J. Phys. Ther. Sci. 29: 1416–1420, 2017

The Journal of Physical Therapy Science

Original Article

Acupressure for chronic low back pain: a single system study

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Abstract. [Purpose] Low back pain (LBP) is the leading cause of global disability. Acupressure is a manual approach that can be used for self-management of LBP. The purpose of the study was to determine the effectiveness of acupressure in treating chronic LBP. [Subjects and Methods] The research design was a single system study utilizing an AB design. The subject was recruited using convenience sampling. During phase A, the subject received traditional physical therapy interventions. During phase B, the subject received acupressure in addition to traditional physical therapy interventions. Outcomes included the Visual Analog Scale (VAS), the Patient Specific Functional Scale (PSFS), and the Oswestry Disability Index (ODI). [Results] For the VAS, the pain was 38.8 mm at baseline, decreased to 11.3 mm after phase A, and decreased to 2.5 mm after phase B. For the PSFS, the subject's function was 5/10 at baseline, remained the same after phase A, and increased to 9/10 after phase B. For the ODI, the subject's disability was moderate (30%) at the baseline, decreased to minimal (14%) after phase A, and completely resolved (0%) after phase B. [Conclusion] The data indicated that integrating acupressure in physical therapy could reduce pain, increase function, and decrease disability.

Key words: Acupressure, Low back pain, Function

(This article was submitted Feb. 27, 2017, and was accepted May 26, 2017)

INTRODUCTION

Low back pain (LBP) is the leading cause of global disability[1)]. With the estimated 21.7 million disability-adjusted life years in 2010, LBP arising from ergonomic exposures at work is considered a major cause of disability. Pharmacologic therapy plays an important role in LBP treatment[2)]. Non-pharmacologic therapies with good evidence of moderate efficacy for chronic or subacute LBP include cognitive-behavioral therapy, exercise, spinal manipulation, and interdisciplinary rehabilitation[3)]. The therapy with good evidence of efficacy for acute LBP is superficial heat[3)], while spinal manipulation is recommended in a joint clinical practice guideline from the American College of Physicians and the American Pain Society[4)]. Systematic Review and Meta-analysis suggests that exercise alone or in combination with education is effective for preventing LBP[5)]. In the US, it is estimated that total costs attributable to LBP could be between $84.1 and $624.8 billion each year[6)].

The Institute of Medicine's Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research calls for a cultural transformation to better prevent, assess, treat, and understand pain[7)]. The Blueprint advocates that the clinicians should increasingly aim at tailoring pain care to each person's experience, and self-management of pain by the patients should be promoted. Acupressure is a manual approach that can be used for self-management of LBP. Acupressure, one of the Traditional Chinese Medicine (TCM) approaches, is a non-invasive manual approach that involves manipulation of the skin and soft tissues with primarily the fingertips instead of needles on acupoints, but it is less well studied than acupuncture[8)]. In addition to fingertips, various body parts (knuckles, forearms, and heels) and blunt devices may also be

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used[9]. In addition, acupressure can be used in conjunction with other approaches such as lavender oil[10, 11]. Acupressure is an ancient healing art, parallel to acupuncture, that is easy to learn and suitable for self-management of pain. It does not require expensive equipment and large space to provide treatment to the patient.

Acupressure treatment has been introduced by physical therapists and other professions to treat LBP based on the beliefs of removing obstructions that block energy flow and relieving pain by improving circulation and nutrition[12, 13]. Randomized controlled trials have demonstrated that one month of acupressure treatment can significantly decrease pain, improve function, and decrease disability for at least 6 months[14–17]. Systematic reviews based on randomized controlled trials concluded that acupressure has been shown to be effective for relieving a variety of symptoms[18, 19]. However, acupressure for treating low back pain has not been well studied and is not widely available in the US. Therefore, it is not included in the joint clinical practice guideline from the American College of Physicians and the American Pain Society[4]. The purpose of this research project was to determine the effectiveness of integrating acupressure in treating chronic LBP.

SUBJECTS AND METHODS

The subject was recruited using convenience sampling in an outpatient physical therapy clinic. Inclusion criteria included an adult between the age of 18–65 complaining of LBP for the past 3 months. Exclusion criteria included no LBP caused by infection, fractures, cancer, systemic disease, osteoporosis, or psychiatric disease; no neurologic sign, herniation, or osteoarthritis of the spine; no acupuncture or acupressure treatment received in the past month; and no open wounds at acupressure points. Ethics approval for this study was sought and obtained from the Institutional Review Board at Youngstown State University. Informed consent was obtained prior to participating in the study.

The research design was a single system study (n=1) utilizing an AB design. During phase A, the subject received traditional physical therapy interventions. During phase B, the subject received acupressure in addition to traditional physical therapy interventions. A thorough evaluation and examination were performed to determine that the subject met all inclusion/exclusion criteria and was appropriate for acupressure and physical therapy interventions.

The subject (n=1) was a 54-year-old male with a 20 year history of low back pain. He was an autoworker whose occupation required him to handle materials weighing up to 40 pounds. His past medical and surgical histories were unremarkable except for a prior left sided hernia surgery and a history of arthritis. His low back pain was recently exacerbated after attempting to lift his dog from the floor. Upon initial assessment, he complained of pain in the lumbar region that radiated into the right hip. He reported having increased pain while sitting and leaning forward to lift objects. Lying down eased his pain. He took Advil as needed for pain management. The subject demonstrated decreased lumbar extensor and abdominal muscle strength of 3+/5. Active left thoracic rotation and lumbar flexion, extension, and left lateral flexion were limited. The subject's right thoracic paraspinal muscles and bilateral piriformis muscles were tight and tender upon palpation. He reported increased pain with passive right straight leg raise and right hip external rotation. The subject reported his pain intensity as 38.8 mm on the VAS. His initial PSFS score was 5/10 for the activity of leaning forward, and his initial modified ODI score was 30%. The subject's pain, decreased strength, decreased range of motion, and decreased functional performance were consistent with chronic low back pain and possible disc herniation.

The subject was treated for a total of three 90 minute sessions within 2 weeks. Traditional physical therapy was administered during the first session. Acupressure and physical therapy were administered during the last two sessions. Traditional physical therapy interventions included stretching, strengthening, modalities (ultrasound), treadmill walking, and motorized mechanical traction. Acupressure was applied to acupoints (LI 4, GB 30, GB 31, and GB 34). Each point was held for approximately one minute or until the patient related that tenderness had subsided, with multiple repetitions (Fig. 1).

Treatment during the first session began with a supine left thoracic rotation exercise and upper extremity driven rolling exercise were performed to address the patient's decreased left thoracic rotation range of motion. Pulsed ultrasound (50% duty cycle) at 0.9 W/cm^2 and 1 MHz was then applied to the right thoracic paraspinal muscles for 10 minutes to reduce pain and muscle spasms. Mechanical lumbar traction was then performed for 20 minutes to reduce low back muscle spasms and decrease intradiscal pressure. Treatment concluded with the following exercises in supine for musculoskeletal reloading and strengthening following traction: short arc quads, knee to chest exercise, trunk rotations, and bridging (1 set of 10 reps each for 10 minutes).

Treatment during the second session began with treadmill walking for 15 minutes at 3.0 mph and 60–75% maximum heart rate to improve aerobic capacity. The supine upper extremity-driven rolling exercise was again performed for 10 minutes. Following this exercise, the subject's left thoracic rotation range of motion was assessed and found to be within normal limits. The supine thoracic rotation exercise was thus omitted. Acupressure was then applied for 35 minutes as described above. Treatment concluded with 20 minutes of mechanical lumbar traction and 10 minutes of the reloading and strengthening exercises listed above.

The final session began with 15 minutes of treadmill walking at 3.6 mph and 60–75% maximum heart rate. Acupressure was then applied for 45 minutes. Treatment concluded with 20 minutes of mechanical lumbar traction and 10 minutes of the reloading and strengthening exercises listed above. The subject was given a home exercise program which consisted of self-administered acupressure. The subject had significantly reduced pain and improved function from baseline measurements and therefore was discharged from physical therapy.

Fig. 1. Acupressure intervention
(A) LI 4 (B) GB 30 (C) GB 31 (D) GB 34

Outcome measurements included pain intensity, function, and disability. Pain intensity was measured using Visual Analog Scale (VAS). The function was measured using Patient Specific Functional Scale (PSFS). Disability was measured using modified Oswestry Disability Index (ODI). The outcome measurements were administered at each session.

The VAS is a horizontal 100-mm line representing pain intensity ranging from no pain to very severe pain and is recommended for pain assessment for patients with chronic LBP[20]. The VAS has been found to be easy to administer and has very good responsiveness, concurrent validity, and test-retest reliability[20, 21]. The Minimum Clinically Important Difference (MCID) for sub-acute and chronic low back pain should be at least 20 mm on the VAS[22]. The ODI is recommended outcome measure used to assess disability level associated with chronic low back pain[20] with a standard error of measurement (SEM) of 5.4 points, MCID of 6 points, and intraclass correlation coefficient (ICC) of 0.90 for reliability[23]. The PSFS was used during the study to assess the difficulty of up to 3 activities that were functional and specifically chosen by the subject. It was found more consistent and responsive in measuring the change in patients with chronic LBP following participation in a back class program in a small sample. The PSFS has SEM of 0.5 points, MCID of 2.3 points, and ICC of 0.91[24].

RESULTS

For the VAS, the subject reported his pain was 38.8 mm at baseline, decreased to 11.3 mm after phase A, and decreased to 2.5 mm after phase B. For the PSFS, the subject's function (leaning forward) was 5/10 at baseline, remained the same after phase A, and increased to 9/10 after phase B. For the ODI, the subjec's disability was moderate (30%) at the baseline, decreased to minimal (14%) after phase A, and completely resolved (0%) after phase B.

DISCUSSION

This research report provides information for the management of chronic LBP. The data indicated that integrating acupressure in physical therapy could reduce pain, increase function, and decrease disability. It supported integrating acupressure into physical therapy treatment for chronic LBP. The data is consistent with the results of other research on

acupressure for treating LBP[10, 14–17, 25].

The limitations of the research project include convenience sampling and the small sample size limited by our available resources. The convenience sampling poses threat to research validity and significantly impacts the generalizability of the results. Future research using randomized controlled trials with a larger sample and more diversified population are necessary.

In the past, acupressure and TCM did not receive significant recognition in the western world. In recent years, TCM has gradually gained popularity which has been enhanced by the cupping therapy in the Rio Olympic Game. A research funded by the National Institutes of Health found that TCM could reduce pain medication use in patients with chronic pain[26]. Major medical journals with high impact factors started to publish research on acupuncture[27]. A recent survey conducted among physicians, nurses, physical therapists, and midwives demonstrated that majority of clinicians responded to the survey strongly agreed or agreed that complementary medicine could be useful for the treatment of chronic pain[28]. Acupressure is rooted in TCM but has grown considerably in the West, despite the fact that it is difficult to be explained in terms of anatomical and physiologic concepts familiar in Western medicine[13]. In addition to decreasing LBP, systematical reviews have found the effectiveness of acupressure in decreasing symptoms such as nausea and vomiting in patients during pregnancy and during chemotherapy, pain in patients with dysmenorrhea, during labor and after trauma, dyspnea, and improving fatigue and reducing insomnia in various populations[18, 19]. Further, the systematical review has found the effectiveness of acupressure in treating patients with neurological[29–32], cardiac[33], and pulmonary[34, 35] disorders.

There are similarities between acupressure and some of the manual techniques that have been used by physical therapists for a long time. Trigger points have significant overlap with acupoints[36]. Ischemic compression manipulates the skin in a similar fashion to acupressure[37–39]. When performing the suboccipital release technique, too[40], the contact points of the therapist are actually acupoints. However, the therapeutic mechanisms of acupressure are not fully understood from the perspective of western medicine. The gate control theory may be used to explain how acupressure works in treating low back pain.

The healthcare spending in the United States has been increasing every year and is now over 17.5% of its GDP[41, 42]. As mentioned earlier, acupressure does not require expensive equipment and large space. Using acupressure, therapists can teach patients a technique to control their own pain, as it is relatively easy to learn key points. In addition, a significant association has been found between complementary and alternative medicine (CAM) use and self-rated excellent health and health improvement[43]. As a manual technique derived from CAM, acupressure has the potential to save the healthcare costs while improving patient satisfaction and outcomes by promoting self-management of pain. The application of acupressure should be advocated with more rigorous research including randomized clinical trials.

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