participants remained in a therapeutic litter, in prone position with knee and hip extended, the therapist positioned forearm in the gluteal fold region forming a fixed point and the other hand held closed sliding towards top to bottom with the proximal phalanges, exerting a slight pressure on the posterior thigh for a minute, then with the patient in supine position stretching the hamstring muscles of the resistance of fabrics by the time 30 seconds was performed.

In the neural mobilization group the individuals remained supine on a therapeutic stretcher with a support under the head providing a slight flexion. The therapist positioned the ankle of the participant in their ipsilateral shoulder. With the ipsilateral hand the therapist held the plantar region of the foot and with the contralateral hand to the knee, preventing flexion of the knee joint. Simultaneously held the passive hip flexion and plantar flexion until the resistance of the tissues, then held fluctuations in plantar flexion and dorsal flexion quickly and tension once a day, lasting a minute.

The evaluation was performed by the CorelDRAW X5 program (Software produced for Assessment angles), as follows: The participant was marked with adhesive on the region of the greater trochanter and lateral epicondyle, then it remained on a local level positioned supine then were asked to perform the same movement of hip flexion in all its ROM, then the researcher performed an image with an acquisition camera. Later the picture was filed in a notebook and sent the program to perform the calculation of ADM hip angle, as shown in Figure 01.

Figure 1. Photo of evaluation of angulation of ROM in flexion of the hip.
FONTE: Faculdade Santo Agostinho (FSA) Laboratory.

From there, were statistically analyzed using the Wilcoxon test using the software "R" and "SPSS"

RESULTS

The present study analyzed data from a sample of participants of both sexes, with 11 men and 46 women, with a mean age of 22 (± 4) years. The mean BMI of the members of the current study was 22.46 (± 3.23) rated according to Cabrera et al, (2005), normal weight ranging from (BMI ≥ 18.5 and <25 kg / m²). All participants were considered sedentary, as they did not engage in regular physical activity (3 times weekly), and did not have any neuromusculoskeletal changes.

Graph 1 presents a comparative analysis of hip ROM values before and after the interventions. In group 1 (G1) was performed the neural mobilization of the sciatic nerve in group 2 (G2) was performed myofascial release followed by passive muscle stretching of hamstrings and in the third group (G3) no technique was applied, serving only compare with others. It is noticed that in all groups improved ROM after performing the techniques. The G1 increased from 68.37 ° to 76.74 ° (p = 0.0004194); G2 from 69.61 ° to 77.14 ° (p = 0.000003815) and G3 from 62.38 ° to 67.39 (p = 0.003918), and the same statistically significant.

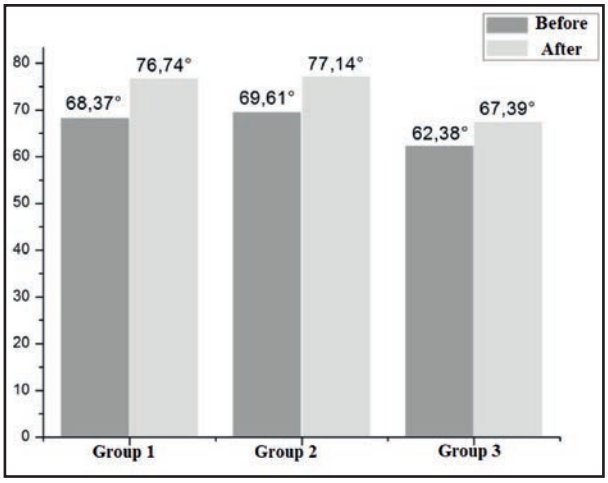
Following, 2 shows the difference between the means of each group after the application of the techniques. In group 1 (G1), neural mobilization of the sciatic nerve in group 2 (G2) was performed myofascial release followed by passive muscle stretching of hamstrings and the third group (G3) no technique was applied was taken, serving only compared with others. G1 had an average of 8.37 ° (p = 0.0004194), the 7.53 º G2 (p = 0.000003815) G3 and 5 (p = 0.003918), demonstrating that all were statistically significant. To evaluate the effectiveness of the techniques used the Wilcoxon test, which evaluates the effectiveness of groups, it was noticed that the myofascial release followed by a passive muscle stretching as the most significant.

DISCUSSION

The stretching is effective in gaining flexibility without influence of the rest time variable, affirmative done after checking the variation in the time interval between sessions of stretching on hamstring flexibility gain the right limb, the study was 28 female subjects where the 48-hour interval was used between one session and another for one of the groups; in the other, the interval was 24 hours, with a total of 10 sessions, which differs from the present study, which used only three sections and still result was 77.14 º ROM hip as shown in Graph 1.[7] It was observed that both studies was observed gain of ROM independent of sessions applied, caused by the viscoelastic properties of the muscle-tendon unit.

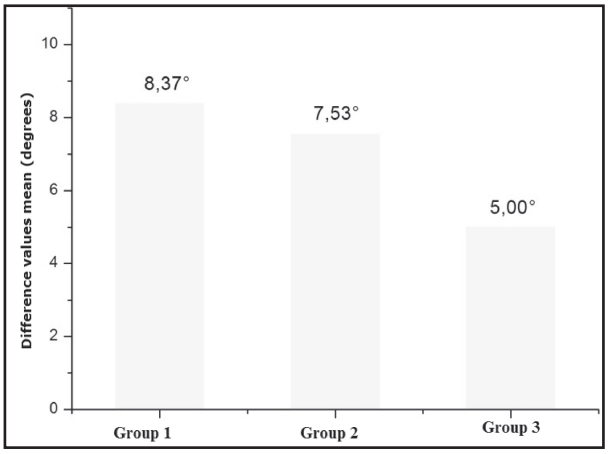
Although the measure of time is not the object of this research, it is worth highlighting the above mentioned authors observed that even with these viscoelastic properties, their flexibility may lose amplitude, because the first 24 hours were lost, as well as the tixotropism, which has the property of increasing the number of stable bonds between actin and myosin molecules when the muscle is at rest.[7]

The stretching of hamstrings has the ability to improve the ROM of the hip flexion, whereas the use of two stretching programs, one with 180s and other with 360s evaluated by a fleximeter, authors found gain flexibility. Still we cannot say that this improvement is 100%, because the indirect measurement of ROM is not a consistent parameter levels of the muscle-tendon unit stiffness. In what regards the torque and maximum work was mainly a negative influence in the group that has undergone a longer stretching time.[8]



Graph 1. Values in flexion of the hip before and after the application of the techniques.

Subtitle: Group 1 - neural mobilization, Group 2-myofascial release followed by passive muscle stretching and 3-Control Group.
Source: Research data.



Graph 2. Difference values mean groups of ROM in flexion of the hip after application of the techniques.

Caption: Group 1 - Neural Mobilization, Group 2- Myofascial Release followed by passive muscle stretching and Group 3 Control.
Source: Research data.

The acute effects of static stretching are due to three points: changes in the perception of stretching by modifying the threshold of sensitivity of pain receptors and, by reflex inhibition of the muscle that decreases the activity of the contractile components and lastly, the viscoelastic muscle responses that allows tissue stretching, decreasing tension and stiffness in the muscle-tendon region.[7,8,9]

Improvement in hamstring flexibility were observed after evaluating the effects of 10 series of 30 seconds and three series of three minutes, with three interventions a week for six weeks of passive static stretching, which remained for a period of five months. For these authors, three series of 30 seconds are sufficient to produce changes in muscle length, but longer time addition stretching can interfere the the musculature flexibility. This research corroborates the study by these authors, it was also observed improvement in ROM with myofascial release group followed by passive stretching using the same duration of 30 seconds and same frequency of three days per week as shown in Graph 2 in this research we used fewer series of intervention.[10]

The connective tissue undergoes plastic deformity; perimysium produces resistance to stretching and passive stresses applied to this tissue enables plastic reorganization, improving the flexibility and hence the ROM.[10,11]

For this reason we chose to use myofascial release associated with stretching.

Three parameters were evaluated in a given study: length, weight and total number of sarcomeres in mice that were subjected to passive stretch with three repetitions of 30 seconds at intervals the same time, being repeated every 48 hours in the soleus muscle. The same did not achieve significant results with p = 0.0668 in the length parameter of the muscle fibers. As flexibility is the ability of the muscle has to stretch, it means that the increase its length and to improve ROM is necessary that the muscles develop its length, Menon's research contradicts the present study that when performing release passive stretch and got a gain of 7.53 º ROM seen in Graph 2.[12]

Moderate levels and excessive passive muscle rigidity, tendons, ligaments and fascias cause mobility changes in the member promoting musculoskeletal injuries. This statement is explained by increased cross sectional area and changes in the composition of the tissue, which can act simultaneously during the process of tissue remodeling. But studies state that technique to maintain and relax with high duration and frequency may decrease tissue stiffness.[13]

A particular study evaluated the effects of age on myofascial release on the flexibility of men, in which their sample consisted of twenty subjects, they participated in the activity of gymnastics, with a frequency of 5 times per week for data collection was used the "Sit-and-reach" test as an indicator of the flexibility of the hamstrings, the myofascial release technique was applied twice a week interspersed. It was found that the method of myofascial release brought benefits in flexibility of the muscle group being in favor of this work had an average gain of 7.53°, and compared the relative age flexibility they become inversely proportional, that is, the higher age less flexibility, so too is the reverse.[2]

The practice of myofascial release isolated or in association with the stretching are capable of producing a positive modification in the ROM both acute and chronic way.[2]

Cronemberger, Silva and Bonfim (2011) conducted a study that had as main objective to analyze the acute effect of myofascial manipulation and functional limitation in mouth opening. The same was to sample 20 participants aged between 20 and 40 years, having less than 45 mm mouth opening, after the effect of myofascial manipulation that limitation of mouth opening, the average of results obtained before the application of the technique was 39.25 mm and 44.70 after the completion of the same. According to the results obtained most individuals gain of functional mouth opening at the end of the procedure.[14] Myofascial release technique has the ability to reduce tensions in the tissues by facilitating elongation provided pro this technique.[2,14]

A case study of a patient with Steinert's Myotonic Dystrophy (SMD) which causes several changes in the body, being more pronounced muscle atrophy of extremities and overall muscle weakness, was performed and investigation aims to evaluate the results of myofascial release on the flexibility of this participant. ADM was assessed in the joints of the shoulder, elbow, wrist, hip, knee, ankle, neck and cervical. A total of six interventions were performed with 60 minute duration at a frequency of once a week, with a total time of 1 month and 15 days.

The results were varied, showing a gain of 34 degrees in the range of medial rotation of the left wrist and a loss of 13 degrees of flexion in the left hip due to the perform myofascial release, body areas are free of tensions and other areas recede to be a structural reorganization and biomechanical favorable to posture. The patient improved locomotion, which is related to the ability of the technique used to act on the fabric, changing its viscoelasticity.[15] In the current study there was a gain in ROM of the hip with the use of myofascial release and stretching it as graph 2, its initial review was around 70 and three days proved close to the range of 80 ° flexion.

When performing myofascial release a pressure on the epithelial tissueis is necessary, in an attempt to modify the fascia potentials of energy effecting tixotropism. The slowly slip applied delivers smooth fabric making this the most flexible producing a plastic transformation in length. These features were observed in a

study that aimed to verify the effect of this technique in the ROM hamstrings hip with extended leg in sedentary women. The survey results were significant with the average in the initial assessment from 62.55° (± 10.44), after the intervention, the average was 73.30 º(± 11.2), with the variation of the mean amplitude was 10.75º (± 3.56), with p = 0.00004.[5]

Effectiveness of neural mobilization through the applied elongation in the region of hamstring was observed in women after being applied to eight treatments with 5 replicates, each with duration of 1 minute. Showed improvement in ROM of hip flexion after mobilization induced in neural hamstrings and presented results to the bottom right of 7.6º member.[1] These results are similar to the present study because this same muscles, there was an increase of ROM in 8.37º even with fewer sessions and repetitions as shown in Graph 2. This efficiency is given by fluctuations of the moves made that convey mobility to that system, normalizing the mechanical and physiological function and the

Techniques of passive stretching and neural mobilization were applied in order to verify their effectiveness in hip flexion ROM, their sample was composed of 10 members of both sexes, which were divided into two groups. In group 1 was applied to the sciatic nerve mobilization and group 2 was performed passive stretching for one minute. As a result we observed the largest increase of ROM in group 1 (gain variation between 14 to 28 degrees) than in group 2 (gain between 10 and 18 degrees) and is in line with what was observed in our study in which the neural mobilization possessed a greater gain degrees in relation to the group of passive stretching.[16]

Ten participants with chronic low back pain were evaluated and five members received neural mobilization technique (group 1) and the other four participated in a stretching group (group 2), each with 20 sessions of 30 minutes. In this study there was an improvement for group 1 in the finger-ground test with a mean of 15.03 cm at baseline and -0.3 cm in the final measure. The stretching group also had an increased flexibility in the assessment requirement finger-ground, but in terms of technical effectiveness was not significant at p ≤ 0.806.[17]

The above study corroborate with our research, as graph 1 shows an increase in the values of the degrees of the group of neural mobilization from 68.37º to 76.74º at the end hip flexion and the mean between groups showed a gain of 8.37 ° in the group 2 had gain of 7.53 ° as shown in graph 2.

CONCLUSION

The range of motion of the hip can be changed when there is shortening of the hamstring muscles, mainly caused by strains of the soft parts of the body. To reverse this situation, the techniques covered in this research are of great value in improving ROM of the hip.

The results of this study showed that neural mobilization technique was more effective than myofascial release followed by a passive muscle stretching. It is also clear that both groups had gains in ROM in normal individuals.

Aiming to expand the literature on the association of these techniques in different protocols, it is suggested that studies be developed to new scientific evidence.

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