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The clinical effect of herbal magnetic corsets on lumbar disc herniation

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Objective: To determine the clinical effects of the treatment of lumbar disc herniation with herbal magnetic corsets.

Design: A randomized control trial.

Setting: The outpatient and inpatient departments of the Rehabilitation Center of the West China Hospital.

Patients: Sixty patients with clinically diagnosed lumbar disc herniation were included in the study.

Interventions: Both groups received lumbar traction, medium frequency electrotherapy and massage, whereas the experimental group wore herbal magnetic corsets in addition.

Main outcome measures: Pain and lumbar function were assessed before treatment and at one week, two weeks and four weeks after intervention.

Results: Both groups reported improvements in pain and lumbar function after treatment ($P < 0.05$ or $P < 0.001$). However, the experimental group reported gradually increasing relief over time leading to a better curative effect than observed in the control group ($P < 0.05$ for visual analogue scale or $P < 0.001$ for lumbar function).

Conclusion: Herbal magnetic corsets can facilitate the reduction of pain caused by lumbar disc herniation and can improve lumbar function. This is a safe and effective non-operative therapeutic option for treatment of lumbar disc herniation.

Introduction

Lumbar disc herniation is a common ailment and frequently encountered clinical syndrome mainly characterized by waist and leg pain. The cause is compression or irritation of the lumbar nerve roots, due to the rupture of the annuli fibrosi or the cartilaginous plate of the intervertebral space and the protrusion of the nucleus pulposus into the vertebral canal or the intervertebral foramina. The disorder originates from lumbar disc degeneration, injury and accumulative strain. About 85–90% of sufferers get satisfactory recovery through non-invasive therapy, an approach that is usually advocated as the first therapeutic choice for lumbar disc herniation.\(^1\),\(^2\) The existing conservative treatments include traction, electrotherapy, massage, specific exercise information, advice for daily life activity and medication.\(^3\),\(^4\) These have a certain clinical effect, but it is often difficult to achieve a complete effect. For this reason, since 2002, we have explored the application of a herbal magnetic corset, an elastic waist-band that integrates a mixture of herbs, magnetotherapy and...
lumbar orthotics, for patients with lumbar disc herniation to determine its effectiveness for pain relief and improvement of lumbar function.

Method

We undertook a randomized controlled trial. To be included patients had to have lumbar disc herniation shown on computerized tomography or magnetic resonance imaging studies, and two of the following four features:

1) Pain in the lower back with radicular lower limb pain presenting as sciatica, aggravated with increased abdominal pressure.
2) Local tenderness between the spinous processes or beside vertebrae, pain radiating to the leg or foot, or with scoliosis.
3) Limited anterior flexion of the spinal column, positive results from a straight-leg-raising test and its strength test (positive femoral nerve stretch test in the disc herniation of the third and fourth lumbar intervertebra).
4) Two of the following four neurological signs: muscular atrophy, decreased myodynamia, sensory disturbance, and reflex anomalies.

In addition this had to be the first onset or presentation in the acute stages of a repeated attack, and the patient had to be aged between 18 and 70 years.

Patients were excluded if they had: received surgical treatment because of lumbar disc herniation; psychosis; liver or kidney disease, haematopathy, tumour, respiratory system disease, cardiovascular or cerebral vascular disease, autoimmune disease or extreme debility; an implanted cardiac pacemaker or artificial valve; were pregnant or lactating; massive skin lesions in the lumbar region; and indications for immediate surgery.

All participants were from the outpatient and inpatient departments of the Rehabilitation Center of the West China Hospital.

Randomized assignment of the subjects to two groups was done using a random number table on the first day that they were seen in the clinic (this was done with the patient at the time). Sixty patients were divided equally into the experimental and control groups (Table 1).

Differences were sought in the patient’s sex and type by analysing the data with a chi-square test. Differences in age between the two groups was sought with a t-test; no significant difference existed between two groups ($P > 0.05$).

Intervention

Both groups received:

- Lumbar traction: Applying persistent traction force (25–100% of body weight) to the patient in a supine position for 30 min, once a day, with an ATA-traction bed (Guangzhou).
- Medium frequency electrotherapy: Electrodes were placed on opposite sides of the body in the lumbosacral region for 20 min, once a day, with K8832-T multi-function electrotherapy instrument (Beijing).
- Massage: Kneading, rolling, pressing, grasping, pushing, digital-striking and traction manipulation were applied to the patients in a prone position for 15 min, once a day.

The intervention phase lasted four weeks. All subjects received information about disc disease and instructions about daily life activities.

Each patient in the experimental group wore a herbal magnetic corset in addition to the above interventions. The front and back parts of the corset were connected with an elastic girdle made of sailcloth. Four steel sheets were positioned on the back and waist parts of the device to assure its intensity. At the centre of the waistband on the posterior side, a herbal magnetic bag was placed. A nylon buckle at centre of the abdomen was used to adjust the elasticity (Figures 1 and 2). The bag was made of soft, light cotton. It contained three magnetic sheets placed at the acupuncture points on each side of the posterior median line, and the herbal powders were placed at the midmost region (these consisted of a ground mixture of Salviae Miltiorrhizae 10 g, ginger 50 g and menthol 0.25 g). During the daytime the herbal magnetic corset was worn at the lumbar sacral region with the median line of the bag over the lumbar spinous processes; at night it was taken off and placed under the waist.
Outcome assessments were undertaken at weeks 1, 2 and 4 by Dr Qun Lan and Mei Han, who were aware of the patient’s group.

The pain observations included back pain and leg pain assessments. Pain was assessed with a visual analogue scale (VAS). The patient was shown a horizontal line with one end labelled as no pain and the other end as the most intense pain imaginable. The patient was asked to indicate a point on the line between these two limits that best represented his or her current sensation in the lumbosacral and leg region.

Lumbar function was assessed with the Lumbar Disease Grade established by Japanese Orthopedics Academic Association in 1984. This grading system includes four items: (1) a self-evaluation of symptoms, (2) a clinical examination, (3) an evaluation of the activities of daily living, and (4) an evaluation of bladder function. The maximum total score is 29.

An index for each patient was obtained at the beginning of the study and a calculation of the rate of improvement was determined to compare the status before and after treatment. Specifically, the index of improvement was calculated as
\[(\frac{\text{score after treatment} - \text{score before treatment}}{\text{score after treatment}}) \times 100\%\]
and the rate of improvement was calculated as
\[(\frac{\text{score after treatment} - \text{score before treatment}}{\text{normal score} - \text{score before treatment}}) \times 100\%\]
Assessment was done before treatment, and at one, two and four weeks after treatment.

Data were shown as means ± standard deviations (M ± SD), and as the differences between before and after treatment. In addition, the experimental and control groups were compared by a t-test with SPSS version 10.0 software.

**Results**

The flow of patients is shown in Figure 3. The general demographic data of the patients are shown in Table 1; the outcomes after treatment are shown in Tables 2 and 3.

There was no difference between the two groups either on the VAS or on lumbar function before treatment (P > 0.05). Both groups improved with treatment and there was a significant difference in both groups for the measures taken before and after treatment (the VAS and lumbar function of one, two and four weeks after treatment compared with that same measure before treatment, P < 0.001). A significant difference was also found in VAS between two groups at one, two and four weeks after treatment respectively (P < 0.05).

While in lumbar function, no difference existed between the two groups at one week after the intervention (P > 0.05), a significant difference was

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**Table 1** General characteristics of the two groups

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Male</th>
<th>Female</th>
<th>Clinic</th>
<th>Wards</th>
<th>Age (years)</th>
<th>Average age (years)</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>30</td>
<td>17</td>
<td>13</td>
<td>19</td>
<td>11</td>
<td>18—69</td>
<td>43.37 ± 13.50</td>
<td>2 days—12 years</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>16</td>
<td>14</td>
<td>17</td>
<td>13</td>
<td>19—70</td>
<td>41.90 ± 14.62</td>
<td>2 days—10 years</td>
</tr>
</tbody>
</table>

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Figure 1 Anterior view of herbal magnetic corset (units: millimetres).
found between the two groups at two and four weeks after treatment ($P < 0.05$ and $P < 0.001$ respectively) (Figure 2).

There was no difference between the two groups in index and rates of improvement at one week after treatment ($P > 0.05$), while a significant difference was found between the two groups at two and four weeks after treatment ($P < 0.05$) (Figure 3).

Throughout the trial none of the subjects in the experimental group presented any local symptoms of irritation such as redness of the skin, itching,

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**Figure 2** Posterior view of herbal magnetic corset (units: millimetres).

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**Figure 3** Flow diagram of study.
Discussion

This study suggests that herbal magnetic corsets might reduce pain and disability in patients who have acute pain and disability associated with lumbar disc herniation. However the study is small, and a placebo effect arising from wearing the corset may account for the difference.

Mechanical compression, aseptic inflammation, blood circulation disturbances, autoimmune responses and tissue swelling may act as the mechanism of pain with lumbar disc herniation, so a non-operative treatment for lumbar disc herniation should focus on controlling inflammation, increasing local circulation, eliminating oedema and enhancing immunity.6–8

The influence of magnetic fields on enzymatic and hormonal activity, free oxygen radicals, carbohydrates, protein and lipid metabolism, the dielectric and rheological properties of blood, as well as behavioural reactions and the activity of central dopamine receptor in experimental animals have been documented.9 Relief of pain by static magnetic fields has been reported in several clinical studies.10,11 Static magnetic fields may decrease the sensory dimensions and intensity of myofascial shoulder pain in people with spinal cord injury, and significantly improve disability and may reduce pain when active magnets are worn continuously for four weeks in patients with chronic pelvic pain.11 In our study, the magnetic corset is applied on the subjects consistently for four weeks. The objective was to achieve adequate analgesic benefits from static magnetic fields.

Any lumbosacral orthosis restricts gross motions of the trunk rather than intervertebral mobility in the lumbar spine,12 and gross body motion restrictions relieve lumbar trunk muscle and spine loads.13 In degenerative lumbar spinal stenosis conditions, studies show a statistically significant improvement in walking distance and decrease of pain score in daily activities with and without corset dressing respectively, which supports the positive effect of the lumbosacral corset in pain relief and functional improvement.14 Studies also show that the driver’s corset is effective in protecting the lumbar spine by producing a change in biomechanical characteristics and resonance

### Table 2

<table>
<thead>
<tr>
<th>Group</th>
<th>Before treatment</th>
<th>One week after treatment</th>
<th>Two weeks after treatment</th>
<th>Four weeks after treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS</td>
<td>76.33 ± 15.20</td>
<td>45.33 ± 17.90</td>
<td>26.17 ± 16.54</td>
<td>13.67 ± 12.73</td>
</tr>
<tr>
<td>LF</td>
<td>11.20 ± 3.59</td>
<td>18.80 ± 4.04</td>
<td>22.57 ± 3.55</td>
<td>24.67 ± 3.22</td>
</tr>
<tr>
<td><strong>Control group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VAS</td>
<td>75.83 ± 15.03</td>
<td>54.33 ± 15.47</td>
<td>36.50 ± 14.33</td>
<td>23.83 ± 13.94</td>
</tr>
<tr>
<td>LF</td>
<td>11.57 ± 3.81</td>
<td>17.57 ± 4.01</td>
<td>19.77 ± 3.63</td>
<td>21.50 ± 3.25</td>
</tr>
</tbody>
</table>

### Table 3

<table>
<thead>
<tr>
<th>Group</th>
<th>One week after treatment</th>
<th>Two weeks after treatment</th>
<th>Four weeks after treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Experimental group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>0.41 ± 0.12</td>
<td>0.51 ± 0.13</td>
<td>0.55 ± 0.12</td>
</tr>
<tr>
<td>RI</td>
<td>44.01 ± 14.85%</td>
<td>65.11 ± 16.17%</td>
<td>77.03 ± 16.20%</td>
</tr>
<tr>
<td><strong>Control group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>0.35 ± 0.16</td>
<td>0.42 ± 0.16</td>
<td>0.46 ± 0.17</td>
</tr>
<tr>
<td>RI</td>
<td>35.86 ± 17.35%</td>
<td>47.61 ± 16.08%</td>
<td>56.74 ± 17.06%</td>
</tr>
</tbody>
</table>
Frequencies of the lumbar spine. Flexible lumbar corsets should contribute to an improved active and passive stabilization of the lumbar spine. The reduced muscle activities with destabilizing stimuli can be interpreted as the result of improved passive stabilization of the lumbar region through wearing a flexible corset. The common elastic corset is rated the most comfortable compared with the Raney jacket, the Camp lace-up corset, and a moulded polypropylene thoracolumbar-sacral orthosis. In our study the elastic corset was used to achieve the aforementioned effects.

Salviae Miltiorrhizae, one of the herbs used, is known to have an analgesic effect. Its extracts contain antioxidant properties that inhibit low-density lipoprotein oxidation and the formation of hydroxyl radicals. Its anti-inflammatory effect may be explained by inhibition of nitrous oxide (NO), interleukin-1β (IL-1β), IL-6 and tumour necrosis factor-alpha (TNFα), expression of NO synthase, IL-8, IL-12, and recombinant monoamine oxidase A. Tanshinone, the active ingredient of Salviae Miltiorrhizae, may inhibit development of calcium overloading injury, has an inductive effect on differentiation of erythrocyte series, protects ischaemia-reperfusion injury through an electron transfer reaction, and protects neuropathological changes. Above all, microcirculation and blood dynamics may improve with Salviae Miltiorrhizae.

Ginger extract is applied topically to relieve pain, shows an analgesic effect in patients with gonarthrosis and has antioxidative and anti-inflammatory activities through inhibiting COX-1, COX-2, TNFα, leukotrienes, phospholipase, lipooxygenase, IL-12, NO and NO synthesis and prostaglandin E2 (PGE-2), etc. Gingerol is also a potent antiplatelet aggregation agent. Menthol and menthone, the extracts from mint, cause loosening of the stratum corneum lipid bilayer, resulting in penetration of water into the lipids of the bilayer and the creation of new aqueous channels, increasing the hydrophilicity of the stratum corneum. Menthol is widely used as penetration enhancer. It also has an analgesic effect on neuropathic pain, through selective activation of kappa-opioid receptors. Moreover, menthol has an inhibitory effect on TNFα production, which contributes to its anti-inflammatory effect.

Studies in China have suggested that the active components of herbs such as Salviae Miltiorrhizae may penetrate the epidermis, especially in combination with a penetration enhancer such as mint, but the mechanism is unclear. The active components of the herbs may then be absorbed by local tissues and transferred to the nerve root and the herniated disc by the circulation, where they could have a direct effect.

There are many limitations to our study. The sample size was small, and the length of follow-up short. Furthermore, patients in the experimental group wore a corset and were aware of its contents and so may have experienced an expectation of greater benefit. The assessors were also aware of the patient’s group when collecting data. Consequently these findings need to be replicated in a further study avoiding these weaknesses.

Acknowledgement

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References


