

University of Texas Rio Grande Valley

ScholarWorks @ UTRGV

---

School of Medicine Publications and  
Presentations

School of Medicine

---

2013

## Management Options for Patients with Chronic Back Pain Without an Etiology

Lenny D. Salzberg

Eron G. Manusov

*The University of Texas Rio Grande Valley*

Follow this and additional works at: [https://scholarworks.utrgv.edu/som\\_pub](https://scholarworks.utrgv.edu/som_pub)



Part of the [Orthopedics Commons](#)

---

### Recommended Citation

Salzberg, L. D., & Manusov, E. G. (2013). Management options for patients with chronic back pain without an etiology. *Health services insights*, 6, 33–38. <https://doi.org/10.4137/HSI.S10469>

This Article is brought to you for free and open access by the School of Medicine at ScholarWorks @ UTRGV. It has been accepted for inclusion in School of Medicine Publications and Presentations by an authorized administrator of ScholarWorks @ UTRGV. For more information, please contact [justin.white@utrgv.edu](mailto:justin.white@utrgv.edu), [william.flores01@utrgv.edu](mailto:william.flores01@utrgv.edu).

REVIEW

**OPEN ACCESS**  
Full open access to this and thousands of other papers at <http://www.la-press.com>.

## Management Options for Patients with Chronic Back Pain Without an Etiology

Lenny D. Salzberg<sup>1</sup> and Eron G. Manusov<sup>2</sup>

<sup>1</sup>Faculty Development Fellowship, Duke/SR-AHEC Family Medicine Residency, 1601 Owen Drive, Fayetteville NC 28304.

<sup>2</sup>Vice President CEAS, Program Director, Duke/SR-AHEC Family Medicine Residency, 1601 Owen Drive, Fayetteville NC 28304. Corresponding author email: [eron.manusov@sr-ahec.org](mailto:eron.manusov@sr-ahec.org)

---

**Abstract:** The treatment and management of low back pain is complex when there is no specific etiology such as cancer, fracture, or herniated disc. An organized approach to management that follows evidence based guidelines will facilitate care in a problem that reflects a lifetime prevalence of over 70 percent. The purpose of this review is to present a guideline to care for a common disabling process with a very heterogeneous etiology.

**Keywords:** back pain, management, non-specific

---

*Health Services Insights* 2013:6 33–38

doi: [10.4137/HSI.S10469](https://doi.org/10.4137/HSI.S10469)

This article is available from <http://www.la-press.com>.

© the author(s), publisher and licensee Libertas Academica Ltd.

This is an open access article published under the Creative Commons CC-BY-NC 3.0 license.



Back pain, defined as pain that is below the costal margin and above the inferior gluteal folds, with or without leg pain, is the fifth most common reason for all physician visits in the United States.<sup>1</sup> The lifetime prevalence of low back pain is reported as over 70% in industrialized countries<sup>2</sup> with a worldwide lifetime prevalence of 84%.<sup>3</sup> Approximately half of adults have low back pain during any given year. Approximately two-thirds of the population has low back pain at some time in their lives.<sup>4</sup> Nonspecific low back pain accounts for over 85% of all low back pain and is defined as low back pain not attributable to a recognizable known specific pathology such as pain due to nerve root pain or radicular syndrome and pain due to infection, tumor, osteoporosis, fracture, structural deformity, inflammatory disorder, or cauda equine syndrome.<sup>3,5</sup>

Many patients with self-limited low back pain do not seek medical attention. Picavet and colleagues reported that less than a third of patients with low back pain had consulted their family doctor in the previous year.<sup>3</sup> Those patients that do seek care improve rapidly but typically do not resolve completely during the first 4 to 6 weeks.<sup>6</sup> Recurrence is a hallmark of low back in large epidemiological studies, although measurement and reporting differences complicates meta-analysis.<sup>3</sup> Therefore, back pain is commonly divided into acute, subacute, chronic, and recurrent low back pain.<sup>6</sup> Chronic low back pain is defined as persistent low back pain for at least 12 weeks.<sup>6</sup> There is a broad array of treatment options available for chronic low back pain, ranging from education, manual therapy, and medications to complementary and alternative integrative medicine.

The European guidelines for the management of acute nonspecific low back pain in primary care were published in 2006 and are very similar to the American College of Physicians (ACP) and the American Pain Society (APS) joint clinical practice guideline on the diagnosis and treatment of low back pain published in 2007.<sup>7</sup> These guidelines address both acute and chronic pain. Since 2007 there have been new studies of several of the treatment options discussed in the guidelines. We will review the management options for patients with chronic back pain without an etiology incorporating the European and the ACP/APS guidelines with new developments published since the working groups on guidelines for the management of low back pain in primary care met.

Advice to patients regarding self-care and the generally favorable prognosis of chronic low back pain is a strong recommendation based on moderate-quality evidence.<sup>7</sup> Avoiding bed rest is a key component of self-care. Remaining active and returning to normal activities as soon as possible helps to relieve symptoms.<sup>8</sup> Self-care education books<sup>9,10</sup> are effective, inexpensive, and efficient. Finding time and space to exercise can be an issue for patients and providing videos of exercise therapy may reinforce the importance of exercise and demonstrate how to exercise correctly.<sup>11</sup> Providing an exercise video may reduce inappropriate fear or avoidance of movement in patients with chronic low back pain.<sup>12</sup>

With the explosion of social media and cell phone technology, it is possible that there are virtual discussion groups (eg, Facebook, email, Twitter), layperson led groups, or apps that help in self-care, but there is no evidence to support these at this time.

Although a firm mattress is commonly believed to be beneficial for low back pain, a randomized controlled multicenter trial compared medium-firm mattresses to firm mattresses for patients with nonspecific low back pain. At 90 days, patients with medium-firm mattresses had better outcomes for pain in bed, pain and rising, and disability.<sup>13</sup>

In addition to self-care, many classes of medications have been used to relieve acute low back pain. These medications may not work as well for chronic low back pain. The ACP/APS and the European guidelines recommend consideration of the use of medications in conjunction with self-care. Physicians should assess the risk-benefit ratio and the long-term safety before initiating therapy.

For first-line therapy, the guidelines recommend acetaminophen (paracetamol) and nonsteroidal anti-inflammatory drugs (NSAIDs). Review of the literature suggests that acetaminophen is not very effective for chronic low back pain when compared with an NSAID and is less effective than amitriptyline.<sup>14</sup> There is a new Australian trial (in the recruitment phase as of late 2011) that will compare 4 grams daily of acetaminophen to placebo for acute low back pain.<sup>15</sup> This dose would not be safe for chronic use due to risk of toxicity.<sup>16</sup>

NSAIDs are effective when compared with placebo<sup>17</sup> and are recommended in the ACP/APS guidelines. NSAIDs do have well known side effects



and toxicity, however, including but not limited to GI bleeding, impaired renal function, elevated blood pressure, and increased risk of myocardial infarction. NSAIDs commonly used to treat low back pain include ibuprofen, naproxen, sulindac, ketorolac, diclofenac, piroxicam, meloxicam, nabumetone, and celecoxib.<sup>18</sup>

Skeletal muscle relaxants, a diverse group of medications, are also recommended in the ACP/APS guidelines, and the European guidelines recommend adding a short course of muscle relaxants to paracetamol or NSAIDs.<sup>2,7</sup> This group includes benzodiazepines (eg, diazepam and alprazolam), antispasmodic medications (eg, cyclobenzaprine, carisoprolol, and tizanidine), and antispasticity medications (eg, dantrolene and baclofen). A 2008 Cochrane review concluded that there is strong evidence that any class of muscle relaxants is effective for short-term relief of pain in acute and chronic non specific low back pain when compared with placebo.<sup>19</sup> However, adverse events, especially related to the central nervous system, are common. Sedation, drowsiness, headache, blurred vision, nausea, and vomiting, in addition to the potential for abuse and dependency make this a difficult class of medications to prescribe. The consensus of the European working group is to consider adding a short course of muscle relaxants on its own or added to NSAIDs if paracetamol or NSAIDs have failed to reduce pain.<sup>2</sup>

Despite evidence that antidepressants are effective for chronic pain other than back pain, and the fact that the ACP/APS guidelines recommend antidepressants for chronic low back pain, a Cochrane review concluded that there was no convincing evidence that antidepressants relieve chronic low back pain more effectively than placebo.<sup>20</sup> Antidepressants in the Cochrane review included tricyclic antidepressants, SSRIs, and atypical antidepressants. In most studies, patients were allowed to continue regular medications including aspirin and NSAIDs thereby confusing the results of the studies.

Opioid analgesics or tramadol are listed as options in the ACP/APS guidelines, but with several caveats.<sup>7</sup> They should be used judiciously for severe debilitating pain that is not controlled with NSAIDs and acetaminophen, and potential benefits and harms should be carefully weighed before starting therapy. Failure to respond to a time-limited course of opioids

should lead to reassessment and consideration of alternatives.

Anticonvulsants have also been used for chronic pain. Carbamazepine and gabapentin result in short-term benefit in patients with radiculopathy but have not been shown to be of benefit for chronic low back pain.<sup>7</sup> Herbal therapies such as devil's claw, willow bark, and capsicum result in small to moderate benefit for exacerbations of chronic low back pain<sup>7</sup> and warrant further study. Corticosteroids have a limited role and are no more effective than placebo. Corticosteroids are not recommended in the ACP/APS guidelines.

There are several nonpharmacologic therapies with proven benefit available for chronic nonspecific low back pain. These include intensive interdisciplinary rehabilitation, cognitive-behavioral therapy, progressive muscle relaxation, exercise therapy, acupuncture, massage therapy, spinal manipulation, and yoga. Other interventions not mentioned in the ACP/APS guidelines but that have some evidence for utility include continuous ultrasound,<sup>21</sup> low-level laser therapy, interferential current electro-massage, and even wearing wool underwear.<sup>22</sup>

Both the ACP/APS and the European Workgroup guidelines recommend a referral for spinal manipulation therapy (SMT) for patients who are failing to return to normal activities. SMT includes both mobilization, whereby the therapist passively moves the spinal joints, and manipulation, where the therapist applies a directed manual impulse or thrust to a joint at the end of a passive range of motion. The thrust often is accompanied by a "crack."

A Cochrane review of over 20 randomized controlled trials (2674 participants), with over one-third of the trials considered to be of high methodological quality, assessed acute low back pain and SMT and found that SMT is no more effective than other recommended therapies. The results of another Cochrane review of 26 randomized controlled trials (6070 participants) demonstrate that SMT appears to be as effective as other common therapies prescribed for chronic low back pain, such as exercise therapy, standard medical care, or physiotherapy.<sup>23</sup> There is increasing evidence for the use of SMT in nonpregnant individuals with chronic nonspecific low back pain without previous low back surgery or major medical conditions.<sup>24</sup>



A 2011 Cochrane review of behavioral treatment for chronic low back pain<sup>25</sup> concluded that there are 3 types of behavioral therapy: operant therapy (that acknowledges that external factors associated with pain can reinforce it), cognitive therapy (dealing with thoughts, feelings, beliefs, or a combination of the 3 that trigger the pain), and respondent therapy (which interrupts muscle tension with progressive relaxation techniques or biofeedback of muscle activity) that are equally efficacious for pain relief in the short term. In the intermediate to long term, there is little or no difference between behavioral therapy and group exercises for pain, and adding behavioral therapy to inpatient rehabilitation was no more effective than inpatient rehabilitation alone.

Exercise therapy also shows a moderate beneficial treatment effect.<sup>26</sup> This treatment effect is independent of changes to the musculoskeletal system, which implies that there is a benefit of exercise for pain not related to an increase in strength. Exercise also has a significant effect on work disability in patients with chronic nonspecific low back pain, regardless of the exercise type.<sup>27</sup>

Evidence exists that acupuncture is more effective than no treatment for treating chronic nonspecific low back pain, but the results of a systemic review demonstrated that there is no significant difference between acupuncture and sham acupuncture in providing pain relief.<sup>28</sup> The evidence-based recommendation for acupuncture is confusing as there is no standard for length of treatment, frequency of sessions, or number and placement of needles. Further high quality evidence is needed before solid recommendations can be made.

Superficial heat, using Therma-Care heat wraps and other treatments (eg, hot water bottles, heated packs filled with grain, hot towels, and electric heating pads) has not been studied for use in chronic low back pain. Heat does reduce pain and disability for acute back pain that lasts less than 3 months.<sup>29</sup> There is insufficient evidence to recommend cold (eg, ice, cold gel packs, ice packs, and ice massage) even for acute pain.<sup>29</sup> Deep heat, using therapeutic ultrasound, was found to be effective in one study for chronic low back pain compared with placebo ultrasound.<sup>21</sup>

A newly popular treatment for low back pain is low-level laser therapy (LLLT). LLLT is a noninvasive single wavelength light treatment that emits no heat, sound, or vibration. It may affect the function of

fibroblasts, reducing inflammation and accelerating repair. A Cochrane review<sup>30</sup> of 7 small studies showed that LLLT was more effective in reducing pain when compared with sham laser. Laser strength and number of treatments varied in the studies, and the effect size was small.

Yoga and Pilates have gained popularity among health conscious adults for prevention and treatment of back pain. Yoga classes using the principles of viniyoga including 17 postures, breathing exercises, and guided deep relaxation taught in 6 classes of 50-minutes each was equally as effective in reducing back pain when compared with physical therapist–led stretching classes and more effective than a self-care book.<sup>31</sup> Pilates was not effective in the reduction of pain in one recent study.<sup>32</sup>

National chain massage spas offer a variety of massage options (eg, Swedish, acupressure, shiatsu, and deep tissue). A Cochrane review<sup>33</sup> concluded that massage had no serious side effects and resulted in more beneficial pain relief than joint mobilization, relaxation, physical therapy, self-care education, or acupuncture. Acupressure or pressure point massage provided more relief than Swedish massage. In one study, Chinese massage combined with herbal ointments was more effective than massage with a placebo ointment among athletes.<sup>34</sup>

Transcutaneous electrical nerve stimulation (TENS) and interferential currents (IFC) are both noninvasive nonpharmacologic therapies that are more effective than placebo for the treatment of nonspecific chronic low back pain.<sup>35</sup> When compared with each other, one was not more effective than the other.

One other behavioral technique studied is mindfulness-based stress reduction (MSBR), a common form of complementary medicine in which meditation and yoga are combined to create greater awareness of the unity of mind and body. At this time, there is inconclusive evidence for effectiveness of MSBR in improving pain intensity, but there is some evidence that MBSR can improve pain acceptance.<sup>36</sup>

In a randomized prospective study of good quality done in Turkey, wearing wool underwear for a 2-month period decreased pain compared with a placebo group wearing cotton underwear.<sup>22</sup> In a randomized controlled trial conducted in Iran with 2 parallel groups, an ancient technique known as “wet-cupping” was also effective in reducing pain. Wet-cupping involves





vacuum cups, multiple superficial incisions, and bloodletting.<sup>37</sup>

In summary, chronic low back pain is common and the etiology is multifocal and complicated.<sup>38–40</sup> There are many good treatment options, some with better evidence-based information than others. We recommend following the current European and APC/APS guidelines. In light of further research, a rational approach would begin with patient information on self-care and prognosis. Consider recommending a new (medium-firm) mattress. If you choose to prescribe medications, acetaminophen or NSAIDs are a reasonable first choice. Muscle relaxants provide relief in the short term but must be weighed according to their risks and benefits. Opioids are effective, but long-term problems with misuse, diversion, and rare addiction may outweigh their benefit.

Currently there is not enough high quality evidence to support the use of TCAs, SSRIs, and gabapentin in the treatment of nonspecific low back pain. Nonpharmacologic approaches may be your best options. Nonpharmacologic treatment options with substantial evidence to support the use in patients with low back pain include SMT, behavioral therapy, exercise therapy, transcutaneous electrical nerve stimulation (TENS), interferential currents (IFC), low-level laser therapy (LLLT), and yoga. Massage may help more than acupuncture. Some combination of information, NSAIDs, and nondrug therapy with attention to risk/benefit ratio, cost, and patient preference is the approach most likely to help with this difficult chronic medical issue.

## Author Contributions

Conceived and designed the concept: LS, EM. Analyzed the data: LS, EM. Wrote the first draft of the manuscript: LS, EM. Contributed to the writing of the manuscript: LS, EM. Agree with manuscript results and conclusions: LS, EM. Jointly developed the structure and arguments for the paper: LS, EM. Made critical revisions and approved final version: LS, EM. All authors reviewed and approved of the final manuscript.

## Funding

Author(s) disclose no funding sources.

## Competing Interests

Author(s) disclose no potential conflicts of interest.

## Disclosures and Ethics

As a requirement of publication the authors have provided signed confirmation of their compliance with ethical and legal obligations including but not limited to compliance with ICMJE authorship and competing interests guidelines, that the article is neither under consideration for publication nor published elsewhere, of their compliance with legal and ethical guidelines concerning human and animal research participants (if applicable), and that permission has been obtained for reproduction of any copyrighted material. This article was subject to blind, independent, expert peer review. The reviewers reported no competing interests. Provenance: the authors were invited to submit this paper.

## References

1. Hart LG, Deyo RA, Cherkin DC. Physician office visits for low back pain. frequency, clinical evaluation, and treatment patterns from a US national survey. *Spine (Phila Pa 1976)*. 1995;20(1):11–9.
2. van Tulder M, Becker A, Bekkering T, et al. Chapter 3. european guidelines for the management of acute nonspecific low back pain in primary care. *Eur Spine J*. 2006;15(Suppl 2):S169–91.
3. Balague F, Mannion AF, Pellise F, Cedraschi C. Non-specific low back pain. *Lancet*. 2012;379(9814):482–91.
4. Deyo RA, Mirza SK, Martin BI. Back pain prevalence and visit rates: Estimates from US national surveys, 2002. *Spine (Phila Pa 1976)*. 2006; 31(23):2724–7.
5. McCarthy CJ, Roberts C, Gittins M, Oldham JA. A process of subgroup identification in non-specific low back pain using a standard clinical examination and cluster analysis. *Physiother Res Int*. 2012;17(2):92–100.
6. Koes BW, van Tulder M, Lin CW, Macedo LG, McAuley J, Maher C. An updated overview of clinical guidelines for the management of non-specific low back pain in primary care. *Eur Spine J*. 2010;19(12):2075–94.
7. Chou R, Qaseem A, Snow V, et al. Diagnosis and treatment of low back pain: A joint clinical practice guideline from the american college of physicians and the american pain society. *Ann Intern Med*. 2007;147(7):478–91.
8. Dahm KT, Brurberg KG, Jamtvedt G, Hagen KB. Advice to rest in bed versus advice to stay active for acute low-back pain and sciatica. *Cochrane Database Syst Rev*. 2010;(6):CD007612.
9. Burton AK, Waddell G, Tillotson KM, Summerton N. Information and advice to patients with back pain can have a positive effect. A randomized controlled trial of a novel educational booklet in primary care. *Spine (Phila Pa 1976)*. 1999;24(23):2484–91.
10. Coudeyre E, Tubach F, Rannou F, et al. Effect of a simple information booklet on pain persistence after an acute episode of low back pain: A non-randomized trial in a primary care setting. *PLoS One*. 2007;2(8):e706.
11. Miller JS, Litva A, Gabbay M. Motivating patients with shoulder and back pain to self-care: Can a videotape of exercise support physiotherapy? *Physiotherapy*. 2009;95(1):29–35.
12. Pincus T, Henderson J. Low back pain patients' responses to videos of avoided movements. *Eur J Pain*. 2013;17(2):271–8.
13. Kovacs FM, Abaira V, Pena A, et al. Effect of firmness of mattress on chronic non-specific low-back pain: Randomised, double-blind, controlled, multicentre trial. *Lancet*. 2003;362(9396):1599–604.



14. Davies RA, Maher CG, Hancock MJ. A systematic review of paracetamol for non-specific low back pain. *Eur Spine J*. 2008;17(11):1423–30. doi: 10.1007/s00586-008-0783-x; 10.1007/s00586-008-0783-x.
15. Williams CM, Latimer J, Maher CG, et al. PACE—the first placebo controlled trial of paracetamol for acute low back pain: Design of a randomised controlled trial. *BMC Musculoskelet Disord*. 2010;11:169.
16. FDA drug safety communication: Prescription acetaminophen products to be limited to 325 mg per dosage unit; boxed warning will highlight potential for severe liver failure. US Food and Drug Administration. <http://www.fda.gov/Drugs/DrugSafety/ucm239821.htm>. Updated 2011. Accessed Jan 18, 2013.
17. Kuijpers T, van Middelkoop M, Rubinstein SM, et al. A systematic review on the effectiveness of pharmacological interventions for chronic non-specific low-back pain. *Eur Spine J*. 2011;20(1):40–50.
18. Miller SM. Low back pain: Pharmacologic management. *Prim Care*. 2012;39(3):499–510.
19. van Tulder MW, Touray T, Furlan AD, Solway S, Bouter LM; Cochrane Back Review Group. Muscle relaxants for nonspecific low back pain: A systematic review within the framework of the cochrane collaboration. *Spine (Phila Pa 1976)*. 2003;28(17):1978–92.
20. Urquhart DM, Hoving JL, Assendelft WW, Roland M, van Tulder MW. Antidepressants for non-specific low back pain. *Cochrane Database Syst Rev*. 2008;(1):CD001703.
21. Ebadi S, Ansari NN, Naghdi S, et al. The effect of continuous ultrasound on chronic non-specific low back pain: A single blind placebo-controlled randomized trial. *BMC Musculoskelet Disord*. 2012;13:192.
22. Kiyak E. The impact of wool in the patients with chronic non-specific low back pain. *Coll Antropol*. 2012;36(2):623–6.
23. Rubinstein SM, van Middelkoop M, Assendelft WJ, de Boer MR, van Tulder MW. Spinal manipulative therapy for chronic low-back pain: An update of a cochrane review. *Spine (Phila Pa 1976)*. 2011;36(13):E825–46.
24. Licciardone JC, Minotti DE, Gatchel RJ, Kearns CM, Singh KP. Osteopathic manual treatment and ultrasound therapy for chronic low back pain: A randomized controlled trial. *Ann Fam Med*. 2013;11(2):122–9.
25. Henschke N, Ostelo RW, van Tulder MW, et al. Behavioural treatment for chronic low-back pain. *Cochrane Database Syst Rev*. 2010;(7):CD002014.
26. Steiger F, Wirth B, de Bruin ED, Mannion AF. Is a positive clinical outcome after exercise therapy for chronic non-specific low back pain contingent upon a corresponding improvement in the targeted aspect(s) of performance? A systematic review. *Eur Spine J*. 2012;21(4):575–98.
27. Oesch P, Kool J, Hagen KB, Bachmann S. Effectiveness of exercise on work disability in patients with non-acute non-specific low back pain: Systematic review and meta-analysis of randomised controlled trials. *J Rehabil Med*. 2010;42(3):193–205.
28. Hutchinson AJ, Ball S, Andrews JC, Jones GG. The effectiveness of acupuncture in treating chronic non-specific low back pain: A systematic review of the literature. *J Orthop Surg Res*. 2012;7(1):36.
29. French SD, Cameron M, Walker BF, Reggars JW, Esterman AJ. Superficial heat or cold for low back pain. *Cochrane Database Syst Rev*. 2006;(1):CD004750.
30. Yousefi-Nooraie R, Schonstein E, Heidari K, et al. Low level laser therapy for nonspecific low-back pain. *Cochrane Database Syst Rev*. 2008;(2):CD005107.
31. Sherman KJ, Cherkin DC, Wellman RD, et al. A randomized trial comparing yoga, stretching, and a self-care book for chronic low back pain. *Arch Intern Med*. 2011;171(22):2019–26.
32. Pereira LM, Obara K, Dias JM, et al. Comparing the pilates method with no exercise or lumbar stabilization for pain and functionality in patients with chronic low back pain: Systematic review and meta-analysis. *Clin Rehabil*. 2012;26(1):10–20.
33. Furlan AD, Imamura M, Dryden T, Irvin E. Massage for low-back pain. *Cochrane Database Syst Rev*. 2008;(4):CD001929.
34. Kong LJ, Fang M, Zhan HS, et al. Chinese massage combined with herbal ointment for athletes with nonspecific low back pain: A randomized controlled trial. *Evid Based Complement Alternat Med*. 2012;2012:695726.
35. Facci LM, Nowotny JP, Tormem F, Trevisani VF. Effects of transcutaneous electrical nerve stimulation (TENS) and interferential currents (IFC) in patients with nonspecific chronic low back pain: Randomized clinical trial. *Sao Paulo Med J*. 2011;129(4):206–16.
36. Cramer H, Haller H, Lauche R, Dobos G. Mindfulness-based stress reduction for low back pain. A systematic review. *BMC Complement Alternat Med*. 2012;12:162.
37. Farhadi K, Schwebel DC, Saeb M, Choubsaz M, Mohammadi R, Ahmadi A. The effectiveness of wet-cupping for nonspecific low back pain in iran: A randomized controlled trial. *Complement Ther Med*. 2009;17(1):9–15.
38. Patel AA, Spiker WR, Daubs M, Brodke D, Cannon-Albright LA. Evidence for an inherited predisposition to lumbar disc disease. *J Bone Joint Surg Am*. 2011;93(3):225–9.
39. Siemionow K, An H, Masuda K, Andersson G, Cs-Szabo G. The effects of age, sex, ethnicity, and spinal level on the rate of intervertebral disc degeneration: A review of 1712 intervertebral discs. *Spine (Phila Pa 1976)*. 2011;36(17):1333–9.
40. Alpantaki K, Katonis P, Hadjipavlou AG, Spandidos DA, Sourvinos G. Herpes virus infection can cause intervertebral disc degeneration: A causal relationship? *J Bone Joint Surg Br*. 2011;93(9):1253–8.