DO EXERCISES WITH THE FOAM ROLLER HAVE A SHORT IMPACT ON THE THORACOLUMBAR FASCIA? – A RANDOMIZED CONTROLLED TRIAL

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Background: Due to new research results in the past few years, interest in the fascia of the human body has increased. Dysfunctions of the fascia are indicated by various symptoms, amongst others, musculoskeletal pain. As a result stronger focus has been put on researching therapeutic approaches in this area. One of the biggest fascia in the human body is the thoracolumbar fascia (TLF). It serves, in particular, the transmission of power between pelvis and trunk as well as between the upper and lower extremities. It seems evident that ischemia and hypoxia of tissue caused by trauma, overstretching, overloads or lack of exercise can cause changes to the basic substance of the fascia and that elasticity is reduced. This can in turn cause pain and discomfort. Langevin et al. (2011) have shown with the help of ultrasound images that people with back pain have a significantly lower mobility of the TLF. This provides a direct connection between the mobility of the fascia and back problems. In order to eliminate dysfunctions like these, physiotherapists use various treatment approaches.

Aim: The aim of this study is to identify whether foam rolling has a short-term impact on the mobility of the FTL.

Method: In total 38 healthy and sports active subjects participated in the study for short-term observation. The sample showed a split of 25 women and 13 men with a total average BMI of 23.18 kg / m^2 (SD = 2.14 kg / m^2). These 38 subjects were assigned to a foam roll group, a placebo group and a control group. To investigate the mobility of the FTL, ultrasound clips were recorded showing a trunk flexion of the subjects at 30 degrees. The subjects were then instructed to place their hands lightly on the thighs and keep the elbows close to the body. A dash was made where the finger pads touched the thighs. Subsequently, the subjects performed a slow flexion of the upper body without moving their arms. While the elbows and fingers remained still, the forward motion of the fingers pushing against the thighs resulted from the movement of the upper body. At the point where the subtracted values of the two goniometers showed a flexion of 30 degrees, the movement was stopped and a second line was marked on the thighs. In the next step of the study investigators fortified an ultrasound probe located two centimeters lateral and to the right of the spine, at the height of the intervertebral space of L2 and L3. At this point the TLF is best to detect since it runs parallel to the skin tissue1. A template made of foam rubber was made and fitted to ensure that the probe remained in place when the movement was recorded. The examiner also ensured that pressure was constant and the probe was always perpendicular to the tissue. After that the videos were analyzed with Cross Correlation Software (CCS Dilley 2013) to calculate the overall movement of the fascia. To analyze the mobility of the TLF regions of interest ("ROI") were set on the TLF by clicking with the cursor on the structure of the TLF shown on the screen. According to Dilley, the ROI had to be carefully placed only on the TLF to prevent measurement errors (Dilley et al. 2001). Because of the anatomy of the TLF and the different moving directions when doing a trunk flexion, six ROIs were selected. Also active lumbar flexion (modified, modified Schober Test) and pressure sensitivity (algometry) of the treated muscles were examined. The investigators were blinded during the study, since intervention and investigation were always carried out in separate rooms. To eliminate bias, chief investigators decided to conduct a double-blind study, which meant leaving the experimental investigators uninformed about which group they were testing. The measurements were completed before, and ten minutes after, the intervention. Then the values were compared. The protocol was created according the Ethical Principles for Medical Research Involving Human Subjects as formulated in the Declaration of Helsinki and accepted by the ethics commission of the University of Applied Science Osnabrück in Germany.

Results: The results indicated that significant improvement of the mobility of the fascia only occurred in the region of the measurement with the CCS. The statistical analysis of other outcomes showed no significant results. Compared to the initial measurement, the mobility of the TLF in the foam roll group improved on average 1.7915 mm ($p < 0.001$) after the second measurement was taken. Furthermore, a significant p-value of $p < 0.001$ was recorded when comparing the changes between the foam roll group and the placebo group. The comparison between the foam roll group and the control group was also found to be highly significant at a value of $p < 0.001$. In this case, because there are statistically significant results, the effective size (d) was also calculated. The changes of the mobility of fascia in the foam roll group could be assigned to an effect size of $d = 0.756$. This corresponds to an average clinical relevance of changes. In contrast, the placebo group ($p=0.397$) and the control group ($p=0.861$) showed no significant improvement. The statistical analysis of the values of the lumbar flexion, which were determined by using the modified, modified Schober test, showed no significant changes. Neither in the pre-post comparison within the three groups nor by the comparison of the changes between each group, were significant changes detected. The values of the foam roll group showed an average improvement of lumbar flexion of 0.0077 cm ($p = 0.935$). The data analysis of mechanosensivity also showed no significant results. There are no significant changes in the pre-post comparison ($p = 0.254$ to $p = 0.991$).

Conclusion: The results of this study have shown that Foam Rolling exercises can increase the mobility of the TLF in a healthy young population. By using ultrasound images and CCS, it has been demonstrated that the mobility significantly increases after the exercises however there was no difference in lumbar flexion mobility and mechanosensivity of the dorsal back region.

Reference:

1. Langevin H.M., Fox J.R., Koptiuch C., Badger G.J., Greenan-Naumann A.C., Bouffard N.A., Konofagou E.E., Lee W.N., Triano J.J., Henry S.M. (2011): Reduced thoracolumbar fascia shear strain in human chronic low back pain, BMC Muskuloskeletal Disorders 12(1): 203