3RD PLACE FOR BEST ORAL PRESENTATION AT THE WCMSR ORIGINAL RESEARCH BASED ON JUDGE SCORE.

ORIGINAL RESEARCH

22. Effectiveness of Haptic Feedback Devices in Reducing Pain Perception During Intra-Articular Corticosteroid Injections in Rural Guatemala and Kenya

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https://www.youtube.com/watch?v=hJIcIJ1w8oM&list=PLhqNq3xJClbafO0Y5bvBcgMmXpgzJxd44&index=5&t=13896s

Background: Osteoarthritis (OA) is the most common joint disease worldwide and a leading cause of disability, affecting most individuals by age 65 due to cartilage degradation, eburnation, osteophyte formation, and inflammation. Intra-articular corticosteroid injections (IACIs) are widely used for moderate to severe OA and are especially beneficial in low-resource areas where long-term medications and physical therapy may be inaccessible. However, IACIs can induce substantial pain and anxiety, particularly when anesthetics or imaging guidance are unavailable. Haptic feedback, such as tactile stimulation through handheld vibration devices, has demonstrated the ability to modulate pain perception in clinical settings. As a simple, low-cost method, it may offer a non-pharmacologic option to reduce procedural discomfort in environments where pain control measures are limited. This study evaluates the effectiveness of handheld vibration devices in reducing pain perception during IACIs in rural Guatemala and Kenya.

Aim: To assess whether handheld vibration devices reduce pain perception during intra-articular corticosteroid injections in patients with osteoarthritis in resource-limited health settings.

Methods: A randomized controlled study was conducted during Kansas City University's Global Health Outreach programs in Guatemala and Kenya. 37 adult patients with OA of the knee (89%), hand (8%), or shoulder (3%) scheduled for IACIs were enrolled; four were excluded due to protocol deviations or incomplete data, resulting in a final sample of 33 participants. Subjects were randomized 1:1 into a control group (standard care) or a haptic group that held a vibration device (Beurer MG10) in the contralateral hand during the injection. Pain perception was assessed using the Wong-Baker FACES Pain Rating Scale before and after the procedure. Statistical analysis was performed using Mann-Whitney and Wilcoxon Signed Rank tests.

Results: No statistically significant difference was found between the control and haptic feedback groups in post-injection pain scores ($p = 0.058$). However, the majority of participants experienced significantly lower actual pain than expected (Haptic = 76.5%, Control = 62.5%), with only two reporting increased pain and seven reporting no change. Pain scores decreased by an average of 4.047 points overall ($p < .001$), with reductions of 3.217 in the control group ($p = .001$) and 2.727 in the haptic group ($p = .006$). The average post-injection pain score was 1.44 for the control group and 2.35 for the haptic group.

Conclusion: Although handheld vibration devices did not significantly reduce pain perception compared to standard care during IACIs, a higher proportion of patients in the haptic group reported less pain than expected. Participants experienced significantly less pain than anticipated, suggesting that factors such as patient reassurance, procedural familiarity, or clinical environment may play a larger role in pain modulation. Limitations included communication barriers despite translator and language support, procedural variability among injectors, and an imbalance in joint types treated, with most injections administered to the knee. Nonetheless, this study highlights the feasibility of implementing low-cost, non-pharmacologic strategies like haptic feedback in resource-limited settings. Further investigation with a larger sample size and standardized technique is warranted to explore the role of haptic feedback in reducing procedural pain in low-resource environments.

Table 1. Comparison of Pain Outcomes Between Haptic and Control Groups

Group	Participants	Avg. Post-Injection Pain	# with Lower Pain than Expected	% with Lower Pain than Expected	Average Decrease in Actual Pain
Haptic	17	2.35	13	76.47	3.217
Control	16	1.44	10	62.50	2.727

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