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Commentary on the Use of Acupuncture in Chronic Pediatric Pain

Michael Waterhouse, MA, LAc, Jennie C. I. Tsao, PhD, and Lonnie K. Zeltzer, MD

Pediatric Pain Program, Department of Pediatrics, David Geffen School of Medicine at UCLA, Los Angeles, CA

Abstract

The use of acupuncture for pain in pediatrics is a long-standing practice in Eastern cultures. Despite growing interest in the West, there has been relatively little systematic research on acupuncture for chronic pediatric pain. In particular, there is a paucity of randomized clinical trials testing the efficacy of acupuncture for chronic pain problems in pediatric populations. This commentary briefly reviews the history of acupuncture for pain and includes a summary of extant findings regarding potential mechanisms of its analgesic effects. Key areas for future research to advance the application of acupuncture to chronic pediatric pain problems are outlined.

Recent reevaluation of the extant Chinese medical literature and archaeological evidence suggests that acupuncture first developed during the Warring States Period (475–221 BCE) and had fully matured by the latter part of the Western Han Dynasty (206 BCE–24 CE) with the compilation of the “Bible” of Chinese medicine, the Huang Di Neijing (Yellow Emperor’s Classic of Internal Medicine).¹ Pediatrics had become a specialty in its own right by the 11th century CE. Concepts that are relevant today in the treatment of chronic pediatric pain had become firmly established by this time. These include the idea that the obstruction of circulation blood and “qi” give rise to pain, that a lack of homeostasis in the body can cause pain, that emotional states such as anger, anxiety, and fear play a role in the perception of pain and finally that the needling of “Ah Shi” or painful points can resolve pain, predating Travell’s trigger point therapy² by several centuries.

Over the last 2 millennia acupuncture has been practiced in many different cultures. This diversity has resulted in the development of different styles that vary from using many points with strong needle stimulation typically used in China to the very light needling that is more popular in Japan. In our previous work,³ we found that when using Traditional Chinese Medicine diagnostic categories it was demonstrated that those patients who fell into the excess or “shi” category responded better to acupuncture in terms of their activities of daily living (sleep quality, appetite, energy levels, so forth) than those who fell into the deficiency or “xu” category. These findings point to the usefulness of Traditional Chinese Medicine diagnostic categories in predicting likely outcomes. Traditionally, increased pain control was created by vigorous manual lifting, thrusting, and twirling of the acupuncture needle. This

technique is in itself quite painful and unsuitable for a pediatric population. During the 1950s, the Chinese discovered that using a low-amperage pulsed current through pairs of needles enhanced the analgesic effect, and the patient experienced this electro acupuncture (EA) as a mild tapping sensation that was well tolerated. It was reported that the combination of mild anesthetic and EA was developed for surgery in children at the Beijing Children's Hospital and in Germany and Austria in the late 1970s.^{4,5}

The actual mechanisms of acupuncture are still not fully known. As reviewed by Han,⁶ data derived from investigations that were not randomized controlled trials (RCTs) have indicated that endogenous opioid peptides in the central nervous system play an essential role in mediating the analgesic effect of EA. In addition, different kinds of neuropeptides are released by EA with different frequencies.⁶ The first evidence that endorphins were released by acupuncture was demonstrated in 1974 when pairs of rats were connected by their circulatory systems and it was found that the pain threshold was raised in both rats when EA was performed on only 1 of them. Similarly, the analgesic effect of 1 rabbit could be transferred to another by exchanging cerebral spinal fluid.⁷ In 1976, it was found that such increases in pain threshold could be blocked by the administration of the morphine antagonist naloxone,⁸ a finding that led to the conclusion that one of the mechanisms of acupuncture analgesia was the production of endorphins. However, because stress stimulates the production of endorphins, but without concomitant analgesia, others have pointed out that findings of such investigations remain unclear unless stress level is controlled for.⁹ Moreover, there are differences in placebo and in acupuncture effects in relation to blocking with naloxone to determine opioid mediation of effects.¹⁰ It seems that acupuncture effects begin later but last longer, so timing of assessment of both analgesia and endorphin effects is critical to understanding the acupuncture/endorphin relationship.¹⁰

It also seems that acupuncture has the ability to induce bidirectional effects where needling the same point can normalize physiological function. It has been demonstrated that this holds for heart rate and blood pressure.^{11,12} In addition, salivary immunoglobulin A levels were found to normalize after acupuncture,¹³ and reports in the Chinese literature found that gastric acid secretions did the same. Nevertheless, the mechanisms of this homeostatic effect of acupuncture require further investigation, particularly as none of the extant data is supported by RCTs.

Research in adults has supported the efficacy of acupuncture for a variety of pain complaints, including headaches¹⁴ and back pain.¹⁵ Yet, there have been very few published studies examining the use of acupuncture for pain management in children. As pointed out by Kemper et al,¹⁶ one possible reason for this lack of research is the conventional view that children do not like or are afraid of needles. Thus, clinicians may hesitate to refer patients to acupuncturists, and researchers may be reticent to initiate trials because of concerns regarding subject recruitment and retention. However, Kemper et al¹⁶ found that among adolescents with chronic pain, 67% reported acupuncture to be a positive experience and 70% indicated pain reduction. These findings suggest that, in an older sample (median age = 16 years), acupuncture is an acceptable intervention. One significant study limitation was that only adolescents who were referred to and actually visited an acupuncturist were

interviewed. The base rate of acupuncture acceptance among children is unknown because no information was given regarding referred adolescents who refused acupuncture.

Our group has found further support for the feasibility and acceptability of acupuncture for pediatric chronic pain in a sample of 33 children, 6 to 18 years of age (mean, 13.0).¹⁷ Treatment consisted of 6 weekly sessions of acupuncture together with a 20-minute hypnotherapy session conducted while the needles were in place. More than 90% of the sample completed treatment, and no adverse effects were reported. Both parents and children reported significant improvements in children's pain, anxiety, and functioning after treatment. However, because the acupuncture was part of a combined treatment package, the acceptability of acupuncture alone (i.e., without hypnotherapy) could not be determined. Moreover, the lack of a control group reduced the specificity of attributing the result to the combined acupuncture and hypnotherapy package.

To date, there has only been one RCT of acupuncture in children with chronic pain. Pintov et al¹⁸ assigned 22 patients (aged 7–15 years) with migraine headaches to either true acupuncture or placebo acupuncture (superficial needling). Both groups received 10 weekly treatment sessions and no children received prophylactic medications. The true acupuncture group reported clear reductions in migraine frequency and severity; in addition, serum opioid levels and especially β -endorphin levels increased significantly. The placebo group evidenced no such changes. Although the study used a rigorous design, there are several limitations. First, the sample sizes were relatively small. Second, the study sample may not have been representative of pediatric migraine patients because patients receiving medication were excluded from the study. Third, information on refusal rates was not reported, so the acceptability of the treatment remains unknown. Finally, no follow-up data were presented, so it is unclear whether treatment gains persisted across time.

The above findings indicate that acupuncture is a well-tolerated and safe approach for children with chronic pain, and the study by Pintov et al does provide initial support for the efficacy of acupuncture in the treatment of pediatric migraine. Nevertheless, additional rigorous trials with sufficient sample sizes and representative patient samples are warranted. Among the methodological issues that must be addressed include the issue of what constitutes a standard “dose” of acupuncture. Some Western medical studies have used just one point or more commonly, a standard formula of points. Other studies have tried to mimic clinical reality more closely by selecting points on an individualized basis depending upon the presenting symptoms and constitution of each patient. As noted earlier, acupuncture is practiced differently across different cultures and, therefore, decisions regarding the type of acupuncture used should be clearly defined and replicable (for additional in-depth discussion of research issues in acupuncture see Ref. 19).

Another methodological concern is the problem of blinding. Placebo acupuncture needles, which make a pricking sensation but actually do not penetrate the skin, can be used but unless the patient is acupuncture naïve or the study is brief, it is likely that patients will be able to discern group assignment. Using sham acupuncture involves needling nonacupuncture points shallowly or in a way that is distinctly different from normal acupuncture. This method is better in terms of blinding but has the disadvantage that

minimal needling may actually trigger neural pathways resulting in diffuse noxious inhibitory control. Indeed many studies have shown that this minimal needling produces statistically significant physiological and therapeutic effects.²⁰

Future research into the physiological mechanisms of acupuncture should be focused in 3 main areas. First and most important, there is a clear need for additional RCTs of acupuncture in the pediatric population. Conclusions regarding the efficacy of acupuncture cannot be drawn without a strong evidence base, which is currently lacking. Second, animal research on which much of the endorphin theory is based relies heavily on the treatment of acute pain. It is unknown whether this model can be transferred to chronic pain situations. Third, it is unclear whether the results produced by the relatively strong stimulation of EA can be reproduced by the gentler manual needle techniques. Despite the paucity of clinical and basic research, it should be noted that the NIH Consensus Conference on acupuncture concluded that “one of the advantages of acupuncture is that the incidence of adverse effects is substantially lower than that of many drugs or accepted procedures for the same conditions.”²¹ A recent review²² of the safety of acupuncture in children came to a similar conclusion. Given the low incidence of adverse events and demonstrated safety record, there is a clear need for rigorous, carefully designed research, particularly RCTs, to provide the necessary evidence to advance the field of acupuncture treatment in pediatric pain populations.

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