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PROSPECTIVE STUDY OF THE TRUNK MUSCLES UNDER THE INFLUENCE OF COMPRESSIVE LUMBAR SUPPORTS

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Should the use of lumbar supports be viewed critically or rated as beneficial? The study examined the question of what effect the use of lumbar supports has on the trunk muscles when walking and under static loading. The myograms recorded provide information about the extent to which the muscles of the trunk are active under loading, both with and without a lumbar support.

METHODOLOGY

Sample:	n = 42 healthy subjects, age: 18–30 years
Test support:	LumboTrain lumbar support (Bauerfeind AG)
Test method:	• Dynamic analysis: gait analysis, treadmill (no picture) • Static analysis in the CTT Centaur, BfMC; Picture 1
Inclusion criteria:	• Healthy test subjects with no back pain, adequate constitution and coordination for the measurements
Exclusion criteria:	• Restricted joint mobility, patients with chronic or acute pain, pathological joint positions, fractures, ligament injuries, muscle injuries, soft tissue damage, or somatoform disorders

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Active support for muscular stabilization of the lumbar spine

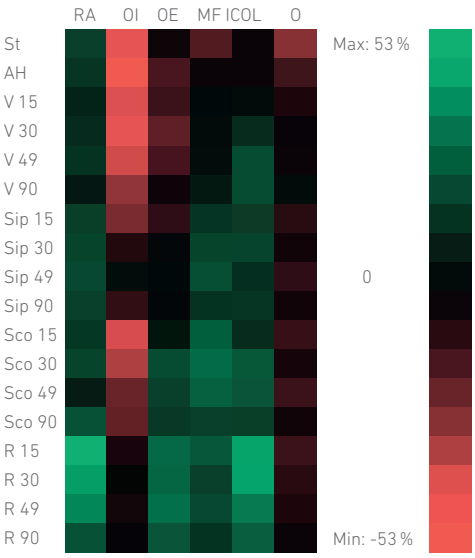
Source:
Hubner, A., Niemeyer, F., Schilling, K., Anders, C.;
Effects of an abdominal belt on trunk muscle activity during treadmill walking;
Biomech Open Lib, 1(1): 7–15; 2017

RESULTS

Two of the three back muscles studied [MF, ICO] showed an increase in their EMG activity of up to 46% with LumboTrain. The third muscle studied [LO] revealed no significant change in its activity under the influence of LumboTrain.
Repression of the back muscle activity by LumboTrain can therefore be refuted. The activity of the lateral trunk muscles [OI, OE], however, was reduced by up to 50% depending on the situation. This decrease in activity does not, however, constitute an inactivation of the muscle; instead it is suggested that this relates to relief effected by LumboTrain. With LumboTrain, the abdominal muscle [RA] showed an average activation of 25%. Overall we can assume a positive influence of LumboTrain on muscular activity.

→ **LumboTrain activates the back muscles**
→ **Muscle atrophy can be refuted**

Activation profile of the trunk muscles



V	Forward tilting
Sip	Ipsilateral sideward tilting
Sco	Contralateral sideward tilting
R	Backward tilting
St	Standing
AH	Working posture = arms crossed in front of the chest
RA	Abdominal muscle
OI	Internal oblique abdominal muscle
OE	External oblique abdominal muscle
MF	Lumbar multifidus muscle
IOC	Erector spinae muscle (illiocostalis)
LO	Erector spinae muscle (longissimus)

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PROSPECTIVE STUDY OF THE TRUNK MUSCULATURE UNDER THE INFLUENCE OF COMPRESSIVE LUMBAR SUPPORTS IN PATIENTS WITH ACUTE LUMBAR BACK PAIN

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The acute lumbar back pain refers to pain episodes which occur for the first time or after at least six pain-free months and last for a maximum period of six weeks. Possible causes for this non-specific, acute, lumbar back pain could be tense muscles or fasciae, overstretched ligaments, or shortened tendons. There is, however, no clear causal link between symptom description, clinical findings, and image-based diagnostics. Since the symptoms have no clear causes, a multimodal and multidisciplinary approach, where lumbar supports are an inherent part of the treatment, is the best course of treatment. However, critics argue that lumbar supports could weaken the trunk muscles because of the relieving characteristics. The study examined the question of what effect the use of lumbar supports has on the trunk musculature when walking and under static loading for patients with non-specific, acute, lumbar back pain.

METHODOLOGY

Sample:	n= 36 in total; n= 24 men; n= 12 women; age [years] = 29-63; BMI [kg/m2] = < 26
Test support:	Lumbar support (LumboTrain, Bauerfeind AG)
Test method:	• Gait analysis (OEMG), treadmill • Pain diary, static analysis in the CTT Centaur, BfMC
Inclusion criteria:	• Patients with unspecified, acute, lumbar back pain, BMI less than or equal to 26 [kg/m2], adequate constitution and coordination for the measurements
Exclusion criteria:	• Restricted joint mobility, patients with chronic pain, pathological joint positions, fractures, ligament injuries, muscle injuries, soft tissue damage, or somatoform disorders

LumboTrain®
Active support for muscular stabilization of the lumbar spine

Quelle:
Anders, C., Hübner, A.
Influence of elastic lumbar support belts on trunk muscle function in patients with nonspecific acute lumbar back pain
PLoS ONE 14(1): e0211042. https://doi. org/10.1371/journal.pone.0211042; 2019

RESULTS

The back muscle activity (Fig. 1) of the support group is higher than the muscle activity of the control group (see Fig. 1) for all three assessment dates U1-U3 (U1 = max. two days after diagnosis, U2 = one week after U1, U3 = three weeks after U1). The increased activity of the back muscles in the support group is around 16%, around 21% after a week, and around 13% after three weeks compared to the control group at the time of treatment with the support.
After three weeks of wearing the lumbar supports, the measured muscle activity in the support group is higher than in the control group. This argues against any muscle atrophy caused by wearing lumbar supports. A habituation effect from wearing the support is also not shown, because the activity values in the support group remain at the same high level over three weeks and do not drop to the values of the control group.

In each case, at the start of the assessment, BEFORE measurement on the treadmill, the difference in the VAS pain values (Fig. 2) in the control group from U1 to U2 "fell" by 0.9 VAS points, and from U1 to U3 by 0.8 VAS points. In the support group, the differences were 0.4 points (U1 vs. U3) and 0.6 VAS points (U1 vs. U3).

The values could reflect the normal healing process for acute back pain, where the severity of pain can be seen as a predictor for the stage of recovery. The difference in the amount of pain perceived by the support group on the various assessment dates was lower. This could be a reflection of the pain-relieving effect of a support. At U1, the perception of pain has clearly reduced partly due to the support, so the differences between U2 and U3 are not as great.

Pain during movement: the difference in the VAS pain value after the EMG test on the treadmill in the support group from U1 to U2 "fell" by 1 VAS point, and from U1 to U3 by 1.3 VAS points. The difference values in the control group only fall by 0.4 points in each case. The support group shows a greater pain reduction than the control group. This highlights the active principle of supports with a pain-reducing effect, most notably during movement.

→ LumboTrain activates muscles
→ LumboTrain relieves pain during movement

EMG back muscles:

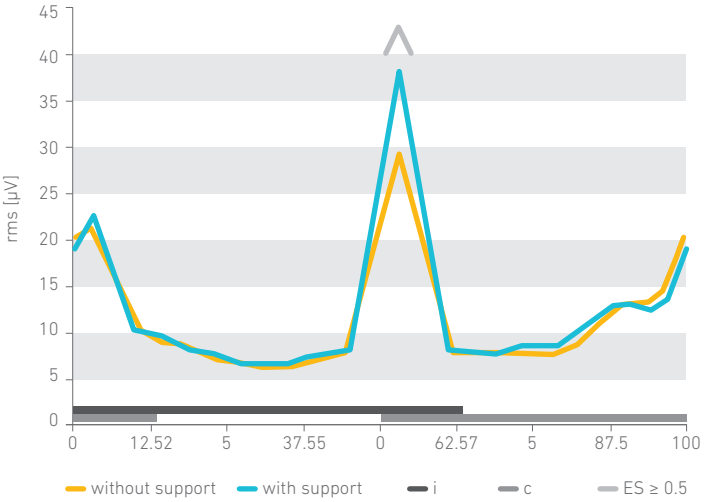

Fig. 1: Representation of the amplitude curves of all the muscles studied, averaged at 4 km/h, entire group, (men and women). X-axis: 0percent-100 percent = entire floor contact phase of the foot in one step, y-axis coordination pattern, muscle activity in µV .i = ipsilateral foot/floor contact phase; c = contralateral foot/floor contact phase

Representation of the difference in the perception of pain at the assessment dates U1-U3; using the visual analog scale (VAS).

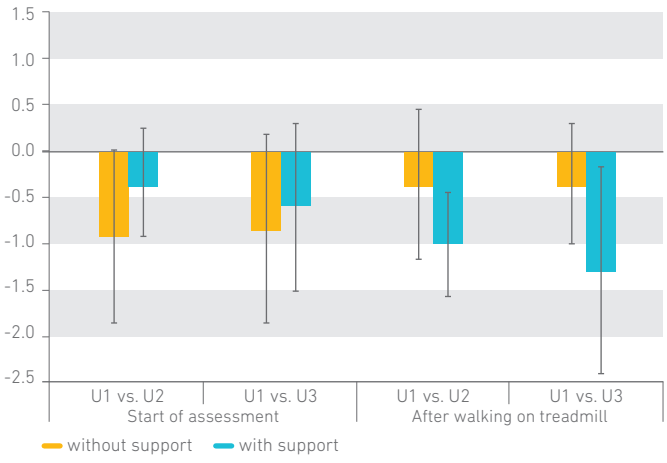

Fig. 2: Representation of the differences in pain: negative figures indicate a reduction against the first value (U1); U1, max. two days after diagnosis, U2 = a week after U1; U3 = three weeks after U1. Within the VAS scale: 0 (no pain) to 10 (highest level of pain imaginable)

LumboTrain®
CONTROLLED TRIAL OF A BACK SUPPORT IN PATIENTS WITH NON SPECIFIC LOW BACK PAIN

Valle-Jones J., C.; Walsh H.; O´Hara J.; O`Hara H.; Davey N., B.;
Medical Consulting Centre; Essex

In cases of lumbar back pain, it is often possible to link the symptoms to an injury such as lifting heavy objects or extreme back twisting due to a fall. Pathological lesions are discussed as one of the possible causes of pain. When the pain arises without injuries to the bones or intervertebral disks, it is known as non-specific back pain. The treatment approaches depend on the symptoms. Apart from drugs such as analgesics and muscle relaxants, physiotherapy or supports are also used. The aim of the study is to demonstrate the effectiveness of lumbar supports in cases of non-specific back pain.

METHODOLOGY

Study design:	Randomized, controlled, two-arm clinical study
Sample:	• n = 216, n = 111 with the support, 105 = control group without the support • Average age: 43 years, average weight: 68.1 kg • 113 = male, 97 = female
Test method:	• Treatment with the support during the day (optional at night), plus standard treatment • Only standard treatment by way of comparison (control group)
Observation period:	21 days; data collection via questionnaire and information provided voluntarily by patients
Inclusion criteria:	• Patients with non-specific lumbar back pain for the first time • Patients with chronic lumbar back pain • Patients with increasing lumbar back pain due to further lumbar pathology • All findings were confirmed in an X-ray to rule out exclusion criteria
Exclusion criteria:	Specific back pain due to conditions such as rheumatoid arthritis or spinal fractures; intervertebral disk pathology, pregnancy

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Active support for muscular stabilization of the lumbar spine

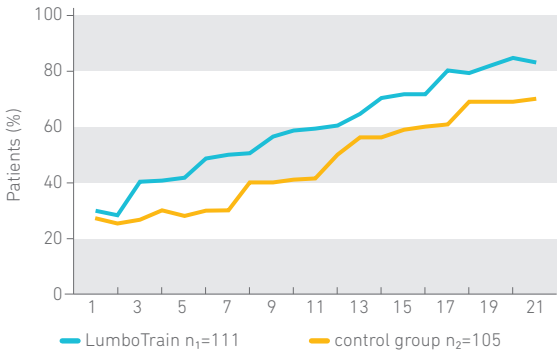
Source:
Valle-Jones J, C, Walsh H, O´Hara J, O`Hara H, Davey N, B, Controlled trial of a back support (LumboTrain) in patients with non specific low back pain ; Curr. Med. Res. Opin. (1992), 12, 604

RESULTS

After as little as three days, almost a third more patients had recovered in the support group than in the control group, i.e. they were able to work again. After three weeks, 83% of patients in the support group were able to work again, as against 73% of patients in the control group. Painkiller consumption fell in the support group from 3.4 dose units per day at the start to 1.4 dose units and was 52% lower than that of the control group after three weeks.

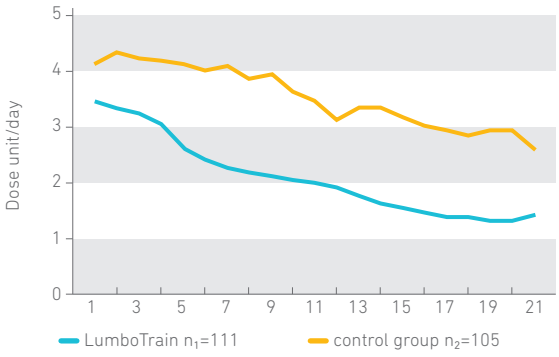
→ **Significantly less pain during activity, at rest, and at night with LumboTrain (no picture)**
→ **Significantly less restriction of movement with LumboTrain**

Percentage of patients fit for normal work at the start and end of the study period



18% more people able to work in comparison with LumboTrain®

Painkiller use during the study period Dose units per day



52% less painkiller use in comparison with LumboTrain®