

# ANALGESIC EFFECTS OF LOCAL MUSCLE VIBRATION ON INDIVIDUALS WITH KNEE PAIN: A SYSTEMATIC REVIEW

Rachel Tyrone, SPT; Sam Jackson Dunnam, SPT; Natalie Hall, SPT;  
MacKenzie Johnson, SPT; Min Huang, PT, Ph.D.

Department of Physical Therapy, University of Mississippi Medical Center, Jackson, MS, USA

Corresponding Author: Min Huang<mhuang@umc.edu>

## ABSTRACT

**Background and Purpose:** Along with traditional pain management, research has demonstrated that whole body vibration decreases pain in patients with knee osteoarthritis. Considering previous research and improvements in technology, the purpose of this study was to investigate the analgesic effects of localized vibration applied on or around knee joint in individuals with knee pain.

**Methods:** Available research was examined that applied external vibration on or around the knee joint that also assessed pain. PubMed and Embase were systematically searched through October 30, 2018, and the following criteria were applied: (1) experimental studies investigating the effects of focal vibration on people with knee pain; (2) outcome measure including a pain scale; (3) reported in English. There were no restrictions on age, gender, ethnicity, type of setting, or reason for pain, whether pre-existing or acute injury of the knee. Quality was assessed using the PEDro scale to grade between-group studies, and the Quality Assessment Tool for Pre-Post Studies with No Control was used to grade within-group studies. Quality scores were defined by the following categories: <4 (poor), 5-6 (moderate) and >7 (high quality).

**Results:** Five studies were included in this systematic review. Each study revealed a significant reduction of knee pain in participants receiving localized vibration on or around the knee joint (p-values ranging from 0.0001 to 0.1652 for between-group studies and from <0.0001 to <0.001 for within-group studies). Overall, the studies had moderate to high quality assessment ratings (PEDro scores for between-group studies ranging from 5/10 to 9/10 and the Quality Assessment Tool for Pre-Post Studies with No Control for within-group studies ranging from 6/10 to 8/10).

**Discussion and Conclusion:** Evidence supports that localized vibration applied to the knee joint significantly decreases pain based on this systematic review. The results of these studies positively support that local vibration can be utilized as an analgesic modality in physical therapy practice. This modality can be effectively used to decrease the dependency of opioid usage for pain management. The small quantity of high-quality research available serves as a limitation that could lead to a high risk of bias in favor of the intervention. Additional studies are needed to further investigate the use of this modality in comparison with other interventions to decrease pain across various patient populations

**Keywords:** vibration, knee pain, physical therapy, gate control theory

## INTRODUCTION

Along with traditional pain management, research has demonstrated that whole body vibration decreases pain in patients with knee osteoarthritis.<sup>1</sup> The use of vibration is related to the gate control theory of pain. This states that non-painful input through mechanical transduction can serve as a key in the dorsal horn of the spinal cord.<sup>2</sup> This can close nerve gates responsible for painful inputs traveling to the central nervous system, which can be explained through the gate control theory.<sup>3</sup> This theory focuses on the spinal cord and not the peripheral tissues, where a dynamic interaction occurs between varying types of nerve fibers,