



Original Article

Can the application of the Ergon[®] IASTM treatment on remote parts of the superficial back myofascial line be equally effective with the local application for the improvement of the hamstrings' flexibility? A randomized control study

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Abstract. [Purpose] This study was aimed to investigate the effects of Ergon[®] IASTM applications on the upper or lower part of the Superficial Back Line (SBL) on the hamstring's flexibility. [Participants and Methods] Sixty University students (age=24.4 ± 4.39; height=176.78 ± 8.31 cm; weight=75.16 ± 11.21 kg) were randomly divided into three sub-groups and received a single 15-minute treatment with Ergon[®] Technique in a) the upper and b) the lower part of SBL or c) served as control. The participants received one treatment per week for four weeks with a simultaneous pre-and post-therapy assessment of their hamstrings flexibility using the passive Straight Leg Raising (SLR). [Results] Both experimental groups improved SLR performance from pre to post during the four weeks from 4.4% to 9.2% in the trunk group and from 4.9% to 8.0% in the lower body group. These differences were significantly greater from the CTRL group. No differences were observed between the two experimental groups. [Conclusion] In conclusion, application of Ergon Technique of either the upper or lower part of the SBL may lead to a significant increase in the hamstring flexibility irrespective of the site of application.

Key words: Hamstrings, Flexibility, IASTM

(This article was submitted Jan. 18, 2019, and was accepted Apr. 3, 2019)

INTRODUCTION

In recent years, the study and treatment of myofascial pathologies has become an essential element of the rehabilitation of human neuro-musculoskeletal pathologies. On that basis, many soft-tissue techniques and methods of myofascial therapy have been developed aiming at a more holistic evaluation and treatment of the human body.

Most of these techniques are based on the work of Thomas Myers, who has defined a set of 12 myofascial continuities-meridians that cover almost all the surfaces of the human body at all levels¹⁾. Of the most evidence-based²⁾ and important lines, is the Superficial Back Line (SBL) which connects and protects the entire posterior surface of the body (from the base of the foot to the top of the head). The overall static function of the SBL lies in supporting the body in the upright extension

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Fig. 1. Ergon IASTM applications in the upper Superficial Back Line (SBL).



Fig. 2. Ergon IASTM applications in the lower Superficial Back Line (SBL).

position and preventing the tendency to bend in flexion as in the fetal position¹).

Given the functional importance of the SBL, Wilke et al.³), conducted 2 randomized control studies to evaluate the effect of static stretching in distant portions of the SBL in other remote segments of the line. Their findings proved that a single session of static stretching could produce acute flexibility increases at distant joints thus demonstrating the existence of a strain transfer along the SBL³). Surprisingly, and even though the Superficial Back Line is associated with injuries and pathologies of high epidemiological incidence (neck pathologies, back pain, hamstrings strains, etc.), there is no research evaluating the effect of specialized soft tissue techniques like Instrument-assisted soft-tissue mobilization (IASTM) techniques on the elasticity and functionality of this myofascial line. One of the most known IASTM techniques is Ergon[®] IASTM Technique which constitutes a manual therapy approach combining static and dynamic soft tissue manipulation with specialized clinical equipment-tools, aiming to treat soft tissue restrictions and to improve tissue flexibility, joint range of motion and patient functionality.

Therefore, the purpose of the present study is to evaluate the effects of Ergon[®] IASTM Technique applications in the posterior trunk and thigh in the flexibility of the Superficial Back Line. In particular, this study aims to investigate the effects of Ergon[®] IASTM applications on the upper or lower part of the superficial Back Line on the hamstrings flexibility.

PARTICIPANTS AND METHODS

This investigation was a randomized control study. The sample consisted of 60 University students (40 males, 20 females, age=24.4 ± 4.39 years; height=176.78 ± 8.31 cm; weight=75.16 ± 11.21 kg), recruited from the Physiotherapy Department of Technological University of Western Greece. Inclusion criteria were: a) decreased trunk-hamstrings flexibility (<22 as measured by Sit and reach test), and b) no injury at least one year before testing. The sample was grossly homogeneous in potential confounding variables, such as weight, height, age, and hamstrings flexibility. All participants were informed about the research processes and signed written consents. The study was approved by the ethical committee of the School of Health Sciences of the Technological Educational Institute of Western Greece (11863-4/4/2017). The participants (N=60) were randomly divided into three research sub-groups and received a single 15-minute myofascial treatment with Ergon[®] IASTM Technique in a) the upper (trunk-neck, Fig. 1) and b) the lower part of SBL (posterior surface of the lower extremity: thigh-calf-foot, Fig. 2) or c) served as control. The Ergon[®] IASTM Technique is an innovative soft-tissue technique with significant research evidence of its effectiveness in a) reducing pain in painful syndromes and b) improving patient function regarding the increasing range of motion^{4, 5}). The Ergon[®] IASTM Technique involves the application of specialized IASTM Strokes that are either linear (Rub, Wave, Snake, Cyriax, Switch), semicircular or circular (Razor, Globe, Small Globes, Excav), applied to specific points of myofascial restrictions. Also included in this technique are particular strokes for the separation of the myofascial structures (Sep, Split) and the treatment of areas with fascial adhesions (Cyriax, Switch).

The whole research procedure took place over four weeks, during which participants received one treatment per week with a simultaneous pre-therapy and post-therapy assessment of the research variables. Pre and post each myofascial treatment with Ergon[®] IASTM Technique, the passive Straight leg raising (SLR) was used for the evaluation of hamstrings flexibility. The hip flexion angle (ROM) in SLR was evaluated using a Smartphone goniometer (iPhone 6s-Goniometer Version 2.7). According to Jones et al.⁶), this specific application is a valid and reliable means of measuring the hip ROM of the passive straight leg raise test (SLR) as it compares favourably with universal goniometers. Three measurements were carried out in all the tests, and the average of these (on each side) was used for later analysis. Two-way mixed (between-within participants effects) analysis of variance (3 groups × 4 pre values) was used to identify differences between pre-values of the groups. When a significant two-way ANOVA was found, Bonferroni's post-hoc tests were used. Multiple 3-way mixed factor ANCOVA (3 groups × 4 weeks × 2 time points [pre-post]) were conducted to examine the acute and short-term effect of interventions in the performance of the flexibility test by using the pre-values as covariates. Bonferroni post-hoc test was used when a

significant interaction was observed. Partial eta squared (η^2) values were used to estimate effect sizes (small: 0.01 to 0.059, moderate: 0.06 to 0.137, large >0.138). All statistical analyses were performed using SPSS (IBM SPSS Statistics Version 23). Data are presented as adjusted mean \pm 95% confidence intervals. Statistical significance was set at $p < 0.05$.

RESULTS

Pre values in the SLR test were significantly different between groups ($p < 0.01$). The 3-way ANCOVA interaction was not significant ($p = 0.44$, $\eta^2 = 0.03$). However, there was a 2-way group \times week interactions ($p < 0.001$, $\eta^2 = 0.22-0.56$) as well as a 2-way group \times time (pre-post) interaction ($p < 0.001$, $\eta^2 = 0.68$). Bonferroni post-hoc tests revealed that both experimental groups improved SLR performance from pre to post during the four weeks from 4.4% (Δ : -3.65 cm, CI95%: -5.26 cm to -2.05 cm, $p < 0.01$) to 9.2% (Δ : -7.78 cm, CI95%: -9.19 cm to -6.36 cm, $p < 0.01$) in the Trunk group ($p < 0.001$) and from 4.9% (Δ : -4.04 cm, CI95%: -5.55 cm to -2.52 cm, $p < 0.01$) to 8.0% (Δ : -6.82 cm, CI95%: -8.15 cm to -5.48 cm, $p < 0.01$) in the lower body group ($p < 0.001$). These differences were significantly greater from CTRL group ($p < 0.01$). No differences were observed between the two experimental groups ($p > 0.05$). Furthermore, post hoc analyses showed that the trunk experimental group increased significantly SLR performance after the interventions in the following four weeks compared with the pre value of week 1 from 6.2% (Δ : -4.89 cm, CI95%: -7.83 cm to -1.95 cm, $p < 0.01$) to 18.2% (Δ : -16.59 cm, CI95%: -20.27 cm to -12.90 cm, $p < 0.01$) respectively ($p < 0.01$). Furthermore, the lower body group improved SLR performance compared with the pre value in the following weeks from 6.6% (Δ : -5.18 cm, CI95%: -8.03 cm to -2.33 cm, $p < 0.01$) to 17.0% (Δ : -14.57 cm, CI95%: -18.13 cm to -11.00 cm, $p < 0.01$) respectively. In contrast the CTRL group was not improved SLR performance ($p > 0.05$).

DISCUSSION

Soft tissue techniques constitute a modern therapeutic approach to the rehabilitation of musculoskeletal disorders. All of these therapeutic procedures ranging from classical massage, treatment of myofascial trigger points, transverse friction and active release techniques to novel myofascial release techniques with hands or IASTM Tools, have been associated with an improvement in the patient's functionality mainly in terms of the peripheral joint range of motion. To our knowledge, this is the first research that has evaluated the effect of IASTM applications (Ergon[®] IASTM Technique) on different parts of the superficial back myofascial line of the human body on hamstrings flexibility. More specifically, this research aimed to examine whether there is a functional interface between the myofascial structures of the line which is likely to affect the functional capacity of anatomical structures that are remote from the point of the treatment.

The first significant finding of this research is that the application of Ergon[®] IASTM Technique is itself capable of inducing substantial gains in myofascial flexibility in the regions and joints applied. The therapeutic applications of Ergon[®] IASTM Technique once a week led to a statistically significant linear increase in myofascial flexibility of the posterior part of the body compared to the control group. These findings are in full agreement with the results of other investigations both for the Ergon[®] IASTM Technique^{4, 5}) and for other IASTM Techniques^{7, 8}).

One of the innovations of the present research is that it assessed the cumulative effect of the Ergon[®] IASTM Technique application on flexibility adaptations over 4 weeks that reflects the length of time for a typical musculoskeletal rehabilitation program. Most of the studies in the past have examined the acute effects of IASTM applications which can be attributed mainly to neurophysiological factors and not to permanent adaptations. The results of the present study further strengthen this theory as it enhances the cumulative impact of the implementation of IASTM techniques on myofascial flexibility. It shows that even one treatment session per week when performed for 4 weeks can lead to a linear and sustained increase in flexibility for the period of therapeutic applications.

The second and the most innovative finding of the present study is that the application of Ergon[®] IASTM Technique on either the lower or upper part of the superficial back myofascial line elicit considerable increases of hamstrings' flexibility irrespective of the site of application. The evaluation of the hamstrings' flexibility with the SLR test indicated that the exclusive application of the Ergon[®] IASTM Technique either to the trunk or to the lower extremity led to significant positive adaptations of the hamstrings' flexibility which did not differ significantly between them. In other words, the application of techniques to upper parts of the superficial back line could result in positive adaptations to the lower parts of the superficial back line, e.g., in structures that are far from the point of Ergon[®] IASTM Technique application. These findings, although important and innovative, cannot be confirmed or questioned for their validity as there is no corresponding research to date. However, they are in complete agreement and are indirectly confirmed by surveys that evaluated the remote stretching application on the superficial back line presenting similar results³). Wilke et al. reported that lower limb stretching based on myofascial chains can induce similar acute improvements in cervical ROM as local stretching³).

Several theories can partly explain the underlying mechanism of remote IASTM treatment effects. One factor explaining non-local treatment reactions could consist of cortical adaptation processes and central pain-modulatory system. As different kinds of interventions (e.g., stretching or self-myofascial release) have been demonstrated to affect both the involved and the uninvolved limb⁹), it might be argued that IASTM applications induce systemic responses like a reduced stretch tolerance. Another explanation may have a neurophysiological basis. Correctly, it has been reported¹⁰) that the application of myofascial

techniques can lead to local as well as general body relaxation and a decrease in myofascial tone, which may explain the findings of the present study. The findings of the present study can also be explained by the mechanical force transmission via connective tissue. In support of this theory, Carvalhais et al.¹¹⁾ have shown that fascial structures function to transfer strain to neighboring skeletal muscles.

Final results regarding the transmission of myofascial energy in the form of tissue relaxation and the increase of elasticity cannot be deduced from this research under the weight of its limitations. The most important limitation of the present study was that it evaluated the effect of the IASTM applications on participants with reduced hamstrings flexibility. This patients selection though necessary to assess the implications of the IASTM Technique and produce clinically meaningful results limits the applications of these findings to people with reduced flexibility. Also, the fact that the participants of this study were young people also makes it difficult to apply these conclusions to older people whose fascia has altered mechanical properties such as increased thickness and stiffness.

Despite its limitations, the clinical value of the findings of this research is particularly important. In particular, the present study shows some evidence that it may be sufficient to treat a part of a myofascial line such as the Superficial back line, to create significant functional adaptations in distant parts of the entire line. If other future studies confirm this finding, it will lead to significant modifications in physiotherapeutic protocols to prevent and rehabilitate major musculoskeletal pathologies and injuries such as low-back pain and hamstrings strains in athletes.

In conclusion, Ergon[®] IASTM treatment of either the upper or lower part of the superficial back line may lead to a significant increase in hamstrings flexibility after four treatment sessions spread over four weeks. Impressively, applying IASTM techniques to distant points has led to the same improvement in the elasticity of some areas by applying a topical treatment to them. The above adaptations can be explained by the myofascial transmission of tension and relaxation and by the neurophysiological reduction of muscle tone. In any case, more research is needed to support such innovative findings that can significantly modify treatment strategies of preventing and rehabilitating musculoskeletal pathologies and injuries.

Conflict of Interest

None.

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