Efficacy and Timing of Acupuncture in Alleviation of Chronic Lower Back Pain

IRB Protocol – CRC rotation
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1. Study Purpose and Rationale

Lower back pain (LBP) is one of the main causes of disability and is the leading cause of work related absences among adults of working age with onset usually occurring between the ages of 30-50[1]. It's estimated that more than 50% of adults experience back pain every year and 70% of adults in Western industrialized countries will be bothered by back pain at some point during their lives[2]. Given the prevalence of LBP, it may not be surprising that it's the 5th most common reason prompting physician visits[3].

Generally, LBP is divided into 3 categories: Nonspecific/Idiopathic, LBP associated with radiculopathy or spinal stenosis, and LBP associated with another specific spinal cause. The overwhelming majority of cases are non-specific or idiopathic accounting for 85% of all LBP presentations[4]. As for specific, diagnosable causes of LBP, the division is as follows: herniated disk 4%, spinal stenosis 3%, compression fracture 4%, ankylosing spondylitis 0.3-5%, cancer 0.7%, cauda equina 0.04%, and spinal infection 0.01%[5-7]. Two-thirds of patients presenting with onset of acute LBP will have resolution of pain without treatment and will recover by 6 weeks[1]. However, recurrences are common and affect 40% of patients within 6 months[14]. For those with pain persisting for longer than 3 months, they transition into the category of chronic back pain. Nonspecific/Idiopathic back pain is the category most often associated with chronic or recurrent symptoms[4, 8]. Less than 50% of patients with greater than 6 months of back pain related disability are able to return to work and the return to work rate approaches 0% for patients with back pain related disability for 2 years[1]. Current available treatments are not effective in curing chronic back pain, and the majority of patients will have persistent and recurrent symptoms. Additionally, back pain patients many times are dissatisfied with conventional medical care and are increasingly turning to alternative medical treatments[12, 14].

Unfortunately, although the prevalence of chronic LBP is great as are the associated health care and work-related costs – it's the most expensive cause of work-related disability in terms of worker's compensation and medical expenses[14], there is little consensus on appropriate evaluation and management of chronic LBP[1,3]. Common treatment options include 2-6 weeks of NSAID or Acetaminophen use with or without an additional opioid, muscle relaxants, and physical therapy. Recently, acupuncture has been suggested as a potential treatment modality for LBP. Although published studies have suggested that acupuncture may be more effective than usual care[1, 4, 9], many investigators point out the need for high-quality RCTs comparing acupuncture to no treatment and to sham, as well as the need to answer questions regarding placebo effect, duration of treatment, and psychosocial factors[1, 4, 9, 10]. Comorbid psychopathology – depression, anxiety, personality disorders- are present in 20-30% of patients with chronic LBP[11], and may play an important role in predicting outcome from acupuncture treatment.

The aim of this study is to investigate the efficacy of acupuncture in modulating LBP in the unique population of patients seen in AIM clinic. Many authors point out the importance of assessing personal beliefs and psychosocial factors[3, 4, 11] in predicting treatment response to acupuncture and thus far published studies have investigated responses in mostly Asian or

Caucasian populations limiting applicability to our predominantly Hispanic AIM clinic population. There are varying reports regarding the role of placebo effect and this 3 armed study (acupuncture vs sham acupuncture vs usual care) will take this into consideration. Moreover, the inclusion of NSAIDs and physical therapy as usual/standard therapy in this study will be of benefit as use of pain meds and PT has not been well controlled for in published trials. In addition to assessing the effect of acupuncture on pain, we would also like to begin characterizing the type of patient likely to benefit from acupuncture. In order to do this, we will look at the effects of depressive symptoms and of duration of LBP on response to treatment. With these results, hopefully we will be able to start building a patient profile to more efficiently screen who could potentially benefit from acupuncture as well as determining when would be an optimal time to suggest the therapy. These data will contribute to evaluation of acupuncture's role in treatment of chronic LBP.

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2. Study Design and Statistical Procedures

This is a prospective, randomized controlled study with equal numbers of patients randomized into 3 treatment arms: usual care, acupuncture, sham acupuncture. All of the patients involved will have diagnosis of chronic LBP of nonspecific/idiopathic etiology as confirmed by their primary care provider at AIM clinic.

All patients will continue standard therapy while enrolled in the study. This includes NSAID use as needed, and physical therapy for stretching, strengthening and aerobic exercise (2-3x/wk for 3-4 wks). The patients randomized to the acupuncture group will receive acupuncture 2 times a week for 2 weeks, and then once a week for 8 weeks for 12 treatments total. Acupuncture will be performed at the CUMC medical clinic by a licensed acupuncturist trained in traditional Chinese medical acupuncture. Other than the acupuncture therapy, the acupuncturist will have minimal interaction with the participant. Sterile disposable needles will be used with needling depth between 5-20mm based on the qi point, with patient lying down and blindfolded. Then birotational rotation of the needle will be performed to induce *de qi* sensation and needles will be left in place for 15-20 minutes[10]. All sessions will include needling of points commonly targeted for LBP: UB23 (shenshu), UB25 (dachangshu), GV3 (yaoyangguan), UB40 (weizhong), GB30 (huantiao)[4]. Those patients randomized to the sham group will receive sham acupuncture for 2 times a week for 2 weeks, and then once a week for 8 weeks for a total of 12 treatments. The sham technique will be performed according to a protocol used by Cherkin et al – This is a non-insertive technique using a toothpick in a guidetube. The acupuncturist will simulate insertion of needles using the toothpick at the same acupoints used in actual acupuncture.

The primary outcome will be change in LBP and disability associated with back pain using VAS (Visual Analogue Scale) and RMDQ (Roland-Morris Disability Questionnaire). Past studies have used a change of 2.0 in VAS and a change of 2.5 in RMDQ – both cited as the minimal clinically important difference. Using an unpaired t-test after Bonferroni adjustment for multiple comparisons, with power of 0.8, alpha of 0.05, standard deviation of 2.73 (consistent with SD used in the literature), a sample size of 42 is needed per group to detect effect size of 2.0 in VAS. For the RMDQ, using a similar calculation and SD of 3.5, a sample size of 44 is needed per group to detect effect size of 2.5. To account for attrition, we will recruit 50 patients per treatment arm.

As psychosocial aspects have been implicated in predicting treatment outcome for patients with chronic LBP, one of the secondary outcomes will be determining if depression plays a role in predicting outcome. Beck Depression Index (BDI- II) scores will be collected from all patients at baseline, week 4, week 8 and week 12. Multiple regression analysis will be performed to look for any correlation between BDI score and change in VAS and RMDQ scores, according to treatment group. Also, we are interested in investigating whether duration of LBP plays a role in treatment efficacy. Again, multiple regression analysis will be performed to look for correlation between chronicity of LBP and primary outcome measures (VAS, RMDQ).

All statistical analyses will be based on an intent-to-treat approach. Data (VAS, RMDQ, BDI) will be collected at baseline, week 4, week 8 and week 12. The purpose of the week 12 data point will be to identify persistence of treatment effect. Student's t-test will be used to compare groups for continuous data, between baseline and various time points. Multiple regression analyses will be performed for secondary outcome measures as detailed above.

3. Study Procedures.

Acupuncture is considered part of traditional Chinese medicine and is performed by inserting thin, metallic needles into the skin at specific points of the body. Qi - otherwise known as the body's vital energy/life energy, is believed to flow along 12 primary (main) and 8 secondary meridians that connect to form a network of energy channels throughout the body. The 12 primary meridians are associated with specific internal organs including: lung, large intestine, stomach, spleen, heart, small intestine, bladder, kidney, liver, gallbladder. The 8 secondary meridians serve as reservoirs of energy and blood for the 12 primary meridians. Acupuncture points are areas where qi channels rise close to the body's surface and are located along these meridians and are identified by name, number and meridian. Local pain can be caused by blockage or stagnation of qi during its travel through these channels and needling those points is believed to restore the flow of qi thus restoring the body's balance [4, 13, 14]. Commonly used acupuncture points during treatment of chronic LBP have been identified and include: *shenshu -* UB23, *dachangshu* –UB25, *yaoyangguan* –GV3, *weizhong* –UB40, *huantiao* –GB30 [4]. In addition to placement of needles along these meridians, manual manipulation of needles after insertion is a vital part of the treatment. Practitioners will rotate or piston the needle after insertion to produce a dull ache named 'de qi' ('obtaining qi') sensed by the patient as well as a 'needle grasp' or a tug on the needle felt by the acupuncturist, obtaining these sensations confirm that the qi has been manipulated.

There are many theories attempting to explain the mechanism of acupuncture's effect on pain, such as – increasing blood flow to affected areas, stimulation of small diameter afferent fibres leading to decreased transmission of pain, release of endogenous opioids, stimulation of brain areas involved in pain processing- but there is currently no universally accepted answer [4,8].

4. Study Drugs or Devices
N/A

5. Study Questionnaires
Beck Depression Inventory (BDI- II):
21 item questionnaire assessing presence and severity of depressive symptoms.

Categories: Sadness, Pessimism, Past Failure, Loss of Pleasure, Guilty Feelings, Punishment Feelings, Self-Dislike, Self-Criticalness, Suicidal Thoughts or Wishes, Crying, Agitation, Loss of Interest, Indecisiveness, Worthlessness, Loss of Energy, Changes in Sleeping Pattern, Irritability, Changes in Appetite, Concentration Difficulty, Tiredness or Fatigue, Loss of Interest in Sex.

Each question graded 0-3. Total score: 0-13 minimal, 14-19 mild, 20-28 moderate, 29-63 severe.

Roland Morris Disability Questionnaire (RMDQ)
24 statements with yes/no responses according to whether the statements apply to the patient in the past 24 hours. Range of scores: 0 = no disability, 24 = maximum disability.

1. I stay at home most of the time because of the pain in my back.
2. I change position frequently to try and make my back comfortable.
3. I walk more slowly than usual because of the pain in my back.
4. Because of the back pain, I am not doing any of the jobs that I usually do around the house.
5. Because of the pain in my back, I use a handrail to get upstairs.

6. Because of the pain in my back, I lie down to rest more often.
7. Because of the back pain, I have to hold on to something to get out of a reclining chair.
8. Because of the pain in my back, I ask other people to do things for me.
9. I get dressed more slowly than usual because of the pain in my back.
10. I only stand up for short periods of time because of the pain in my back.
11. Because of the pain in my back, I try not to bend or kneel down.
12. I find it difficult to get out of a chair because of the pain in my back.
13. My back hurts most of the time.
14. I find it difficult to turn over in bed because of the pain in my back.
15. My appetite is not very good because of the pain in my back.
16. I have trouble putting on my socks (or stockings) because of the pain in my back.
17. I only walk short distances because of the pain in my back.
18. I sleep less because of the pain in my back.
19. Because of the pain in my back, I get dressed with help from someone else.
20. I sit down for most of the day because of the pain in my back.
21. I avoid heavy jobs around the house because of the pain in my back.
22. Because of the pain in my back, I am more irritable and bad tempered with people.
23. Because of the pain in my back, I go upstairs more slowly than usual.
24. I stay in bed most of the time because of the pain in my back.

6. Study Subjects
Inclusion criteria:
Age between 18-65
VAS score of ≥ 5 at start of trial
Acupuncture naive
LBP of at least 3 months

Exclusion criteria:
Specific causes of back pain: ex) malignancy, infections, inflammatory disease, vertebral fracture, cord compression, herniated nucleus pulposus
Clotting disorders, on Warfarin
Pregnancy
Myofascial pain syndromes, Fibromyalgia
Oral or Intrathecal opioid use
Prior back surgery
Skin infections
Congenital spinal deformations

7. Recruitment
Subjects will be recruited from the AIM outpatient clinic of CUMC via suggestion from PMD, or from IRB approved flyers posted in the hallways of Vanderbilt clinic. If the participant meets criteria for the study, the investigators will meet with the patient to explain study protocol and reasoning. Participants will be enrolled after obtaining written, informed consent.

8. Confidentiality of Study Data
All study data will be coded with a unique code number for each study subject and data will be stored in a secure location, accessible only to the investigators.

9. Potential Risks
Major adverse effects or reactions to acupuncture are not common. Minor side effects that may be experienced by those in the acupuncture group include: needle site insertion pain, hematoma, nausea, vomiting, dizziness, fainting. As there will be no penetration of skin with our sham protocol, adverse effects are not expected.

10. Potential Benefits
Some published studies have shown effectiveness of acupuncture in alleviating intensity of back pain and in improving disability experienced secondary to back pain- participants in the acupuncture arm may experience similar benefits. In addition, those in the sham acupuncture group may also experience alleviation of back pain beyond what's expected from usual care secondary to placebo effect.

11. Alternative Therapies
N/A