

# Effect of Hanna Somatic Education on Low Back and Neck Pain Levels

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## Abstract

**Background:** Neck and low back pain are very common worldwide. Hanna somatic education (HSE) is a method of neuromuscular (mind–body) movement retraining that helps in managing pain, but its efficacy has not yet been studied.

**Objective:** To evaluate the clinical effect of HSE on low back and neck pain and determine differences in pain, use of pain medication, and number of doctor visits before and after 6 months of HSE sessions.

**Methodology:** This retrospective study included patients with neck and/or low back pain of >2-month duration who underwent HSE sessions between January 2016 and January 2018 and completed a minimum one follow-up session. Two to five one-to-one sessions of 40–60 min once every 1–2 weeks for 2–8 weeks were provided for each patient. Pain levels were recorded at each visit using the Wong-Baker FACES Pain Rating Scale. Data regarding medication use and number of doctor visits for pain management were also recorded.

**Results:** A total of 103 patients were included, of which 81 (78.6%) were female. Completing a mean 2.8 HSE sessions resulted in a significant pain level reduction. There were significant reductions in the mean low back, neck, and low back + neck pain values between the first and the last visits ( $P < 0.001$ ). In the 6 months before and after the HSE intervention, the number of patients using pain medication decreased from 53 (53.5%) to 14 (13.6%), respectively, and the mean number of doctor visits reduced significantly from 2 ( $\pm 1.6$ ) to 0.5 ( $\pm 1.16$ ) ( $P < 0.001$ ), respectively.

**Conclusion:** Clinical sessions of HSE were found to significantly reduce chronic spinal pain. Further investigations are recommended regarding evidence-based treatment of HSE in patients with muscles pain.

**Keywords:** Back pain, concentric/eccentric, exercise therapy, mind-body intervention, neck pain, nonpharmacologic therapies

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## INTRODUCTION

Spinal (back and neck) pain are among the most frequent reasons for visiting a general practitioner or physiotherapist in primary care.<sup>[1,2]</sup> In fact, in the recent Global Burden of Disease (1990–2019), low back pain was ranked as the fourth leading cause of disability-adjusted life years in the age groups 10–24 years and 25–49 years.<sup>[3]</sup>

The treatment of these conditions is complex. Recently, a clinical guideline from American College of Physicians (ACP) recommended that clinicians and patients should consider initial exercise therapies such as yoga, tai chi, Pilates, motor control, etc., for chronic low back pain.<sup>[4]</sup> Currently, low to moderate evidence is available regarding the effectiveness of mind–body interventions in reducing chronic low back pain.<sup>[5]</sup> One such mind–body intervention is the Hanna Somatic Education (HSE), which was developed by Dr. Thomas Hanna.

HSE is a self-care, self-efficacy system of neuromuscular (mind–body) movement re-education that was designed to reverse a common root cause of chronic muscular pain: sensory motor amnesia.<sup>[6]</sup> Sensory motor amnesia is the tendency of the human brain to forget certain movements or ways of relating to muscles or muscle groups, leaving them chronically contracted. The contraction is the result of ongoing, subcortical, brain stem-level impulses sent to the motor units causing contractions of muscle fibers.<sup>[7]</sup> It has been claimed that HSE helps improve the muscles function by changing the function of the brain. It teaches the person to regain awareness of sensation and cortical control of muscles and movement through a program of sensory and motor training. This internalized learning process is achieved through a specific voluntary movement pattern called “voluntary pandiculation.”<sup>[7]</sup> The potential effect of this is improvement in muscle function, reduction of pain, and increased sense of wellbeing. HSE, in comparison with other forms of alternative therapies, is a relatively new method.

Somatic education has been reported anecdotally in the literature. Case studies and testimonials demonstrate that HSE might be effective in relieving chronic muscle pain such as in neck or shoulder and back.<sup>[7]</sup> However, clinical studies on the effect of this approach is lacking. A few published studies in the literature have examined the effects of the earlier somatic education interventions such as the Alexander technique and the Feldenkrais method.<sup>[8]</sup> In a randomized clinical trial that included 517 patients with chronic low back pain, Little *et al.*<sup>[9]</sup>

reported that the Alexander technique led to long-term significant reductions in chronic low back pain. Similarly, Woodman *et al.*<sup>[10]</sup> found significant reduction in neck pain and associated disability using the Alexander technique. Some researchers reported significant positive effects of the Feldenkrais method. In another study, Paolucci *et al.*<sup>[11]</sup> found that the effectiveness of the Feldenkrais method in reducing chronic low back pain was comparable with that of back school interventions, which comprise exercise and education. The Feldenkrais method has also been shown to improve joint mobility of the neck and shoulders and reduce pain in people with visual impairment.<sup>[12]</sup>

To the best of our understanding, clinical evidence of HSE as a mind–body intervention for reducing muscle pain has not yet been reported. The purpose of this study was to evaluate the clinical effect of HSE on low back and/or neck pain and determine differences in pain levels, use of pain medication, and number of doctor visits before and after 6 months of HSE sessions.

## METHODOLOGY

### Study design, setting, and participants

This retrospective study included patients with spinal pain (neck or low back) who underwent HSE sessions at the Wellness Teaching Clinic of Employee Health at Johns Hopkins Aramco Healthcare (JHAH), Dhahran, Saudi Arabia, between January of 2016 and January of 2018. All patients were treated by a nurse who is a certified HSE practitioner.

Patients were included in the study if they had complaints of spinal pain (neck or low back), the duration of pain was >2 months, and they attended a minimum one follow-up session of HSE.

Pain levels were recorded both before and after each session of HSE. The pain levels were assessed using the Wong–Baker FACES Pain Rating Scale. Patients in the first two years of the study reported their pain level on a 0–5 scale documented on the SAP software (0 = no pain; 5 = the worst possible pain), while those in the third year reported their pain level on a 0–10 scale documented on the Epic system (0 = no pain; 10 = the worst possible pain). Year 1 and 2 had a larger sample size, and thus for conformity across the sample, the Year 3 values from the 0–10 pain scale values were converted by dividing the values by two per principle of Wong–Baker FACES Pain Rating Scale. The patients were categorized based on pain location and duration.

## Variables

The clinical data collected included age; gender; dates of initial and final evaluations; pain levels before and after HSE; location and duration of pain; occupation; nationality; prior treatment of physical therapy; referral source; the number of physician visits associated to only spinal pain; and the use of pain medication 6 months before the first session of HSE intervention and 6 months after the last session of HSE intervention. The data were collected from patients' records, including the electronic system (SAP and Epic) and hard copies.

## Outcomes

The primary outcome measured is the reduction in pain after the first and last visit. The secondary outcomes measured is the reduction in the use of pain medication and doctor visit 6 months after completion of HSE sessions.

## Intervention

The intervention was part of a standard voluntary offering at the Wellness Teaching Clinic to all patients with spinal pain who either presented directly to the clinic or were referred by a physician. The patients were taught the practical procedures and the key underlying principles of HSE, with the aim of empowering them to adopt this self-care approach in daily life, and thus helping in reducing the frequency and intensity of low back/neck pain. A minimum of two and a maximum of five one-to-one clinical sessions of HSE were offered, with each session typically being delivered 1 day/week, or once every 2 weeks; therefore, the sessions were delivered over 2–8 weeks. The duration of the first session was 60 min and that of each follow-up session was 40 min. Appointment scheduling accommodated both the care providers' discretion and the patients' preference.

Each clinic session consisted of special assessment, discussion, explanation of the philosophy and theory of HSE associated with pain, and the provision of HSE technique by verbal or hands-on guidance in line with the home exercise recommendations of HSE. The patients were either in sitting or lying positions when doing the exercises. All patients were encouraged to routinely do home exercises. After each session, handouts were provided, and feedback was obtained from the patients.

## Description of the Hanna Somatic exercise

The essential technique of HSE is “voluntary pandiculation,” which involves specialized voluntary muscle movement: contracting (concentric) followed by slow lengthening (eccentric). The technique of HSE involves unlearning unwanted habits (e.g., habitual tightening of

the muscles) initiated from the subcortical level of the brain by developing a more accurate sense of body and self-awareness and recondition the neuromuscular control on the brain cortex level. In practice, when a patient is asked to deliberately contract a muscle or muscle groups through a specialized concentric (not isometric) movement, the muscle action is designed to work against gravity or against a resistance provided by the HSE practitioner. The resistance increases the muscle's load, after which it slowly and gradually lengthens to its natural position. This eccentric contraction recruits the corticospinal tract originating in the motor cortex as the only part of the motor system that can decrease the firing of the motor unit.<sup>[13]</sup> By the time the patient finishes the movement, the muscles would have lengthened and relaxed, creating a new resting muscle tonus. Information regarding the new level of resting muscles is sent by the sensory pathway upward to the brain sensory cortex.<sup>[13]</sup> The neuron connections between the sensory and motor systems complete their sensory–motor loop. The result is restoration of fuller control to voluntary muscles groups. By applying the same basic principles to areas suffering from hypertonus, HSE practitioners can help patients release chronic muscle tension and relieve soreness and pain by recovering voluntary control of compromised muscle.<sup>[7]</sup>

A simple example of a HSE lower back exercise is as follows: a patient is lying in the supine position with bended knees and is asked to consciously arch (concentric contraction) the low back by voluntarily pressing the tailbone downward toward the floor, and then allowing the lower back to flatten slowly (eccentric contraction). During these movements, the corticospinal tract contracts the back extensor muscles, and then decreases the output to the muscles, allowing them to relax and lengthen. The patient is advised to do these movements slowly and comfortably with deep breathing, pay attention to the sensation from movements, and always stay within their comfort zone. Help and guidance from a qualified HSE practitioner is essential and usually includes implicit (experiential) and explicit verbal or hands-on instructions.

## Ethical consideration

Ethical approval was obtained from the Institutional Review Board (IRB) of JHAH. All patients' records included in the study were coded using serial numbers to collect information in aggregate format without identifying information by individuals. No patient/family/physician contact occurred at any point. Data were collected and stored electronically; data were then stored in a folder on a password-protected computer that was only accessible to the primary researcher.

## Data analysis

Data analysis was conducted using Python software (Python, Library SCIPY/Programming Language). Descriptive statistics was performed using Wilcoxon signed-rank test;  $P < 0.001$  was considered significant.

## RESULTS

A total of 240 patients presented during the study period; however, 137 patients were excluded because the pain location was different ( $n = 115$ ), did not attend a minimum one follow-up session for HSE ( $n = 20$ ), or the pain duration was  $< 2$  months ( $n = 2$ ).

### Baseline characteristics of the patients

Of the 103 included in the study, 81 (78.6%) were female. Most patients were Middle Eastern (48.5%) and professionally were health providers (49.5%) or office workers (45.6%). The age of the patients ranged from 27 to 71 years (mean:  $48.3 \pm 9.6$  years). Most patients had been referred by physicians (83.5%) and 39.8% patients had been treated by physical therapists prior to attending the HSE sessions [Table 1].

In terms of the pain location, most patients had neck pain (43.7%) followed by low back pain (34%). Most patients had a pain duration of 1–5 years (43.7%) [Table 2].

### Number of sessions

The mean number of HSE sessions attended was 2.8 ( $\pm 1$ ) (range: 2 to 5), with the sessions being highest among those with pain in both areas ( $3.5 \pm 1.2$ ) and lowest among those with pain only in neck ( $2.4 \pm 0.7$ ). When segregated by pain duration, the mean number of sessions were highest among patients with a pain duration of  $> 5$  years ( $3.3 \pm 1.1$ ) and lowest among those with pain duration of 2 months to 1 year ( $2.4 \pm 0.5$ ) [Table 3].

### Pain

Completing a mean 2.8 sessions of HSE resulted in significant reduction of pain levels. Overall, between the first and the last visits, the mean low back pain decreased from 3.3 ( $\pm 0.8$ ) to 0.6 ( $\pm 0.8$ ), the mean neck pain decreased from 3.1 ( $\pm 0.8$ ) to 0.6 ( $\pm 0.8$ ), and the mean low back + neck pain decreased from 3.4 ( $\pm 0.8$ ) to 0.7 ( $\pm 0.9$ ) ( $P = < 0.001$ ). There was no significant between group differences in terms of pain location ( $P > 0.05$ ) and duration of pain ( $P > 0.36$ ) [Table 4].

### Medication

The number of patients using pain medication 6 months before the HSE intervention decreased from 53 (53.5%)

**Table 1: Demographic characteristics of patients (N=103)**

Characteristics	Number of patients (%)
Gender	
Male	22 (21.4)
Female	81 (78.6)
Age (years)	
27-49	52 (50.5)
50-71	51 (49.5)
Physical therapy	
Yes	41 (39.8)
No	62 (61.1)
Referral	
Doctor	85 (83.5)
Self	18 (17.5)
Occupation	
Office worker	47 (45.6)
Medical care provider	51 (49.5)
Other	5 (4.9)
Ethnicity	
Middle Eastern	50 (48.5)
Western	22 (21.4)
Indian	14 (13.6)
Chinese	10 (9.7)
Filipino	6 (5.8)
African	1 (0.97)

**Table 2: Frequency and percentage of patients based on location and duration of pain**

Category	Number of patients, n (%)
Location of pain	
Back	35 (34)
Neck	45 (43.7)
Both	23 (22.3)
Duration of pain	
2 months to $< 1$ year	17 (16.6)
1 year to $< 5$ years	45 (43.7)
5 years to $< 10$ years	19 (18.5)
$\geq 10$ years	22 (21.4)

**Table 3: Mean and standard deviation of number of Hanna somatic education sessions by patients**

Category	Mean $\pm$ SD
Mean HSE session for all patients	2.8 $\pm$ 1
Location of pain	
Back	3 $\pm$ 0.9
Neck	2.4 $\pm$ 0.7
Both	3.5 $\pm$ 1.2
Duration of pain	
2 months to $< 1$ year	2.4 $\pm$ 0.5
1 year to $< 5$ years	2.8 $\pm$ 0.9
5 years to $< 10$ years	3.3 $\pm$ 1.1
$\geq 10$ years	3.3 $\pm$ 1.1
Age	
27-49	2.7 $\pm$ 1
50-71	3 $\pm$ 1

SD: Standard deviation, HSE: Hanna somatic education

to 14 (13.6%) 6 months after the HSE intervention. The decrease in pain medication use was noted for all subcategories of the pain location and duration [Table 5]. The reduction in the use of medication for patients with low back pain was 87.5%, with neck pain was 73%, and with both neck and low back pain was 61.5%.



### Doctors' visit

The mean number of visits to a doctor for pain management significantly reduced from 2 ( $\pm 1.6$ ) in the 6 months before the HSE intervention to 0.5 ( $\pm 1.16$ ) in the 6 months after the HSE intervention. The reduction in mean doctor visits were significant across all subcategories of pain location and duration as well as across age ( $P < 0.001$  for all) [Table 6]. The reduction in the mean number of doctors' visit for patients with low back pain was 84.3%, with neck pain was 83.3%, and with low back + neck pain was 61.6%.

### DISCUSSION

This study found that completing about three clinical sessions of HSE significantly reduced chronic neck and/or low back pain. In addition, this reduction in pain was sustained, as there was a significant reduction in the number of patients using pain medication (by 74.5%) and the mean number of doctor visits (by 58%) in the 6 months after the HSE sessions compared to the 6 months prior to these sessions. Therefore, the findings of this study indicate that HSE is an effective and sustainable method of reducing spinal pain.

One of the main activating factors leading to muscle pain is acidic tissue pH. When muscles are in persistent involuntary contraction with hypertonus, blood flow is limited, cells lack a supply of nutrients, waste products (lactic acid) are not eliminated properly, and free nerve endings are excited, and consequently, these changes manifest as pain.<sup>[14]</sup> When the tight muscles become relaxed, blood flow increases, waste is flushed, and pain decreases. This is the plausible explanation for the significant effect HSE was found to have in reducing chronic neck and/or low back pain in this study.

HSE is an educational, self-care efficacy approach that is different from traditional stretching and other therapies such as massage. Stretching and massage are both passive activities that do not involve learning. Stretching can cause harm if the muscles are habitually contracted and unable to relax, and it can make the muscles recontract because of the "stretch reflex".<sup>[13]</sup> HSE involves a collaborative educational approach between patients and providers that gives patients the knowledge and resources to adopt greater control over their own bodies, thereby becoming their own healthcare providers. This is the possible explanation for the sustained effects of HSE noted in this study.

A direct comparison of the findings of this study is not possible given that, to the best of the authors' knowledge,

**Table 4: Difference in pain levels before and after Hanna somatic education sessions**

Category	Mean $\pm$ SD		P
	Before	After	
Pain level for all patients	3.2 $\pm$ 0.8	0.6 $\pm$ 0.9	<0.001
Location of pain			
Back	3.3 $\pm$ 0.8	0.6 $\pm$ 0.8	<0.001
Neck	3.1 $\pm$ 0.8	0.6 $\pm$ 0.9	<0.001
Both	3.4 $\pm$ 0.8	0.7 $\pm$ 0.9	<0.001
Duration of pain			
2 months to <1 year	2.9 $\pm$ 0.9	0.2 $\pm$ 0.4	<0.001
1 year- <5 years	3.3 $\pm$ 0.7	0.6 $\pm$ 0.7	<0.001
5 years- <10 years	3.1 $\pm$ 0.7	0.6 $\pm$ 0.8	<0.001
$\geq 10$ years	3.6 $\pm$ 0.9	1 $\pm$ 1.2	<0.001
Age			
27-49	3.3 $\pm$ 0.7	0.7 $\pm$ 0.9	<0.001
50-71	3.2 $\pm$ 0.9	0.5 $\pm$ 0.8	<0.001

SD: Standard deviation

**Table 5: Frequency and percentage of patients use of medication in the 6 months before and after Hanna somatic education**

Category	Before		After	
	Yes, n (%)	No, n (%)	Yes, n (%)	No, n (%)
All patients	55 (53.5)	48 (46.6)	14 (13.6)	89 (86.4)
Location of pain				
Back	16 (15.5)	19 (18.4)	2 (1.94)	33 (32)
Neck	26 (25.2)	19 (18.4)	7 (6.9)	38 (36.9)
Both	13 (12.6)	10 (9.7)	5 (4.9)	18 (17.5)
Duration of pain				
2 months to <1 year	8 (7.8)	9 (8.7)	1 (0.8)	16 (15.5)
1 year to <5 years	24 (23.3)	21 (20.4)	6 (5.8)	39 (37.9)
5 years to <10 years	11 (10.7)	8 (7.8)	2 (1.9)	17 (16.5)
$\geq 10$ years	12 (11.7)	10 (9.7)	5 (4.9)	17 (16.5)
Age				
27-49	29 (28.2)	23 (22.3)	7 (6.8)	45 (43.7)
50-71	26 (25.2)	25 (24.3)	1 (6.8)	44 (42.7)

**Table 6: Descriptive statistics for mean number of doctor's visits in the 6 months before and after Hanna somatic education**

Category	Mean $\pm$ SD		P
	Before	After	
All patients	2 $\pm$ 1.6	0.5 $\pm$ 1.1	<0.001
Location of pain			
Back	1.9 $\pm$ 1.6	0.3 $\pm$ 0.7	<0.001
Neck	1.8 $\pm$ 1.4	0.3 $\pm$ 0.73	<0.001
Both	2.6 $\pm$ 2.1	1 $\pm$ 1.8	<0.001
Duration of pain			
2 months to <1 year	2.1 $\pm$ 1.5	0.2 $\pm$ 0.4	<0.001
1 year to <5 years	2 $\pm$ 1.9	0.5 $\pm$ 0.9	<0.001
5 years to <10 years	1.6 $\pm$ 1.0	0.3 $\pm$ 0.8	<0.001
$\geq 10$ years	2.3 $\pm$ 1.6	0.8 $\pm$ 1.7	<0.001
Age			
27-49	2.3 $\pm$ 1.8	0.6 $\pm$ 1.3	<0.001
50-71	1.8 $\pm$ 1.5	0.4 $\pm$ 0.8	<0.001

SD: Standard deviation

this is the first study to have clinically analyzed the effects HSE in reducing low back and neck pain. Nonetheless, the findings of this study are coherent with those using other somatic education such as the Alexander technique and the Feldenkrais method.<sup>[7-12]</sup> The collective findings of these studies indicate that somatic education in general is a

viable nonpharmacologic therapy for sustained reduction in low back and/or neck pain.

### Limitations and recommendations

The inherent limitations of a retrospective study design are applicable to this study. In addition, the pre/post intervention findings are unable to exclude nonspecific effects such as placebo effects. Therefore, a randomized controlled trial with a long-term follow-up is required to provide robust validation of the findings of this study. In addition, the study did not include those with a single clinical HSE session (about 15%), which although a modest dropout, may have marginally affected the accuracy of the experiment. In future prospective studies, we also would recommend that during the initial and final evaluations of pain and functionality, participants should be assessed using functional tests (range of movement, posture, and gait) and self-reporting assessment (for example, efficacy scale and disability index).

### CONCLUSION

Clinical sessions of HSE significantly reduced chronic low back and/or neck pain and resulted in reduction in the use of pain medication and in the number of visits to physicians for pain management. Further investigations are recommended regarding evidence-based treatment of HSE in patients with muscles pain.

### Ethical considerations

The study was approved by the Institutional Review Board of JHAH (IRB #18-35). The study adhered to the principles of Declaration of Helsinki, 2013.

### Data availability statement

The datasets generated during and/or analyzed during the current study are not publicly available but are available from the corresponding author on reasonable request.

### Peer review

This article was peer-reviewed by two independent and anonymous reviewers.

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### Conflict of interest

There are no conflicts of interest.

### REFERENCES

1. Bot SD, van der Waal JM, Terwee CB, van der Windt DA, Schellevis FG, Bouter LM, *et al.* Incidence and prevalence of complaints of the neck and upper extremity in general practice. *Ann Rheum Dis* 2005;64:118-23.
2. Jordan KP, Kadam UT, Hayward R, Porcheret M, Young C, Croft P. Annual consultation prevalence of regional musculoskeletal problems in primary care: An observational study. *BMC Musculoskelet Disord* 2010;11:144.
3. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: A systematic analysis for the Global Burden of Disease Study 2019. *Lancet* 2020;396:1204-22.
4. Somerville S. Guideline: In low back pain, nonpharmacologic treatments are recommended. *Ann Intern Med* 2017;166:JC62.
5. Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, *et al.* Nonpharmacologic therapies for low back pain: A systematic review for an American college of physicians clinical practice guideline. *Ann Intern Med* 2017;166:493-505.
6. Hanna T. *Somatics: Reawakening the Mind's Control of Movement, Flexibility, and Health*. Cambridge, MA: Da Capo Press; 1989. p. 37-92.
7. Criswell-Hanna E. Compare Other Methods. Retrieved from the Association of Hanna Somatic Education® Inc. Available from: [http://hannasomatics.com/index.php/the\\_somatics\\_difference/compare\\_other\\_methods/](http://hannasomatics.com/index.php/the_somatics_difference/compare_other_methods/). [Last accessed on 2020 Jan 06].
8. Hanna T. *The Body of Life: Creating New Pathways for Sensory Awareness and Fluid Movement*. Rochester, VT: Healing Arts Press; 1980. p. 155-89.
9. Little P, Lewith G, Webley F, Evans M, Beattie A, Middleton K, *et al.* Randomised controlled trial of Alexander Technique lessons, exercise, and massage (ATEAM) for chronic and recurrent back pain. *BMJ* 2008;337:a884.
10. Woodman J, Ballard K, Hewitt C, MacPherson H. Self-efficacy and self-care-related outcomes following Alexander Technique lessons for people with chronic neck pain in the ATLAS randomised, controlled trial. *Eur J Integr Med* 2018;17:64-71.
11. Paolucci T, Zangrando F, Iosa M, De Angelis S, Marzoli C, Piccinini G, *et al.* Improved interoceptive awareness in chronic low back pain: A comparison of back school versus eldenkrais method. *Disabil Rehabil* 2017;39:994-1001.
12. Lundqvist LO, Zetterlund C, Richter HO. Effects of feldenkrais method on chronic neck/scapular pain in people with visual impairment: A randomized controlled trial with one-year follow-up. *Arch Phys Med Rehabil* 2014;95:1656-61.
13. Kandel ER, Schwartz JH, Jessell TM. *Principles of Neural Science*. 5<sup>th</sup> ed. New York: McGraw-Hill; 2000. p. 717-78.
14. Mense S. Muscle pain: Mechanisms and clinical significance. *Dtsch Arztebl Int* 2008;105:214-9.