

AZUSA PACIFIC UNIVERSITY

**THE INFLUENCE OF LOCAL MUSCLE VIBRATION
ON PAIN REDUCTION IN COMBAT ATHLETE
WITH SHOULDER IMPINGEMENT**

by

Reiko Ortega

A capstone project submitted to the
School of Behavioral and Applied Sciences
in partial fulfillment of the requirements
for the degree Doctor of Physical Therapy

Azusa, California

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PREVIEW

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DEDICATION

I wish to dedicate this thesis to my friend, Leo, whom this case report is based on. I would also like to dedicate this to my friends in the boxing community who support me, challenge me, and celebrate my boxing endeavors. It has been my pleasure learning from you all.

Lastly, I would like to dedicate this to my parents, Ramon and Donna. I would not have made it this far without you.

PREVIEW

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I would like to thank L.A.K.O. Boxing Club & Training Studio for letting me use their facility to conduct my case report.

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PREVIEW

ABSTRACT

THE INFLUENCE OF LOCAL MUSCLE VIBRATION ON PAIN REDUCTION IN COMBAT ATHLETE WITH SHOULDER IMPINGEMENT

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Doctor of Physical Therapy, 2019
Azusa Pacific University
Advisor: Melissa Cole, DPT

Background. Whole body vibration (WBV) is effective in pain reduction in the low back and lower extremity (LE), but limited research exists on the use of local vibration (LV), particularly with shoulder injuries. Furthermore, there is limited research on injuries sustained by athletes during training, as most studies report post-competition injuries.

Purpose. The purpose of this study was to determine if LV is as effective as manual therapy (MT) on pain reduction in a combat athlete with shoulder impingement syndrome (SIS). *Literature review.* Nine articles were considered in the literature review. Seven articles reviewed the efficacy of manual therapy on SIS. One article examined scapular dysfunction in boxers, and another investigated the efficacy of vibration on pain. Current literature supports the use of WBV on pain reduction in LE and low back injuries. However, there are no studies on the use of LV on upper-extremity injuries. Research also supports the use of WBV for pain reduction in combat athletes, but limited research

exists on the use on LV in that population. *Case description.* The patient was a 28-year-old male combat athlete with insidious shoulder pain who complained of posterolateral and anterior shoulder pain as well as medial scapular border pain while training clients and working out. *Discussion.* Myofascial trigger points are hypothesized to cause shoulder impingement and alter scapular kinematics. In this study, vibration therapy (VT) was used to inhibit trigger points and reduce pain associated with SIS. Primary outcome measures include the Disabilities for Hand and Arm Questionnaire (DASH) and Numerical Pain Rating Scale (NPRS). The patient improved significantly in primary outcome measures from initial visit to discharge. Therefore, this case study supports the use of LV as an effective means of reducing shoulder pain.

Keywords: vibration, local vibration, combat athlete, boxing, shoulder impingement, shoulder pain

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CHAPTER 1

INTRODUCTION

Shoulder impingement syndrome (SIS) is the most common reason for non-traumatic unilateral upper-limb pain (Bron, Dommerholt, Stegenga, Wensing, & Oostendorp, 2011). Older studies attribute SIS to inflammation and degeneration of tendons and bursae under the subacromial arch. However, more recent studies suggest myofascial trigger points (MTrPs) as primary factors for SIS. Researchers claim that MTrPs decreases muscle extensibility and strength, alters motor patterns and scapular kinematics, produces pain, and inhibits range of motion (Bron, Dommerholt, et al., 2011). Manual therapy when combined with exercise has been documented as an effective treatment for SIS. The purpose of this study was to determine if vibration therapy (VT) is as effective as manual therapy in reducing pain in a combat athlete with SIS. Combat athletes in striking sports sustain numerous upper- and lower-extremity injuries from delivering and receiving blows. In addition, they spend many hours training in an adapted posture that puts them at risk for SIS and other upper-limb injuries.

Chapter 2 reviews literature on manual therapy interventions for SIS, shoulder injuries sustained by boxers, and the influence of vibration on pain. Limited research exists on local muscle vibration, as most studies (not included in the literature review) employ whole body vibration platforms. In addition, there is limited research on the effect of vibration on upper-extremity injuries, as most studies discuss low back and

lower extremity injuries. There is limited research on injuries sustained by combat athletes during training, as most studies report injuries post-competition.

Chapter 3 is a case report evaluating the efficacy of vibration therapy for pain reduction in a combat athlete with shoulder impingement. Local muscle vibration on MTrPs was the primary intervention and was supplemented with exercises directed toward the rotator cuff and scapular stabilizers. The primary outcome measures included Numeric Pain Rating Scale and Disabilities of Arm and Hand (DASH) questionnaire. Secondary outcome measures included manual muscle test (MMT) scores. At the end of the 8-week intervention, the combat athlete improved in pain, DASH scores, and MMT scores.

Chapter 4 reviews the implications of the findings of the case report and discusses the clinical significance of the outcomes. The discussion also reviews the limitations of the study and suggests possible studies for the future.

CHAPTER 2

LITERATURE REVIEW

Research shows that combat styles involving striking, such as kickboxing, boxing, mixed martial arts (MMA), and Muay Thai, have higher incidences of injuries than non-striking styles, such as wrestling and jiu-jitsu (Bledsoe, Hsu, Grabowski, Brill, & Li, 2006; Ngai, Levy, & Hsu, 2008; Rainey, 2009). There is conflicting research about which body area is most commonly injured in combat sports, as characteristics of injuries differ according to rules and skills utilized, but research trends show more injuries to the extremities in striking sports and, specifically, more shoulder injuries in boxing (Bledsoe et al., 2006; Jensen, Maciel, Petrigliano, Rodriguez, & Brooks, 2017; Lystad, 2015; Noh et al., 2015; Rainey, 2009).

Current literature supports the use of manual therapy (MT) in alleviating symptoms related to shoulder impingement syndrome (SIS), in which the rotator cuff tendons in the subacromial space are compressed by the coracoacromial arch or by the humeral head during elevation of the arm (Bang & Deyle, 2000; Ludewig & Braman, 2011). Many factors contribute to pain associated with SIS, such as tight musculature around the shoulder, lack of motor control of the scapulothoracic muscles, and myofascial trigger points (MTrPs), which are tender spots in muscle that produce pain (Bron, de Gast, et al., 2011; Ludewig & Braman, 2011). Research shows that MT, including stretching, massage, and treatment of MTrP, have immediate effects on pain

reduction and that MT plus exercise was superior to exercise alone for pain (Bang & Deyle, 2000; Diercks et al., 2014; Hidalgo-Lozano et al., 2011; Senbursa, Baltaci, & Atay, 2011; Steuri et al., 2017; van den Dolder & Roberts, 2003).

Research has shown the effectiveness of whole-body vibration (WBV) on pain reduction, range of motion (ROM), flexibility, muscle performance, and prevention of delayed onset muscle soreness in musculoskeletal conditions (Cerciello, Rossi, Visonà, Corona, & Oliva, 2016; Hollins, McDermott, & Harper, 2014). Current literature supports the use of vibration in lower-extremity (LE) injuries, but there is none so far addressing its feasibility in upper-extremity injuries.

Problem

Shoulder injuries are prevalent in combat sports due to the nature of the sport as well as the fighter's training posture. However, there is limited research on upper-extremity injuries sustained by combat athletes from long-term training, as most studies record acute injuries after competition. There is also limited research on the effectiveness of local vibration (LV) therapy on pain reduction, particularly in the upper extremities, as most studies report on LE and low back.

Purpose

The purpose of this systematic literature review is to evaluate the effectiveness of LV therapy for pain reduction in combat athletes with chronic pain related to shoulder impingement syndrome.