

TREATMENT OF CHRONIC NECK PAIN USING DIFFERENT INJECTIONS (COMPARATIVE STUDY)

Thesis

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببنا انك لا تعلم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

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List of Abbreviations

Abb.	Full term
<i>5-HT</i>	<i>Serotonin</i>
<i>ACD</i>	<i>Acid-citrate dextrose</i>
<i>Ach</i>	<i>Acetylcholine</i>
<i>ADL</i>	<i>activities of daily living</i>
<i>ADSCs</i>	<i>Adipose-derived stem /stromal cells</i>
<i>AMPA</i>	<i>Alpha-Amino-3-hydroxyl- 5-methyl-4-isoxazole-propionate</i>
<i>AP</i>	<i>Anteroposterior</i>
<i>ASIA</i>	<i>American Spinal Injury Association</i>
<i>ASICs</i>	<i>Acid-sensing ion channels</i>
<i>ATP</i>	<i>Adenosine triphosphate</i>
<i>BDI</i>	<i>Beck Depression Inventory</i>
<i>BDNF</i>	<i>Brain derived neurotrophic factor</i>
<i>BMSCs</i>	<i>Bone marrow mesenchymal stem cells</i>
<i>BTA</i>	<i>Botulinum toxin A</i>
<i>BTx</i>	<i>Botulinum toxin</i>
<i>CBC</i>	<i>Complete blood count</i>
<i>CGRP</i>	<i>Calcitonin gene-related peptide</i>
<i>CNS</i>	<i>Central nervous system</i>
<i>COX</i>	<i>Cyclo-oxygenase</i>
<i>CPD</i>	<i>Citrate-phosphate-dextrose</i>
<i>CPGS</i>	<i>Chronic pain grade scale</i>
<i>CRPS 1</i>	<i>Complex Regional Pain Syndrome type 1</i>
<i>CSP</i>	<i>Chronic spinal pain</i>
<i>CVLI</i>	<i>Chronic venous lymphatic insufficiency</i>
<i>DDN</i>	<i>Deep Dry needling</i>
<i>DH</i>	<i>Dorsal Horn</i>
<i>DMAE</i>	<i>Dimethylaminoethanol</i>
<i>DN</i>	<i>Dry needling</i>

List of Abbreviations (cont...)

Abb.	Full term
<i>DNRI.....</i>	<i>Dopamine Noradrenaline Reuptake Inhibitors</i>
<i>DRG.....</i>	<i>Dorsal root ganglia</i>
<i>EDTA.....</i>	<i>Ethylene diamine tetra-acetic acid</i>
<i>ESIs</i>	<i>Epidural steroid injections</i>
<i>ESR.....</i>	<i>Erythrocyte Sedimentation Rate</i>
<i>GBD</i>	<i>Global Burden of Disease</i>
<i>IASP.....</i>	<i>International Association for the Study of Pain</i>
<i>IED.....</i>	<i>Intraepidermic</i>
<i>IM.....</i>	<i>Intramuscular</i>
<i>IQR</i>	<i>Inter-quartile range</i>
<i>LBP.....</i>	<i>Low Back Pain</i>
<i>LIT.....</i>	<i>Local intradermal therapy</i>
<i>LTRs</i>	<i>Local twitch responses</i>
<i>MPS.....</i>	<i>Myofascial pain Syndrome</i>
<i>MRE.....</i>	<i>Magnetic Resonance Elastography</i>
<i>MRI.....</i>	<i>Magnetic Resonance Imaging</i>
<i>MSCs</i>	<i>Mesenchymal stem cells</i>
<i>MTrPs.....</i>	<i>Myofascial Trigger Points</i>
<i>NDI</i>	<i>Neck Disability Index</i>
<i>NK1.....</i>	<i>Neurokinin 1</i>
<i>NMDA.....</i>	<i>N-methyl-D-aspartate</i>
<i>NPQ.....</i>	<i>Northwick park neck pain questionnaire</i>
<i>NSAIDs.....</i>	<i>Non-Steroidal Anti-Inflammatory Drugs.</i>
<i>NSS.....</i>	<i>Normal saline solution</i>
<i>OA.....</i>	<i>Osteoarthritis</i>
<i>OFP.....</i>	<i>Oedematous fibrosclerotic panniculopathy</i>
<i>PAG.....</i>	<i>Periaqueductal grey</i>

List of Abbreviations (cont...)

Abb.	Full term
<i>PC</i>	<i>Phosphatidylcholine</i>
<i>PPP</i>	<i>Point by point</i>
<i>PRP</i>	<i>Platelet rich plasma</i>
<i>PTH</i>	<i>Parathyroid Hormone</i>
<i>RA</i>	<i>Rheumatoid Arthritis</i>
<i>RCR</i>	<i>Rapid contraction response</i>
<i>RIT</i>	<i>Regenerative Injection Therapy</i>
<i>ROM</i>	<i>Range Of Motion</i>
<i>RVM</i>	<i>Rostroventromedial medulla</i>
<i>sCt</i>	<i>Salmon calcitonin</i>
<i>SDN</i>	<i>Superficial Dry needling</i>
<i>SEA</i>	<i>Spontaneous Electrical activity</i>
<i>SIA</i>	<i>Stress-induced analgesia</i>
<i>SNRIs</i>	<i>Serotonin Noradrenaline (Norepinephrine) Reuptake Inhibitors</i>
<i>SSRIs</i>	<i>Selective Serotonin Reuptake Inhibitors</i>
<i>TCAs</i>	<i>Tricyclic Antidepressant</i>
<i>TRP</i>	<i>Transient Receptor Potential</i>
<i>TRPV1</i>	<i>Transient receptor potential vanilloid</i>
<i>VAS</i>	<i>The visual analog scale</i>
<i>WHO</i>	<i>The World Health Organization</i>

INTRODUCTION

Neck pain is an important personal and societal burden, affecting 30–50% of adults in the general population in any given year. Approximately 50–85% of individuals with neck pain do not experience complete resolution of symptoms and some may go on to experience chronic, impairing pain (*Goode et al., 2010*).

The limitation of motion can have a devastating effect on activities of daily living. People may have difficulty driving safely and become confined to their homes. Workers may have increasing neck pain at their workplace. They may have problems remaining productive at their jobs, placing their employment at risk (*Borenstein, 2007*). Neck pain may cause absenteeism as frequently as low back pain (LBP). Like chronic LBP chronic neck pain is often unresponsive to treatment and costly in regard to direct and indirect costs (*Goode et al., 2010*). Chronic neck pain is a serious condition that must be treated aggressively (*Borenstein, 2007*).

Myofascial trigger points (MTrPs) can be involved in pain processes in patients with neck pain. Simons et al., defined an MTrP, as a hyperirritable spot in a taut band of a skeletal muscle that is painful on contraction, stretching, or stimulation and elicits a referred pain distant from the point (*Muñoz-Muñoz et al., 2012*). They are typically found proximal to an inflamed or painful joint such as the rectus femoris in patients

with knee osteoarthritis and paraspinal regions in the cervical and lumbar spine (**Karrar and Mackworth-Young, 2015**).

The majority of subjects with chronic impairing neck pain reported taking an over the counter non-steroidal anti-inflammatory drugs (NSAIDs). Twenty-nine percent of subjects reported taking strong narcotics (e.g., morphine and oxycodone), whereas 23.1% reported taking weak narcotics (codeine or propoxyphene) for chronic impairing neck pain. Another commonly used medication was muscle relaxants, with almost one-third of the sample reporting use. Evidence on the effectiveness of medications in the treatment of chronic neck pain is quite limited (**Goode et al., 2010**).

Numerous noninvasive methods such as stretching, massage, ischemic compression, laser therapy, heat, acupuncture, ultrasound, transcutaneous electrical nerve stimulation and pharmacological treatments have been used to alleviate chronic myofascial pain, but no single strategy has been proved to be universally successful (**Kalichman and Vulfsons, 2010**).

Although injection, as interventional method, should be used cautiously in the setting of chronic pain, there is a role for a variety of injections (least interventional methods) to facilitate patients overall rehabilitation program (**Singh et al., 2015**).

Injection therapy is found to be effective in decreasing pain and muscular spasm, increasing the range of motion (ROM) and local blood circulation, and cause fibrotic scar formation on trigger points. Local anesthetic, saline, steroid, NSAIDs, botulinum toxin, and dry needling techniques are used as local injections (**Ay et al., 2010**).

NSAIDs could be injected using mesotherapeutic technique which is mainly consist of subcutaneous injections (into the mesoderm, hence the term “mesotherapy”) of steroids, NSAIDs and local anesthetics, administered alone or in various combinations can be injected (**Hermann et al., 2008**).

NSAIDs exhibit analgesic effects by COX inhibition and the reduction of prostaglandin and other inflammatory mediators. Nitric oxide seems to play a major part in local inflammation, and the injection of analgesic drugs may activate neuronal nitricoxide synthase to produce nitric oxide and consequently peripheral antinociception (**Mammucari et al., 2012**).

Dry needling (DN) is a minimally invasive method which is increasingly used for treatment of MTrPs. DN involves inserting a needle into an MTrP without injecting any medication. This technique is reported to be an effective and efficient treatment for reducing somatic pain and dysfunction associated with MTrPs in a muscle (**Abbaszadeh-Amirdehi et al., 2013**).

There are various DN modalities known for the treatment of MTrPs, and these can be classified in different ways, according to the various classification criteria. The most commonly used classification criterion is the depth of needle insertion. According to this, the different DN modalities can be classified into two categories: superficial DN (SDN) techniques, in which the needle does not reach the MTrP and stays in the tissues immediately overlying it and deep DN (DDN) techniques, in which the needle reaches the MTrP and passes through it (*Del Moral and Salvat, 2015*).

The most likely mechanisms of action of superficial needling are: the stimulation of A- δ nerve fibres performed by inserting a needle into the skin overlying the MTrP, the well-known capacity for stimulation using needles to induce secretion of endogenous opioid peptides (e.g. enkephalins, dynorphins), the gate-control theory: the stimulation of A- β nerve fibers tends to ‘close’ the gate and inhibit the transmission of pain to the superior centres and hypothetical action over the autonomous nervous system, which is known to modulate the activity of MTrPs (*Del Moral and Salvat, 2015*).

Hyperosmolar dextrose or phenol-glycerin-glucose injection, is an irritant substance injected into a joint space, ligament, subcutaneous tissue or tendon insertion site (prolotherapy), is complementary medical treatment, with the main goal being pain relief. Many different solutions have been used through-out the past 100 years that this technique has been