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A Comprehensive Examination of Sports Massage Therapy and Muscle Energy Techniques in Alleviating Joint Pain and Restoring Range of Motion

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Abstract

Osteoarthritis, which is characterized by cartilage degeneration, is the most common type of joint pain, affecting a staggering 8.5 million people in the UK (Wood et al., 2023). Synovial joints play a crucial role in enabling smooth, efficient movement by acting as levers that absorb and transmit the necessary forces. Joint mobility is reliant on the underlying anatomical structure and the surrounding tissues. Excessive stress on these joints can lead to injuries and subsequent joint pain, resulting in discomfort and reduced mobility, ultimately compromising an individual's quality of life. Therefore, it is imperative to understand and effectively treat conditions associated with joint dysfunctions. This paper aims to explore the effectiveness of Sports Massage Therapy (SMT) and Muscle Energy Technique (MET) in alleviating Joint Pain and restoring Range of Motion.

Keywords: Joint pain; Sports massage therapy; Muscle energy technique; Healing process; Collagen fibers; Inhibitory neurons

Introduction

SMT is a form of manual therapy. Manual therapy is defined as ‘a passive, skilled movement applied by clinicians that directly or indirectly targets a variety of anatomical structures or systems, which is utilised with the intent to create beneficial changes in some aspect of the patient pain experience’ [1]. Pain can be defined as an ‘unpleasant sensory and emotional experience associated with actual or potential tissue damage’. Range of motion refers to ‘the range, measured in degrees of a circle, through which the bones of a joint can be moved’. SMT encompasses a wide range of techniques, including effleurage, petrissage, friction, and compression. The strokes can be applied longitudinally to promote blood and lymph flow or cross-fibre to loosen up adhesion. Deep longitudinal stroke promote muscle relaxation and help to reduce Delayed Onset Muscle Soreness [2]. Effleurage and petrissage (or kneading) techniques aim to stimulate local circulation. While effleurage may increase lymphatic and venous return, petrissage is used to address fascia and loosen up scar tissues as shown in (Figure 1). Friction is also used to break down adhesions and realign collagen fibres, which promotes tissue repair. Friction creates a mild inflammation of the tissues causing bradykinin and histamine to be released. The activation of these chemicals causes vasodilation, enhancing the tissue repair process as nutrients access the tissues [3]. Compression involves pumping lymph through the capillaries by applying pressure to empty them and then allowing them to refill through decompression. The reduction of pressure within the capillaries enables the lymph to flow, drain excessive fibrin (forms scar tissues) and eliminate wastes and by-product of inflammation [4]. According to Rattray and Ludwing, the cross-fibre technique induces an analgesic effect on injuries of ligaments and tendons by initiating the healing process. Additionally, cross-fibre, friction, and compression techniques actively participate in different stages of the healing process by breaking down adhesions on tendons, ligaments, and muscles. Scar tissues are initially formed during tissue healing and these collagen fibres act like glue, binding tissues together until the healing process is complete [5]. In the granulation phase, scar tissue forms over the wound to create a framework for epithelial cells to fill. These scar tissues remain present at the next phase of healing, where fibroblast, collagen, and ground substance increase. Even so, the texture and structure will remain rough and uneven [6]. For this reason, Rattray and Ludwig suggest that remodelling formatting scar tissues shall start at this particular phase of healing and the beginning of the maturation phase as these tissues will still be malleable, and collagen fibres are more likely to realign throughout treatment. Scar tissue can also be broken down, resulting in smaller and more mobile tissue.

Figure 1: Petrissage.

Methodology

If left untreated, scar tissue may cause tissue shrinkage because of

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the cross-linking of collagen fibres, ultimately leading to a decreased range of motion. Manual therapy alleviates pain and increases joint ROM by inhibiting pain signals, playing a part in the healing process, breaking scar tissues and enhancing blood and lymphatic flows [7]. Pain reduction is achieved by altering the pain stimuli (nociceptors) in the nervous system. Melzack and Wall suggest that a gating mechanism is present within the dorsal horn of the spinal cord. When inhibitory neurons are stimulated, they prevent the projection neuron from sending a pain signal to the brain (closed gate). According to Fernandez-de-las-Peñas, Cleland and Dommerholt, this neurological process occurs by deep touch. Additionally, massage therapy releases opiate neurochemical (enkephalins and endorphins) in order to control the pain [8]. Lastly, manual therapy reduces pain on tight muscles and fascia or when muscle spasms occur by increasing blood and lymphatic flow. As the patient relaxes, the activity of the parasympathetic system increases, generating hormones and chemical release (endorphins, serotonin, histamine and acetylcholine), leading to a rise in skin temperature and dilatation of the blood vessels, which will allow more blood viscosity. It is also suggested that light pressure enhance dilation of the capillaries. The second method to be discussed is Muscle Energy Technique (MET) [9].

Discussion

MET are defined as 'a manual treatment in which a patient produces a contraction in a precisely controlled position and direction against a counterforce applied by a manual therapist MET treat soft tissue, mobilise joints, stretch tight muscles and fascia, reduce pain and improve circulation and lymphatic drainage'. There are different types of MET, including Post-Isometric Relaxation (PIR), which works through autogenic inhibition, and Reciprocal Inhibition (RI) [10]. The literature does not find common ground to explain the physiological processes in which stretch is achieved. MET and PIR involve two musculotendinous proprioceptors playing an essential role in coordination and muscular control: the Golgi tendon organ, sensing muscle tension and muscles spindles, sensing muscle stretch and speed [11]. During the autogenic inhibition process, when a muscle contracts, the Golgi tendon organ (GTO) responds by inhibiting the contraction through stretch inhibition, resulting in contraction of the antagonist muscle [12]. The Reciprocal Inhibition (RI) process occurs when the muscle experiences an increased stretch, causing the muscle spindle to trigger a reflexive contraction (stretch reflex) in the agonist muscle and relaxation in the antagonist (opposite) muscle [13]. After 7 to 10 seconds of contraction, the GTO response occurs, leading to temporary inhibition of the muscle spindle in the stretched muscle as shown in (Figure 2).

Figure 2: Muscle energy technique.

This "time window" provides the therapist with an opportunity to move the muscle to its next barrier for further stretching [14]. A controversial theory claims that muscle activation remains the same or increases after contraction. According to this author, MET processes can desensitize nociceptors by reducing the concentration of cytokines, which trigger the inflammation response, and by increasing blood flow in the capillaries as interstitial pressure increases [15]. This process brings nutrients to the tissues, removes waste, and affects the mechanical signal transduction processes of fibroblasts involved in tissue remodelling [16]. According to Havas, isometric muscle contraction increases lymph flow and tissue drainage, promoting tissue repair and potentially reducing pain [17]. To ensure the physiological benefits of manual therapy and MET, the speed and amount of pressure applied are crucial. While frictions can be performed at a faster rate, other techniques may require a slower pace [18]. When using these methods, the therapist should consider their treatment goals and work within the patient's pain tolerance threshold [19]. Slow technique execution can help the therapist feel the tissue's response and avoid further damage. A deliberate pace and focus on patient comfort can also maintain activity in the parasympathetic nervous system, which is essential for working through tissue barriers, enhancing blood flow, and promoting lymphatic drainage.

Conclusion

This paper has highlighted the importance of utilizing massage therapy and MET to restore joint range of motion and alleviate pain, while also describing the associated physiological processes. Both techniques are commonly used in sports massage therapy, and therapists must choose the appropriate method based on their treatment objectives. The pressure and speed of these techniques are crucial indicators of tissue response and should be adjusted to ensure patient comfort and stay within their pain threshold.

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Conflict of Interest

None

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