

**THE RELATIVE EFFECTIVENESS OF A HOME PROGRAMME
OF ISCHAEMIC COMPRESSION, SUSTAINED STRETCH AND
A COMBINATION OF BOTH FOR THE TREATMENT OF
MYOFASCIAL TRIGGER POINTS IN THE UPPER TRAPEZIUS
MUSCULATURE**

By

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A dissertation submitted to the Faculty of Health in partial compliance with the requirements for a Masters Degree in Technology: Chiropractic at the Durban Institute of Technology.

I, Marlon Dean Thoresson, do hereby declare that this dissertation represents my own work both in concept and execution.

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9/12/03

DEDICATION

To my **God** above, with whom all things are possible!

To my **Mom**, I am what I am today because of your unfailing love and support.

I thank you for all your encouragement and belief in me, and most of all I
thank you for just being you.

To my sister, **Leisha**, and my brother, **Lester**, who helped mould me into who
I am today.

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ABSTRACT

The purpose of this study was to determine the relative effectiveness of a home programme of ischaemic compression, sustained stretch and a combination of the two, in terms of subjective and objective clinical findings for the treatment of Myofascial Pain Syndrome.

This study was a prospective, randomised, controlled clinical trial. A sample size of 60 patients from the Durban Metropolitan area was used. Only patients diagnosed with active trigger points in the upper trapezius muscle were accepted into the study.

The sample was divided into three groups of 20 patients each. Group A received a home programme of ischaemic compression using a Thera – cane device, group B received a home programme of sustained stretching exercises and group C was a combination group utilising both of the above mentioned home programmes. Each group performed their treatment over 5 consecutive days.

Data was obtained from the patients at the initial consultation (prior to the 5 consecutive days of treatment), at a second consultation (after the treatment period) and again at a follow – up consultation one week later.

Objective data was obtained using pressure threshold algometry and the Myofascial Diagnostic Scale (MDS). Subjective data was obtained using the Numerical Pain Rating Scale (NRS 101) and the CMCC Neck Disability Index.

Statistical analysis of the data involved non – parametric testing. Intra – group comparisons of the subjective and objective data were made using the Wilcoxon Signed Ranks test, whereas inter – group comparisons were made using the Kruskal – Wallis H – test. The level of significance was set at $\alpha = 0.05$, and p – values were used for decision making.

Evaluation of the results obtained from the intra – group analysis revealed significant improvements with regards to subjective and objective data for all three, treatment groups.

Intra – group analysis of data obtained from group A revealed significant improvements between measurements 1 & 2, 2 & 3 and 1 & 3 in terms of objective and subjective data. The NRS 101 measurements between consultations 2 & 3 however, did not show any significant improvement. This finding suggests that group A experienced comparatively less pain after 5 consecutive days of self – ischaemic compression, than either group B or C, with regards to subjective pain measurements.

The inter – group analysis of the data obtained from groups A, B and C did not show any significant improvement at the end of the research programme, with regards to the subjective or the objective findings. This suggests that no one group had a better outcome than the others. This is supported by the constant improvement seen in all three groups with regards to the mean values for subjective and objective data, collected throughout the course of the research programme.

The results of the study indicate that both self – ischaemic compression (using a Thera – cane device) and sustained stretching exercises, are as effective as one another, and that a combination of the two treatments is no better than each treatment on their own, in terms of both subjective and objective clinical findings.

Further work is needed in this area of self – treatment to validate the findings of this study, and to help standardise the programme of rehabilitation for those suffering with Myofascial Pain Syndrome.

This study and the observations made by the researcher are hoped to contribute to the limited literature available on this subject.

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CHAPTER ONE: INTRODUCTION

1.1 THE PROBLEM AND ITS SETTING

Myofascial Pain Syndrome (MPS) is defined as the sensory, motor and autonomic symptoms caused by myofascial trigger points (TrPs), or hyperirritable spots within skeletal muscles that are associated with palpable nodules in a taut band (Travell, Simons and Simons, 1999).

According to Hong et al. (1993) MPS is considered to be one of the most common muscular dysfunctions found in patients. The syndrome is one of the least understood yet commonly encountered problems in the outpatient settings. Unfortunately, the condition often goes unrecognised, misdiagnosed and mistreated, leading to unnecessary pain, suffering and disability (Auleciems, 1995).

Myofascial trigger points, the components of MPS, can be described as localized areas of pain within muscles or their fascia, which are exquisitely tender to touch, and can cause referred pain on manual compression of the myofascial trigger point (Travell, Simons and Simons, 1999).

In the clinical setting it becomes important to differentiate between active and latent trigger points. According to Travell, Simons and Simons (1999) an active myofascial TrP is always tender, prevents lengthening of the muscle, weakens the muscle, mediates a local twitch response and when directly compressed refers pain within a specific pattern. It is this referred pain that distinguishes an active TrP from a latent TrP. A latent trigger point may have all the characteristics of an active trigger point in the absence of spontaneous pain (Travell, Simons and Simons (1999).

Despite the fact that such a wide variety of treatments for myofascial pain already exists, there is still agreement amongst authors that more studies aiding in the management of this condition, are required (Han and Harrison, 1997; Hanten, 2000). This is particularly evident in the area of patient self-care.

The major goal of TrP therapy is to relieve pain and taut bands of the involved muscles (Esenyel et al. 2000). Treatment protocols vary and include; spray and stretch, transcutaneous electrical nerve stimulation (TENS), ischaemic compression, ultrasound therapy, massage therapy, TrP injection therapy, dry needling and elimination of causative and perpetuating factors (Esenyel et al. 2000). For all the above treatments the mechanism of action is thought to be hyper-stimulation analgesia of TrPs (Baldry, 1998) mediated through the gate control mechanism (Melzack and Wall, 1982).

It is noted by Anderson (1997) that choice of treatment is often a personal one, due to lack of clinical evidence to support one specific therapy over another.

1.2 NEED FOR A SOLUTION TO THE PROBLEM

This research study is designed to test two of the above treatment modalities namely, ischaemic compression and sustained stretch, so that they may be offered to patients as a self-administered home programme.

Ischaemic compression can be defined as the application of slowly increasing, non-painful pressure over a TrP until a barrier of tissue resistance is encountered. Contact is then maintained until the tissue barrier releases, and pressure is increased to reach a new barrier to eliminate the TrP tension and tenderness (Travell, Simons and Simons, 1999).

It is thought that the localised compression causes a stretch of the contracted fibres thereby producing a mechanical separation of the actin-myosin cross fibre links (Schneider, 1996). Schneider also suggested that the prolonged deep pressure might induce a so-called “nerve-block” by inhibiting the reflex pathways that perpetuate the TrP activity.

Ischaemic compression has been found to be more effective than other modalities in two independent studies by Garvey (1989) and Hong (1993). Garvey (1989) ($p=0.09$) compared injection of a local anaesthetic, injection of a local anaesthetic plus steroid, dry needling,

and ischaemic pressure with vapocoolant spray. He found that the ischaemic pressure plus vapocoolant spray was the most effective at relieving pain. Hong (1993) found the ischaemic compression to be more effective than spray and stretch, moist heat packs and ultrasound ($p < 0.05$).

Stretching of the affected muscles is believed by some authors to be an integral part of TrP therapy. Lewit and Simons (1984) found the post-isometric relaxation technique to be effective in reducing TrP sensitivity and pain intensity. The technique involves stretching the muscle containing the TrP, followed by an isometric contraction against minimal resistance. Jaeger and Reeves (1986), who reported the effectiveness of spray and stretch in decreasing pain intensity and increasing pressure pain threshold, suggested that it is the stretch that resulted in the decrease in TrP sensitivity, not the spray.

Although ischaemic compression and sustained stretch are both widely prescribed to patients for home use in order to aid in the treatment of myofascial pain syndrome, the literature provides no clear guidelines regarding this area of care.

A study by Hanten (2000), did however attempt to provide a structural guide to home based/self-help care. A device called a "Thera-cane" was used to perform a home programme of ischaemic compression followed by sustained stretch of the muscles of the neck and upper back. The Thera-cane is a passive non-invasive device,

which is used to apply pressure to active myofascial TrPs. The use of the Thera-cane proved to be more effective ($p<0,05$) than the control of cervical range of motion exercises in the treatment of myofascial pain syndrome.

A major limitation of the study according to Hanten (2000) is that it may be possible that either the ischaemic pressure or the sustained stretch produced the results independently.

Therefore this study compares the relative effectiveness of a home programme of ischaemic compression (using a standardised ischaemic compression device – Thera-cane) as opposed to sustained stretch in an effort to further improve the management of myofascial TrPs.

1.3 STATEMENT OF THE PROBLEMS

The aim of this study is to evaluate the relative effectiveness of a home programme of ischaemic compression, sustained stretch and a combination of the two, in terms of subjective and objective clinical findings for the treatment of myofascial trigger points.

1.3.1 Sub-problem one

To determine the relative effectiveness of a home programme of ischaemic compression, sustained stretch and a combination of the two for the treatment of myofascial trigger points in terms of subjective clinical findings.

1.3.2 Sub-problem two

To determine the relative effectiveness of a home programme of ischaemic compression, sustained stretch and a combination of the two for the treatment of myofascial trigger points in terms of objective clinical findings.

1.4 HYPOTHESES

1.4.1 The first hypothesis

It is hypothesised that a home programme of ischaemic compression will be effective in the treatment of patients with myofascial TrPs in terms of both subjective and objective clinical findings.

1.4.2 The second hypothesis

It is hypothesised that a home programme of sustained stretch will be effective in the treatment of patients with myofascial TrPs in terms of both subjective and objective clinical findings

1.4.3 The third hypothesis

It is hypothesised that a combined home programme will have efficacy beyond that of either ischaemic compression or sustained stretch performed on their own, in terms of both subjective and objective clinical findings.

1.5 BENEFITS OF THE STUDY

Ischaemic compression and sustained stretching are both safe and effective procedures for self-treatment. The application of ischaemic compression can be performed using a standardised ischaemic compression device (Thera-cane) created specifically for this purpose, whilst stretching techniques are easily taught. Using a home programme reduces physical therapy visits and actively involves the patient in his or her treatment, acting as the primary pain manager. Other advantages to using a home programme potentially include shorter treatment times, minimal patient-clinician contact and the convenience of self-treatment without having to leave home.

It is hoped that this investigation provides valuable information that may contribute to the limited literature available on home programme treatment of myofascial pain syndrome, providing the basis for future research into this area of study.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

Myofascial pain syndrome is one of the least understood, yet commonly encountered problems in the outpatient settings. Unfortunately, the condition often goes unrecognised, misdiagnosed and mistreated, leading to unnecessary pain, suffering and disability (Auleciems, 1995).

This chapter gives a review of the available literature on MPS and highlights the possible weaknesses in knowledge of the therapies used in the treatment of this condition. The information reviewed will attempt to provide a clearer understanding of the current concepts in trigger point etiology, pathogenesis, diagnosis and management.

2.2 PREVALANCE AND INCIDENCE

Myofascial Pain Syndrome has been described as a common health problem affecting a substantial portion of the population, which affects the individual in every aspect of their life (Bruce, 1995). It is one of the most predominant soft tissue syndromes seen in clinical practice and there is a growing interest within the Chiropractic profession towards the management of soft tissue disorders such as MPS (Schneider, 1995).

A study conducted by Skootsky et al. (1989) showed myofascial pain to be the single most common reason for a patient with pain to visit a physician. In this study, 172 consecutive patients presenting to a university primary care general internal medicine practice were examined. Thirty percent of the 54 patients, whose reason for the visit was pain, were diagnosed with myofascial pain, representing the prevalence of this condition. It is the opinion of the author however, that a larger number of patients would have helped to strengthen the study.

Friction et al. (1995) found that, of the 164 patients with head and neck pain of at least six months duration, 55% had a primary diagnosis of MPS with active TrPs. Han and Harrison (1997) found that the incidence of Myofascial Pain Syndrome varied between 30 and 85% of people presenting to pain clinics. In the same review, it was stated that of the 200 adults presenting for a particular study, 54% of women and 45% of men had latent myofascial trigger points in the shoulder girdle.

Chaiamnuay et al. (1998) found similar results in their study conducted in villages from rural Thailand where 2463 subjects were examined, of which 36.2% had musculoskeletal pain with MPS being the most common diagnosis. In a similar manner, Fishbain et al. (1986) reported that of 283 consecutive admissions to a pain centre programme, myofascial trigger points were the primary cause of pain in 85% of cases.

Myofascial Pain Syndrome occurs in both sexes however it appears to be more common in females as found in a study done by Hou et al. (2002) where of the 119 individuals treated for MPS, 107 were female.

People of any age can develop active myofascial trigger points, which leads to MPS, but people between the ages of 30-49 are more commonly affected by the condition, which then decreases with age (Han and Harrison, 1997). As with advancing age comes reduced activity and the stiffness and restricted range of motion of latent myofascial trigger points becomes more prominent than the pain of active myofascial trigger points (Travell, Simons and Simons, 1999).

One study done in South Africa, based on the prevalence and types of headaches in Afrikaans speaking high school children (13 – 18yrs of age) in the greater Durban area, revealed a 24.95 – 37.1% prevalence of active Trapezius TrPs in a sample population of 1441 pupils (Jansen, 1998).

2.3 RELATED DIAGNOSTIC TERMS

The cause of muscle pain syndromes and of musculoskeletal pain in general, has perplexed the medical community for more than a century. The subject has been plagued by a multitude of terms such as Fibrositis, Myofascitis, Myogeloses, Nonarticular Rheumatism, Soft Tissue Rheumatism and Tendomyopathy that emphasized different aspects of basically the same condition (Travell, Simons and Simons, 1999).

2.4 AETIOLOGY

According to Travell, Simons and Simons (1999), there is still uncertainty over the aetiology of MPS as no studies conducted indicate positive predictive values (PPV+) for any one or combination of factors. Acute injuries may cause immediate symptoms, while chronic stresses are more likely to cause a gradual onset of symptoms. Some authors are of the opinion that TrPs may result from or be perpetuated by trauma, overuse, mechanical overload, postural faults or psychological stress (Hanten et al. 2000).

Gatterman (1990) states that many factors interact to create TrPs. Usually, one stress activates the TrP, and then other factors perpetuate it.

Travell, Simons and Simons (1999) and Chaitow and Delany (2002) have proposed a number of factors that may lead to the development of TrPs:

- **Mechanical abuse or Trauma** – this may be through acute, sustained or repetitive muscle overload i.e. prolonged muscle contraction. The mechanical stresses that tend to activate myofascial TrPs acutely include stresses such as a wrenching movement, automobile accidents, falls, fractures, joint sprains, dislocations, or a direct blow to the muscle. Acute onset may also be associated with an episode of excessive or unusual exercise.

- **Prolonged muscle shortening** – especially if the muscle is contracted in the shortened position.
- **Nerve compression** – can cause neuropathic electromyographic changes and result in disturbed microtubule communication between the neuron and the endplate.
- **Febrile Illness**
- **Systemic Biomechanical Imbalances** – e.g. Hormonal disturbances
- **Adverse environmental conditions** – including, but not limited to excessive cold, heat or damp.

Baldry (1993) goes further to classify secondary activating factors, which are not limited to, but include:

- **Satellite referral myofascial trigger points** – that evolve within the referral zone of another trigger point.
- **Compensating synergist and antagonist muscles.**
- **Infections** – not necessarily related to febrile illness.
- **Allergies** – not only related to food allergies, but also pollutants, pollen etc.
- **Nutritional deficiency** – especially vitamins C, B-complex and iron.
- **Low oxygenation of tissues** - resulting in localised areas of ischaemia.

It is of the opinion of Travell, Simons and Simons (1999) that in patients where the onset of symptoms is gradual, most of these patients cannot remember when or why the pain started.

According to these authors it is important to establish the aetiology, as chronic overload may perpetuate and intensify the trigger point's symptoms.

Factors specific to the activation of TrPs in the upper trapezius muscle according to Travell, Simons and Simons (1999) include:

- Overload owing to tilting of the shoulder-girdle axis can be due to a lower limb-length inequality or small hemi-pelvis. The limb asymmetry tilts the pelvis laterally, which bows the spine into a functional scoliotic curve and, in turn, tilts the shoulders, causing one to sag. The upper trapezius must work constantly to keep the head and neck vertical and the eyes level.
- A walking cane that is too long tilts the axis of the shoulder girdle and causes a similar trapezius problem by forcing the shoulder up on the side of the cane.
- Any position or activity in which the trapezius helps to carry the weight of the arm for a prolonged period: telephoning or sitting without armrest support, particularly when the upper arms are congenitally short; holding the arms elevated to reach a high keyboard or a high drawing board; or working with sewing material on the lap with the elbows unsupported.
- The upper trapezius may also be strained by injury caused from clothing and accessories such as, pressure from tight narrow bra straps supporting large breasts, a shoulder strap from a heavy handbag or backpack, or by a heavy coat.

2.5 PERPETUATING FACTORS

Perpetuating factors are responsible for the reoccurrence of pain after treatment in patients suffering from MPS. Therefore they need to be identified and eliminated for the long-term relief of pain (Esenyel, 2000). According to Fomby et al. (1997) the treatment of myofascial trigger points can fail owing to the perpetuating factors left untreated.

The following is a list of perpetuating factors outlined by Travell, Simons and Simons (1999).

- Misfitting furniture, poor posture and prolonged immobility are significant contributing factors. People who work at a desk, computer or typewriter for long periods of time are more susceptible to developing TrPs.
- Mechanical stresses such as skeletal asymmetry (short leg or small hemi pelvis) and disproportion (long second metatarsal and short upper arms).
- Nutritional inadequacies, metabolic and endocrine disturbances, psychological factors, (depression, tension, anxiety), chronic infection, allergy, impaired sleep and nerve entrapment are all factors, which could aggravate the condition of MPS.

2.6 CLINICAL PRESENTATION AND DIAGNOSIS

SYMPTOMS

Patients with MPS will typically present to a clinician with a history of pain that may at first seem poorly localized, but is usually limited to one muscle region of the body (Schneider, 1995). The pain may range from a mild ache to excruciating pain and words such as dull, pressure, heavy and burning are often used to describe the pain (Han and Harrison, 1997).

Myofascial pain may present as referred pain to a site distant from the TrP, in a characteristic pattern for that muscle with some patients being aware of numbness or paresthesia instead of pain (Travell, Simons and Simons, 1999).

In the history the patient will usually present with pain related to a traumatic injury e.g. muscle overload or strain, or, in chronic cases related to repetitive strain or cases of chronic muscular tension e.g. poor posture (Schneider, 1995).

According to Travell, Simons and Simons (1999), patients presenting with TrPs in the upper trapezius muscle, most commonly complain of pain and tenderness along the posterolateral aspect of the neck, behind the ear and to the temple.

2.6.1 SIGNS

On examination of a patient with MPS, certain physical findings are necessary before a correct diagnosis can be made. The most characteristic physical sign in MPS is the presence of TrPs (Travell, Simons and Simons, 1999).

As stated by Travell, Simons and Simons (1999), myofascial trigger points may be clinically identified by the following common characteristics:

1. **A palpable taut band.** It is the opinion of Gerwin and Shannon (2000) that this is the most important aspect of their physical examination as it distinguishes the myofascial trigger point from other muscle pains such as Fibromyalgia.
2. **A localised spot of tenderness** or a nodule in the palpable taut band of muscle.
3. **Pain - restricted full stretch range of motion** of the involved muscle (Travell, Simons and Simons, 1999).
4. **Increased pain on passive or active stretch** of the involved muscle.
5. **Weakness** of the involved muscle (Borg – Stein and Stein, 1996).
6. Snapping palpation produces a **local twitch response** (Kuan et al. 2002).
7. **A jump sign** is usually elicited. A jump sign is a pain response where the patient may wince, cry out or move away from the painful stimulus (Travell, Simons and Simons, 1999).

8. **Referred pain on manual compression** of the myofascial trigger point (Kuan et al. 2002). An active myofascial trigger point will have spontaneous pain referral, whereas a latent myofascial trigger point is a sensitive spot that only causes pain in response to compression (Hou et al. 2002).

2.7 DIAGNOSTIC TESTING

Schneider (1995) outlines a set of recommended diagnostic criteria for MPS:

Major criteria:

- Regional pain complaint
- Pain pattern in the expected distribution of referred pain of a muscle
- Palpable taut band in accessible muscles
- Exquisite spot tenderness at one point or nodule within a taut band
- Some degree of restricted range of motion or slight muscle weakness

Minor criteria:

- Manual pressure on the TrP nodule reproduces the clinical pain complaint
- Snapping palpation or injection of the tender spot results in a local twitch response
- Pain is diminished or eliminated by muscular therapy e.g. therapeutic stretch, ischaemic compression or needle injection of the TrP

To diagnose MPS, all five major criteria should be present and at least one of the three minor criteria.

Travell, Simons and Simons, (1999), suggest that the minimal suggested criteria for identifying a TrP are a combination of the spot tenderness in a palpable band and patient recognition of the pain.

2.7.1 CONFIRMATORY DIAGNOSIS

The Myofascial Diagnostic Scale, developed by Chettiar (2001), is made up of four indicators. The first indicator consists of five grades of soft tissue tenderness. Each grade is scored as follows:

Grade 0 - no tenderness = 0

Grade 1 - tenderness to palpation without grimace or flinch = 1

Grade 2 - tenderness with grimace and or flinch to palpation = 2

Grade 3 - tenderness with withdrawal = 3

Grade 4 - withdrawal to non-noxious stimuli = 4

The second and third indicators represent the presence of a local twitch response and the taut band respectively. These indicators are given a value of 4 each. The fourth indicator is the presence of referred pain. Since this sign is considered by Travell, Simons and Simons, (1999), the strongest indicator of an active trigger point, it is given a value of 5. These signs are assessed and scored by the researcher. Total values of 9 or more are indicative of an active trigger point and only these patients were accepted into the study. The data was collected at the initial; the fifth and one week follow up visits, which allowed the researcher to establish intra-group and inter-group changes in terms of clinical signs.

2.8 NORMAL PHYSIOLOGY OF MUSCLE CONTRACTION

In order to grasp the nature of myofascial TrPs, it is necessary to understand the basic structure of skeletal muscle and the physiology behind normal muscle contraction.

Skeletal muscle is composed of fascicles, of which each consists of a bundle of approximately 100 muscle fibres (muscle cells). Each muscle cell encircles roughly 1000 – 2000 myofibrils in most skeletal muscles. Each myofibril consists of a chain of sarcomeres connected end - to - end. The sarcomere is the basic contractile unit of skeletal muscle. Sarcomeres are connected to each other by their Z lines (or bands) much like the links in a chain. Filaments consisting of actin and myosin molecules (which interact to produce the contractile force) are contained within the sarcomeres.

The heads of a myosin filament are a form of the enzyme, adenosine triphosphate (ATP) that contacts and interacts with the actin to produce a contractile force. These contacts between the actin and myosin filaments are known as cross – bridges. ATP provides the energy, while ionised calcium triggers the interaction between the filaments. The ATP releases a myosin head from the actin after one power “stroke” and immediately “recocks” it for another cycle. The ATP is then converted into adenosine diphosphate (ADP) and the presence of calcium immediately triggers another cycle. Many of these power “strokes” are needed to produce the random rowing motion of the myosin heads that are required to produce one smooth twitch contraction.

The force of contraction that any one sarcomere can exert on activation depends largely on its length. The force decreases dramatically as the sarcomere reaches maximum or minimum length.

The calcium required for contraction of the muscle is contained within the tubular network of the sarcoplasmic reticulum that surrounds each myofibril, and is released when a propagated action potential reaches it through "T" tubules. After release, the free calcium is rapidly pumped back into the sarcoplasmic reticulum, which terminates the contractile activity of the sarcomeres. In the absence of ATP, the myosin heads will remain firmly attached and no contraction will result. (Travell, Simons and Simons, 1999.)

2.9 PATHOPHYSIOLOGY OF MYOFASCIAL TrPs

A myofascial TrP is found in a taut band of skeletal muscle and is associated with a hypersensitive palpable nodule (Travell, Simons and Simons, 1999).

According to Travell, Simons and Simons, (1999) a TrP or a tender nodule is a cluster of numerous microscopic loci of intense abnormality that are scattered throughout the nodule. This abnormality appears to be a neuromuscular dysfunction at the motor end plate, and thus MPS is seen as a neuromuscular disease (Travell, Simons and Simons, 1999).

Dysfunctional endplates are defined as active loci, when in the vicinity of a TrP, and are motor structures. Trauma or prolonged mechanical stress,

examples of an initiating event, result in a dysfunctional endplate releasing an excessive amount of acetylcholine from the nerve terminal. This results in a sustained release of calcium from the sarcoplasmic reticulum, which causes maximal contracture of the muscle fibre and an increased metabolic demand for oxygen and ATP. This contraction also produces an area of local ischaemia, which results in a failure of the calcium pump to return calcium to the sarcoplasmic reticulum. Now that the contractile elements are continuously exposed to calcium, a vicious cycle of further contraction results. This hypothesis of TrP formation is known as the “energy crisis theory”. These areas of contraction found in the location of dysfunctional endplates (active loci) are visible histologically as contraction knots, which collectively constitute a TrP.

It has been further hypothesised that the “energy crisis” that results from the dysfunctional endplate activity can stimulate the production of vasoreactive substances that can sensitise local nociceptors. These sensory nociceptors are believed to be the sites from which pain, referred pain and local twitch responses are elicited. These sites are distributed throughout the entire muscle, but tend to congregate within the TrP region.

When a sensitive locus and an active locus lie within the immediate vicinity of each other, a myofascial TrP locus develops. This is the basic unit of a TrP. The mechanism of referred pain is unclear; convergence of somatic and visceral afferent inputs with pain projecting neurons in the spinal cord may explain this phenomenon (Travell, Simons and Simons, 1999).

2.10 TREATMENT OF MYOFASCIAL TrPs

The effective treatment of MPS requires more than just the application of a procedure to a TrP (Travell, Simons and Simons, 1999). Management of MPS must take into account the chronicity of the disease process, as well as any perpetuating, physiologic or psychological factors that may be involved. The purpose of the treatment is not only to reduce or eliminate the clinical pain complaint, but also to enable the patient to cope with their pain (Han and Harrison, 1997). Fischer (1999) added that the recurrence of pain must also be prevented and this can only be achieved by removal of the aetiological factors.

The severity of MPS can range from being a simple case involving a single muscle to a more complex case involving several muscles (myotatic unit). There is a critical need to match the complexity of the management protocol with the complexity of the individual patient and syndrome. Failure to address the entire syndrome may lead to its perpetuation and failure to resolve (Fricton, 1994).

There are a wide variety of techniques available for the treatment of MPS and the choice of treatment by the clinician is often case dependent and/or preference of the clinician. Treatment methods can be divided into invasive

and non-invasive methods. The decision to treat MPS with an invasive technique such as dry needling or TrP injection depends strongly on the training skill of the practitioner. All approaches should be equally available to the patient and used when indicated (Travell, Simons and Simons, 1999).

2.10.1 TECHNIQUES USED IN THE TREATMENT OF MYOFASCIAL PAIN SYNDROME

2.10.1.1 Dry needling and TrP injection

TrP injections, according to Han and Harrison (1997), are one of the more effective therapeutic approaches for the treatment of MPS and achieve the best results in chronic active TrPs where fibrotic scar formation is often present. It is often preferred to dry needling because of the analgesic effects that the local anaesthetic agents offer to the surrounding tissue (Han and Harrison, 1997).

It is proposed by Han and Harrison (1997) that the mechanisms by which both needling and local injection reduce TrP pain are:

1. The mechanical disruption of the muscle fibres and nerve endings.
2. The mechanical disruption of the muscle fibre, causing release of intracellular potassium, which depolarises the nerve fibres.
3. Interruption of the positive feedback mechanism that perpetuates pain.
4. Local dilution of nociceptive substances by the local anaesthetic or saline that is infiltrated.

5. Vasodilator effect of local anaesthetics, which increases the removal of metabolites.

Although both needling and injection have both been proven effective in the treatment of MPS, they cannot be used in all cases presenting to the clinician. Patients presenting with contraindications to TrP injection, including allergy to anaesthetic agents, bleeding disorders and those on anticoagulation therapy, require alternative forms of treatment for their pain (Han and Harrison, 1997). Similarly, the post needling soreness experienced after dry needling, as described by Hong (1994), may discourage patients from opting for this form of treatment. More serious complications associated with local steroid injection include tendon atrophy, depression of plasma cortisol levels and complications in patients with insulin-induced hypoglycaemia (Han and Harrison, 1997).

2.10.1.2 Electrotherapeutic Modalities

Various electrotherapeutic modalities have been used in the treatment of MPS. These include ultrasound therapy, interferential current (IFC), action potential therapy and transcutaneous electrical stimulation (TENS).

Ultrasound consists of sound waves with a frequency of more than 20 000Hz/s, and these are absorbed differently in tissue with low and high protein content (Gam et al. 1998). In randomised controlled trial done by Gam et al. (1998), they found that ultrasound gave no pain reduction and was ineffective in the treatment of MPS. Contradictory results were obtained by

Hong et al. (1993), who found ultrasound to be effective in increasing pain threshold in patients with active TrPs, where the sample used was 16.

A controlled study by Christie (1995) compared the relative effectiveness of dry needling and IFC on two groups of 15 patients with TrPs in the shoulder girdle. The aim of the study was to determine whether the use of IFC provided a non-invasive alternative to dry needling. He found no significant difference between the two groups, although both groups showed improvement in symptoms. Christie (1995) concluded that IFC could be used in the treatment of MPS. As a larger sample size may have yielded different results, further study should be conducted on this subject.

The TENS modality has proved successful in the treatment of MPS according to Hutchings (1998), though a relatively small sample size of 30 participants (15 per group) was used, thus weakening the study. In two independent studies by Han and Harrison (1997) and Graff-Radford et al. (1989), TENS showed no change in trigger point sensitivity even though there was a reduction in myofascial pain intensity. This questions the ability of the TENS modality in producing sufficient long-term effects in the condition of MPS.

2.10.1.3 Spray and Stretch

Spray and stretch, using a vapocoolant spray along with passive stretching of the muscle containing the TrP, has been described as an effective treatment for MPS by Travell, Simons and Simons (1999). The vapocoolant spray aids in blocking the pain and spasm reflexes and gradually allows the passive stretch of the muscle, harbouring the TrP, to its full length. It is hypothesized that the decrease in TrP pain is due to the elongation of the muscle to its full normal length (Travell, Simons and Simons, 1999).

2.10.1.4 Ischaemic compression and stretch

At present, a widely recognised form of manual therapy used in the treatment of MPS is ischaemic compression, first developed by Travell and now known as trigger point pressure release (Travell, Simons and Simons, 1999). It is described as a firm, direct pressure to the centre of the TrP, which mechanically breaks up the fibrous bands of the TrP and improves point tenderness. The application of the deep pressure produces local ischaemia, that when pressure is released, results in a reactive hyperaemia, thereby improving circulation to the area (Auleciems, 1995).

Ischaemic compression has been found to be more effective than other modalities in two independent studies by Garvey (1989) and Hong (1993). Garvey (1989) ($p=0.09$) compared injection of a local anaesthetic, injection of a local anaesthetic plus steroid, dry needling, and ischaemic pressure with

vapocoolant spray. He found that the ischaemic pressure plus vapocoolant spray was the most effective at relieving pain. Hong (1993) found ischaemic compression to be more effective than spray and stretch, moist heat packs and ultrasound ($p<0.05$).

Stretching of the affected muscles is believed by some authors to be an integral part of TP therapy. Lewit and Simons (1984) found the post-isometric relaxation technique to be effective in reducing TrP sensitivity and pain intensity. The technique involved stretching the muscle containing the TrP, followed by an isometric contraction against minimal resistance.

Jaeger and Reeves (1986), who reported the effectiveness of spray and stretch in decreasing pain intensity and increasing pressure pain threshold, suggested that it is the stretch that resulted in the decrease in TrP sensitivity, not the spray. Their study supports the idea that muscle lengthening is the process that provides pain relief (Hanten, 2000).

Although ischaemic compression and sustained stretch are both widely prescribed to patients for home use in order to aid in the treatment of myofascial pain syndrome, the literature provides no clear guidelines regarding this area of care.

However a study by Hanten (2000), did attempt to provide a structural guide to home based/self-help care. A device called a “Thera-cane” was used to perform a home programme of ischaemic compression followed by sustained stretch of the muscles of the neck and upper back. The Thera-cane is a

passive non-invasive device, which is used to apply pressure to active myofascial TrPs. The use of the "Thera-cane" proved to be more effective ($p < .05$) than the control of cervical range of motion exercises in the treatment of myofascial pain syndrome.

The study did however leave much room for methodological improvement. Larger sample sizes could have been used, and a number of other confounding variables could have been limited by changes to the structure and methodology of the trial. Shortcomings in the study include non-specific application of treatment interventions, naming of the specific muscles involved, duration of the condition in subjects used for the study and the absence of a reliable disability index.

A major limitation of the study according to Hanten (2000) is that it may be possible that either the ischaemic pressure or the sustained stretch produced the results independently.

Ischaemic compression and sustained stretching are both safe and effective procedures for self-treatment. The application of ischaemic compression can be performed using a standardised ischaemic compression device (Thera-cane) created specifically for this purpose, whilst stretching techniques are easily taught.

Using a home programme reduces physical therapy visits and actively involves the patient in his or her treatment, acting as the primary pain manager. Other advantages to using a home programme potentially include shorter treatment times, minimal patient-clinician contact and the convenience of self-treatment without having to leave home.

2.11 BRIEF OVERVIEW OF THE TRAPEZIUS MUSCLE

According to Travell, Simons and Simons (1999), the trapezius muscle is the muscle most often affected by myofascial TrPs. For the purpose of this study, only fibres of the upper trapezius muscle will be reviewed.

The upper, middle, and lower parts of the trapezius muscle have different fibre directions and often have different functions. For this reason, they are frequently identified as if they were three different muscles.

The upper fibres arise from the medial third of the superior nuchal line. In the midline, they arise from the ligamentum nuchae. The fibres converge laterally and forward and attach to the posterior border of the lateral third of the clavicle.

Innervation of the trapezius is provided by the spinal portion of the accessory nerve (cranial nerve XI), which supplies mainly motor fibres, and by the second to fourth cervical nerves, which supply mainly sensory nerves to the muscle.

Travell, Simons and Simons (1999), discusses two TrPs found in these upper fibres of the muscle, namely TrP 1 and TrP 2.

TrP 1 is located in the upper trapezius fibres by pincer palpation of the free margin of the muscle and is found approximately midway between the spinous processes and the acromion, in the anterior fibres.

Referred pain from this TrP is unilateral, along the posterior aspect of the neck to the mastoid process. When severe, this pain may extend to the side of the head and temple as well as the back of the orbit, and may include the angle of the jaw. It is a common cause of tension type neck pain and temporal headaches (Travell, Simons and Simons, 1999).

TrP 2 is located very close to TrP 1, but slightly posterior and inferior, just caudal to the free border of the upper trapezius. Palpation of this TrP is performed in a similar manner as for TrP 1, although larger patients may require flat palpation.

Referred pain from this TrP also lies slightly posterior to that of TrP 1, blending with its distribution behind the ear (Travell, Simons and Simons, 1999).

2.12 SUMMARY OF THE LITERATURE

The above literature review, which outlines the high prevalence and common aetiological factors of MPS, substantiates the need for ongoing research into the effective treatment and self-management of patients suffering with this common syndrome. Ischaemic compression and sustained stretching are both safe and effective procedures for self-treatment. Using a home programme reduces physical therapy visits and actively involves the patient in his or her treatment, acting as the primary pain manager. Other advantages to using a home programme potentially include shorter treatment times, minimal patient-clinician contact and the convenience of self-treatment without having to leave home.

CHAPTER THREE: METHODOLOGY

3.1 INTRODUCTION

This chapter outlines the methods and general procedure utilized in carrying out the research and the gathering of data. The questionnaires used in collecting the subjective data are discussed, along with their respective validity. The treatment of the data and the statistical analysis used is also discussed.

3.2 STUDY DESIGN AND PROTOCOL

3.2.1 STUDY DESIGN AND SAMPLE SIZE

The study was a prospective, randomised, comparative clinical trial involving 60 patients divided into 3 groups of 20 individuals each. Owing to the smaller sample sizes, non-parametric tests were used. Only patients presenting to the Durban Institute of Technology (D.I.T) Chiropractic Day Clinic were considered for the study. Advertisements for patients suffering with neck and upper back pain, and/or headaches, were posted around the D.I.T campus (Appendix A).

3.2.2 DIAGNOSTIC CRITERIA

Both latent and active myofascial trigger points cause stiffness, restricted range of motion and pain on manual compression. However only active myofascial TrPs cause spontaneous pain referral (Travell, Simons and Simons, 1999).

Only patients with one or more active TrPs in the upper trapezius musculature were accepted into the study. The TrPs in the upper trapezius fibres characteristically refer pain and tenderness along the posterolateral aspect of the neck, behind the ear and to the temple (Travell, Simons and Simons, 1999).

3.2.3 INCLUSION AND EXCLUSION CRITERIA

The inclusion criteria for the study were as follows:

1. Only patients between the ages of 18 – 55 years were accepted into the study. This age group was used to avoid the need for parental consent and to limit the variables associated with advancing age and concomitant age related disease. According to Travell, Simons and Simons, (1999) individuals in their mature[✓] years (up to 55 years) are most likely to suffer from the pain syndromes of active myofascial TrPs.
2. Both male and female volunteers of all race groups were able to participate in this study.

3. An active trigger point is one that shows the characteristics as outlined by (Travell, Simons and Simons, 1999), including:
- Taut band of muscle fibres palpated by snapping or rolling the muscle under the finger.
 - Tender nodule palpated within this taut band of muscle fibres.
 - Local twitch response of the taut band fibres to snapping palpation.
 - Pain referral to the reference zone specific to the muscle involved. (Travell, Simons and Simons, 1999).
4. Patients were only accepted into the study on exhibition of varying degrees of the above characteristics ranked in the Myofascial Diagnostic Scale, as explained later on in this chapter. (Appendix G).

The exclusion criteria for the study were as follows:

- A full case history, physical and regional examination was performed in order to expose those patients that might have exhibited any of the contra indications to the interventions performed in this study (Basmijian, 1985).
- Patients who exhibited signs of fibromyalgia were excluded from the study. Fibromyalgia is diagnosed by a history of wide spread pain for at least three months (pain on both sides of the body, above and below

the waist) in 11 of the 18 tender point sites on digital palpation (Schneider, 1995).

- Participants were not to receive any other form of treatment, for Myofascial Pain Syndrome (for the entire duration of the study), as this would have resulted in them being excluded from the study.
- If any major lifestyle changes (exercise) were made whilst involved with the study, the participant was asked to inform the researcher, following which the participant was excluded from the study.

3.3 PATIENT PROCEDURE AND INTERVENTION

On presentation to the clinic the study criteria and implications of the study for the patient was explained to each patient. The patient received an information sheet outlining the nature and requirements of the study (Appendix B). A full case history (Appendix D), physical (Appendix E) and regional examination (Appendix F) was performed followed by a screening of the Trapezius muscle for active TrP's.

Once accepted into the study, the patients were asked to give signed consent (Appendix C), before commencement of the treatments.

Participants were placed into one of three groups (A, B or C) according to availability of the Thera-canes. (Owing to budget constraints, only 6 Thera-canes were available for use throughout the study. So if all were in use, the following patient was placed in the stretching group.)

Group A patients received a home programme of ischaemic compression using a Thera-cane device. They were given verbal and written instructions (Appendix L) followed by a demonstration on how to perform ischaemic compression using a Thera-cane device. The patient was then given the chance to practise this procedure. Any questions or difficulties, with regards to the correct use of the Thera-cane, were dealt with at that point. Once the researcher was satisfied that the patient was able to use the Thera-cane correctly the procedure was continued. The patient was instructed to place the Thera-cane over his or her primary TrP, apply gradually increasing pressure to the TrP, and hold that pressure for about 35 seconds or until a release was felt (Hanten, 2000). The examiner explained that the release would feel like a “letting go” or a “melting” of the muscle with the TrP, accompanied by a decrease in localised pain. The patients were instructed to perform this procedure at home twice per day (once in the morning and again in the evening) for five consecutive days. They visited the Chiropractic Day Clinic on the first and fifth treatment day and again for a one-week follow up for subjective and objective data collection. Patients in all 3 groups were asked to keep a diary of their treatment sessions (Appendix M).

Group B were given verbal and written instructions (Appendix K) followed by a demonstration on how to perform the sustained stretching technique. The patient was then given the chance to practice this procedure. Any questions or difficulties with regards to the correct use of the stretching techniques were dealt with at this point. Once the researcher was satisfied that the patient was able to perform the stretching techniques correctly, the procedure was continued. The patient was instructed to sit near the edge of an armless chair with both feet planted firmly on the floor. They were then given the appropriate stretches relevant to the affected muscle (see Appendix J) and told to hold the stretch for 30 to 60 seconds. The researcher then observed and made sure that the procedure was performed correctly. These patients were instructed to perform this procedure at home twice per day (once in the morning and again at night) for five consecutive days. They visited the Chiropractic Clinic at the first and fifth treatment day and then again for a one-week follow up for subjective and objective data collection.

Group C were given verbal and written instructions followed by a demonstration on how to perform ischaemic pressure using the Thera-cane device followed by a demonstration on how to perform the sustained stretching techniques. The patient was then given the chance to practise both these procedures. Any questions or difficulties were dealt with at this point. The researcher then observed the procedure. These patients were instructed to perform this procedure at home twice per day (once in the morning and again at night) for five consecutive days. They visited the Chiropractic Clinic at the first and fifth treatment day and again for a one-week follow up for subjective and objective data collection.

3.4 THE DATA

Both primary and secondary data were incorporated into this study.

3.4.1 The Primary Data

The primary data included the following information for each patient:

Subjective data Numerical Pain Rating Scale (Appendix H)

 CMCC Neck Disability Index (Appendix I)

Objective data Algometric measurement (Appendix J)

 Myofascial Diagnostic Scale (Appendix G)

3.4.2 The Secondary Data

Secondary data was collected from related literature found in journal articles, textbooks and the Internet.

3.5 METHODS OF MEASUREMENT

The subjective and objective measurements were obtained from each patient prior to the first treatment at the initial consultation, and again at the fifth consultation and finally at a one-week follow-up.

3.5.1 Subjective Measurements

3.5.1.1 Numerical Pain Rating Scale (NRS-101)

The NRS-101 assesses the perceived level of pain intensity of the patient. The questionnaire consists of a numerical scale from 0 – 100, where 0 = no pain and 100 = pain at its worst. Jensen et al (1986) examined the usefulness of six different pain intensity measures in a group of 75 chronic pain patients and the NRS 101 proved to be the most practical. It is simple to administer and score in written or verbal form. The NRS-101 is not associated with incorrect responding more than any other scale and the difficulty is not associated with age. A mean percentage was obtained for each consultation by adding the two scores (for pain at its least and pain at its worst).

3.5.1.2 CMCC Neck Disability Index

The CMCC Neck Disability Index was also included to assess the degree to which the patients' neck pain affected their everyday life or activities of daily living. The patient had to answer 10 questions which could each score a maximum of 5 points and a minimum of 0 points. The total score was thus out of 50 and calculated as a percentage. Vernon and Mior (1991) found that the CMCC Neck Disability Index had a high level of reliability and internal consistency. They also found that it was unaffected by gender and it had an acceptable level of validity.

3.5.2 Objective Measurements

3.5.2.1 Pressure Threshold Algometry

Fischer (1987) refers to pressure threshold, as the minimum pressure required causing pain or discomfort. Fischer (1987) performed a study on the pressure threshold measurement for diagnosis and evaluation of treatment results of trigger points and he concluded that pressure algometry is an accurate method for diagnosis of trigger points and useful in their clinical management and assessment of treatment results. The reliability of the pressure algometer has been demonstrated in studies done by Reeves et al. (1986). The algometer used was the FDK20 force dial manufactured by Wagner Instruments: P O Box 1217, Greenwich, CT 06836. The pressure range of the algometer was 11 kilograms.

The algometer was used as follows:

- The dial on the gauge was set to zero.
- The 1cm² rubber disc was applied to the point of maximum tenderness by placing the gauge perpendicular to the surface.
- The pressure was gradually increased at a rate of 1kg/second, as recommended by Fischer (1987).
- The patient was told to say “now” at the point of which they first perceived pain.
- The pressure was stopped at this point by removing the gauge from the skin.
- The reading on the dial was recorded in kg / cm².

3.5.2.2 Myofascial Diagnostic Scale

The Myofascial Diagnostic Scale was designed and used to evaluate the clinical signs of Myofascial Pain Syndrome by Chettiar (2001). According to Travell, Simons and Simons, (1999) the signs of a trigger point are the following: referred pain in the zone of reference, local twitch response, palpable taut band, and focal tenderness.

The Myofascial Diagnostic Scale as outlined by Chettiar (2001) is made up of 4 indicators. The first indicator consisted of 5 grades of soft tissue tenderness:

- 0 = no tenderness (0 points).
- 1 = tenderness to palpation without grimace or flinch (1 point).
- 2 = tenderness to palpation with grimace or flinch (2 points).
- 3 = tenderness with withdrawal (3 points).
- 4 = withdrawal to non-noxious stimulus (4 points).

The second and third indicators represented the presence of the local twitch response and the taut band respectively. These were each given a value of 4. The fourth indicator is the presence of referred pain due to trigger point compression. This indicator was given the value 5 as it is deemed the strongest indicator of active trigger points. Any patient scoring a total of 9 or more points was considered to have an active myofascial trigger point and hence accepted into the study (Chettiar, 2001). Face validity for the Myofascial Diagnostic Scale has been completed, though for the purpose of this study it was only used as a standardising tool.

3.6 ETHICAL CONSIDERATION

- The rights and the welfare of the patients were protected.
- Informed consent was obtained (Appendix B).
- Patients were not coerced into participating in the study.
- Information was given to patients in an understandable language.
- Confidentiality was maintained.
- Participation was voluntary and did not involve financial benefits.
- Patients were free to withdraw from the study at any stage.

3.7 TREATMENT OF THE DATA

The subjective data was treated as follows:

- The researcher assessed the questionnaires for suitability. e.g. Selection of the appropriate criteria blocks.
- The scores obtained from the NRS-101 were expressed as mean percentages for each consultation.
- The scores obtained from the CMCC Neck Disability Index were expressed as mean percentages for each consultation.
- The data was then statistically analysed.

The objective data was treated as follows:

- The algometric readings were recorded in kg/cm squared.
- The scores obtained from the myofascial diagnostic scale were recorded as whole numbers, with the highest possible score being 17.
- The data was then statistically analysed.

3.8 STATISTICAL ANALYSIS

Statistical Analysis was conducted using the SPSS (version 11.5) software suite. This Statistical software programme is manufactured by SPSS Inc, 444N. Michigan Avenue, Chicago, Illinois, USA.

Various descriptive and inferential statistical techniques were used. The descriptive procedures used were tables, graphs and summary statistics including but not limited to means, proportions and percentages. Various hypothesis tests were used in the inferential procedures.

Throughout the statistical analysis, testing was performed for normality of the appropriate random variant and based on the results we applied non-parametric tests. All hypothesis tests set our type 1 error at 5% ($\alpha = 0.05$). If our p value as reported was less than 0.05 we declared a significant result

and our null hypothesis was rejected and alternatively if our p – values were greater than 0.05, we accepted our null hypothesis.

Owing to the smaller sample sizes (3 groups of 20), non – parametric testing was used, namely the Wilcoxon Signed Ranks test for the Intra – group analysis and the Kruskal – Wallis H – test for the Inter – group analysis. Data was transferred to a spreadsheet and statistical analysis was conducted.

3.9 FLOW DIAGRAM OF METHODOLOGY

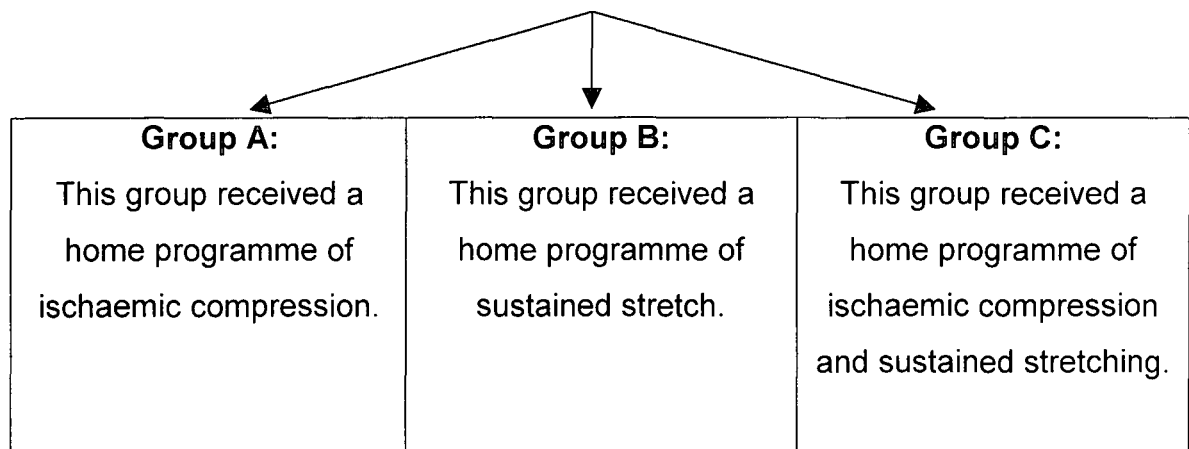
Advertisements were distributed two weeks prior to commencement of the study.



Patients were screened as they present to the Chiropractic day clinic.



Patients underwent the first consultation and were assessed to see whether they conformed to the inclusion and exclusion criteria. (9 weeks) Patients were divided into three groups of twenty as they entered the research.



All groups received five treatments over five consecutive days.



Subjective and objective measures were obtained prior to the first and fifth treatments and at the one - week follow up.



Data was analysed and interpreted using the SPSS package (approximately 1 week). The research was completed once the dissertation was written.

CHAPTER FOUR: RESULTS

4.1 INTRODUCTION

This chapter tabulates the results obtained from the statistical analysis of the primary data collected over the duration of the research programme. The measurement criteria included:

- Algometer readings (Alg)
- Myofascial Diagnostic Scale (MDS)
- Numerical Pain Rating Scale 101 (NRS 101)
- CMCC Neck Disability Index (CMCC)

4.2 CRITERIA FOR GOVERNING THE ADMISSIBILITY OF DATA

The data collected was only used from those patients who met the research criteria and who participated for the full duration of the research programme. Only objective data (Algometer readings, MDS scores) that were recorded by the researcher were utilized. Only subjective data (NRS and CMCC) that were completed by the patients under the supervision of the researcher were utilized.

4.3 TABLES OF DEMOGRAPHIC DATA

Table 1: Gender distribution

60 patients participated in the research programme, of which 41 were female and 19 were male. As the table below depicts groups A, B and C were similar in distribution.

Gender	Group A	Group B	Group C	Total % of patients
No. of males	8	7	4	31.67
No. of females	12	13	16	68.33

Table 2: Age distribution

The age range chosen for the study was 18 – 55 years old. The three groups were considered similar and comparable with regards to their ages, thus strengthening the statistical results

Age group	Group A	Group B	Group C	Total % of patients
18-24	4	4	5	21.7
25-30	2	4	2	13.3
31-35	3	-	3	10
36-40	1	1	1	5
41-45	2	2	1	8.3
46-50	4	2	5	18.3
51-55	4	7	3	23.3

Table 3: Race distribution

The evaluation of the race groups as represented in the table below show the majority of patients to be of Caucasian and Indian races respectively.

Race	Group A	Group B	Group C	Total % of patients
White	14	14	13	68.3
Black	1	-	2	5
Indian	3	6	5	23.3
Mixed race	2	-	-	3.3

Table 4: Patient occupations

The table below depicts the most common occupations recorded as seen in this study.

Occupation	Group A	Group B	Group C	Total % of patients
Business man/ woman	8	5	3	26.5
Estate agent	1	-	-	1.7
Student	4	5	6	25
Mechanic	1	-	-	1.7
Housewife	3	4	4	18.3
Lecturer	1	-	-	1.7
Driver	1	-	2	5
Builder	1	-	-	1.7
Retired	-	2	-	3.3
Civil engineer	-	1	-	1.7
Hairdresser	-	1	-	1.7
Secretary	-	1	1	3.3
Attorney	-	1	-	1.7
Nurse	-	-	1	1.7
Travel agent	-	-	2	3.3
Customs inspector	-	-	1	1.7

Table 5: Activity most commonly associated with aggravating the pain

The table below depicts the most common activities associated with MPS, as reported by the participants in this study.

Activity	Group A	Group B	Group C	Total % of patients
Working at a P.C/desk, incl. Studying	6	4	7	28.3
Emotional stress	5	7	4	26.7
Sport	1	2	1	6.7
House work	1	2	1	6.7
Bar work	1	-	-	1.7
Whiplash injury	3	1	2	10
Driving	2	1	2	8.2
Carrying heavy objects/ children	1	1	2	6.7
Direct trauma	-	2	1	5

4.4 TABLES OF STATISTICAL RESULTS

N = Sample size

NEG R = Negative Ranks

POS R = Positive ranks

Tx = Treatment

Std. Dev = Standard Deviation

4.4.1 Tables of the statistical results of Intra – group comparison with regards to objective data.

Table 6: Intra – group comparison using Wilcoxon Signed Ranks Test to analyse results obtained from Algometer readings at treatments 1, 2 and 3.

Descriptive Statistics

Group		Mean	Std. Dev
Grp A	ALG 1	2.795	.575
	ALG 2	3.325	.931
	ALG 3	3.780	.947
Grp B	ALG 1	2.970	.741
	ALG 2	3.360	.851
	ALG 3	3.475	.996
Grp C	ALG 1	3.005	.963
	ALG 2	3.450	1.068
	ALG 3	3.655	1.294

	Group A			Group B			Group C		
	Tx 1 - 2	Tx 2 - 3	Tx 1- 3	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3
N	20	20	20	20	20	20	20	20	20
Neg R	4	6	1	4	7	5	5	6	4
Pos R	16	13	17	16	11	15	14	9	16
Ties	0	1	2	0	2	0	1	5	0
P - value	0.006	0.034	0.00	0.007	0.555	0.009	0.008	0.266	0.003

Neg R: Algometer readings showing deterioration of patients over the previous treatments.

Pos R: Algometer readings showing improvement of patients over the previous treatments.

Ties: Algometer readings showing neither improvement nor deterioration over the previous treatments.

For Group A, the null hypothesis was rejected for the algometer readings, indicating that there was a statistically significant improvement between treatments, at $\alpha = 0.05$ level of significance.

For Group B, the null hypothesis was also rejected for all algometer readings, except between treatments 2 and 3 where $p = 0.555$, indicating that there was no statistically significant improvement between treatments, at $\alpha = 0.05$ level of significance, during this period.

For Group C, the null hypothesis was also rejected for all algometer readings, except between treatments 2 and 3 where $p = 0.266$, indicating that there was no statistically significant improvement between treatments, at $\alpha = 0.05$ level of significance, during this period.

Table 7: Intra – group comparison using Wilcoxon Signed Ranks Test to analyse results obtained from the Myofascial Diagnostic Scale readings at treatments 1, 2 and 3.

Descriptive Statistics

Group		Mean	Std. Dev
Grp A	MDS 1	12.95	2.31
	MDS 2	8.90	3.14
	MDS 3	6.95	3.27
Grp B	MDS 1	12.65	1.69
	MDS 2	8.15	2.35
	MDS 3	6.65	2.13
Grp C	MDS 1	12.65	2.23
	MDS 2	8.20	2.82
	MDS 3	6.30	1.92

	Group A			Group B			Group C		
	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3
N	20	20	20	20	20	20	20	20	20
Neg R	17	12	17	17	12	20	18	9	20
Pos R	2	2	0	0	2	0	0	2	0
Ties	1	6	3	3	6	0	2	9	0
P - value	0.000	0.034	0.000	0.000	0.012	0.000	0.000	0.020	0.000

Neg R: MDS readings showing improvement of patients over the previous treatments.

Pos R: MDS readings showing deterioration of patients over the previous treatments.

Ties: MDS readings showing neither improvement nor deterioration over the previous treatments.

For Group A, the null hypothesis was rejected for the Myofascial Diagnostic Scale readings, indicating that there was a statistically significant improvement between all treatments, at $\alpha = 0.05$ level of significance.

For Group B, the null hypothesis was rejected for the Myofascial Diagnostic Scale readings, indicating that there was a statistically significant improvement between all treatments, at $\alpha = 0.05$ level of significance.

For Group C, the null hypothesis was rejected for the Myofascial Diagnostic Scale readings, indicating that there was a statistically significant improvement between all treatments, at $\alpha = 0.05$ level of significance.

4.4.2 Tables of the statistical results of Intra – group comparison with regards to subjective data.

Table 8: Intra – group comparison using Wilcoxon Signed Ranks Test to analyse results obtained from the NRS 101 readings at treatments 1, 2 and 3.

Descriptive Statistics

Group		Mean	Std. Dev
Grp A	NRS 1	47.375	8.754
	NRS 2	28.750	9.372
	NRS 3	24.750	10.849
Grp B	NRS 1	49.750	12.245
	NRS 2	35.250	11.382
	NRS 3	23.750	7.339
Grp C	NRS 1	49.500	10.532
	NRS 2	35.250	10.289
	NRS 3	21.250	12.760

	Group A			Group B			Group C		
	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3	Tx 2 - 1	Tx 2 - 3	Tx 3 - 1	Tx 2 - 1	Tx 2 - 3	Tx 1 - 3
N	20	20	20	20	20	20	20	20	20
Neg R	19	14	19	17	18	20	17	14	17
Pos R	1	4	0	1	1	0	1	2	1
Ties	0	2	1	2	1	0	2	4	2
P - value	0.000	0.063	0.000	0.001	0.000	0.000	0.000	0.001	0.000

Neg R: NRS readings showing improvement of patients over the previous treatments.

Pos R: NRS readings showing deterioration of patients over the previous treatments.

Ties: NRS readings showing neither improvement nor deterioration over the previous treatments.

For Group A, the null hypothesis was also rejected for all Numerical Pain Rating Scale readings, except between treatments 2 and 3 where $p = 0.063$, indicating that there was no statistically significant improvement between treatments, at $\alpha = 0.05$ level of significance, during this period.

For Group B, the null hypothesis was rejected for the Numerical Pain Rating Scale readings, indicating that there was a statistically significant improvement between all treatments, at $\alpha = 0.05$ level of significance.

For Group C, the null hypothesis was rejected for the Numerical Pain Rating Scale readings, indicating that there was a statistically significant improvement between all treatments, at $\alpha = 0.05$ level of significance.

Table 9: Intra – group comparison using Wilcoxon Signed Ranks Test to analyse results obtained from the CMCC neck disability index readings at treatment 1, 2 and 3.

Descriptive Statistics

Group		Mean	Std. Dev
Grp A	CMCC 1	22.00	8.18
	CMCC 2	12.90	7.52
	CMCC 3	8.60	5.55
Grp B	CMCC 1	25.70	10.59
	CMCC 2	16.30	7.41
	CMCC 3	12.10	5.60
Grp C	CMCC 1	23.10	6.91
	CMCC 2	15.00	7.41
	CMCC 3	9.00	5.68

	Group A			Group B			Group C		
	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3	Tx 1 - 2	Tx 2 - 3	Tx 1 - 3
N	20	20	20	20	20	20	20	20	20
Neg R	19	17	20	19	15	20	19	16	20
Pos R	1	1	0	1	2	0	0	1	0
Ties	0	2	0	0	3	0	1	3	0
P value	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.000

Neg R: CMCC neck disability index readings showing improvement of patients over the previous treatments.

Pos R: CMCC neck disability index readings showing deterioration of patients over the previous treatments.

Ties: CMCC neck disability index readings showing neither improvement nor deterioration over the previous treatments.

For Group A, the null hypothesis was rejected for the CMCC Neck Disability Index readings, indicating that there was a statistically significant improvement between all treatments, at $\alpha = 0.05$ level of significance.

For Group B, the null hypothesis was rejected for the CMCC Neck Disability Index readings, indicating that there was a statistically significant improvement between treatments, at $\alpha = 0.05$ level of significance.

For Group C, the null hypothesis was rejected for the CMCC Neck Disability Index readings, indicating that there was a statistically significant improvement between treatments, at $\alpha = 0.05$ level of significance.

4.4.3 Tables of the statistical results of Inter – group comparison with regards to objective data.

Table 10: Inter – group comparison using Kruskal - Wallis H-Test to analyse results obtained from the algometer readings at treatments 1, 2 and 3.

Algometer Readings	P – Value
Treatment 1	0.811
Treatment 2	0.971
Treatment 3	0.509

Conclusions at treatment 1

At treatment one, $p = 0.811$. Therefore the null hypothesis was accepted. This indicates that there was statistically no difference between the groups at treatment 1, and therefore no bias in group allocation.

Conclusions at treatment 2

At treatment two, $p = 0.971$. Therefore the null hypothesis was accepted. This indicates that all three groups improved similarly.

Conclusions at Treatment 3

At treatment three, $p = 0.509$. Therefore the null hypothesis was accepted. This indicates that all three groups improved similarly.

Table 11: Inter – group comparison using Kruskal - Wallis H-Test to analyse results obtained from the Myofascial Diagnostic Scale readings at treatments 1, 2 and 3.

Myofascial Diagnostic Scale	P - Value
MFDS 1	0.817
MFDS 2	0.521
MFDS 3	0.679

Conclusions at consultation 1

At consultation one, $p = 0.817$. Therefore the null hypothesis was accepted. This indicates that there was statistically no difference between the groups at treatment 1 and therefore no bias in group allocation.

Conclusions at consultation 2

At consultation two, $p = 0.521$. Therefore the null hypothesis was accepted. This indicates that all three groups improved similarly.

Conclusions at consultation 3

At consultation three, $p = 0.679$. Therefore the null hypothesis was accepted. This indicates that all three groups improved similarly.

4.4.4 Tables of the statistical results of Inter – group comparison with regards to subjective data.

Table 12: Inter – group comparison using Kruskal - Wallis H-Test to analyse results obtained from the Numerical Pain Rating Scale readings at treatments 1, 2 and 3.

Numerical Rating Scale	P - Value
NRS 1	0.782
NRS 2	0.111
NRS 3	0.498

Conclusions at treatment 1

At treatment one, $p = 0.782$. Therefore the null hypothesis was accepted. This indicates that there was statistically no difference between the groups at treatment 1, and therefore no bias in group allocation.

Conclusions at treatment 2

At treatment two, $p = 0.111$. Therefore the null hypothesis was accepted. This indicates that all three groups improved similarly.

Conclusions at treatment 3

At treatment three, $p = 0.498$. Therefore the null hypothesis was accepted. This indicates that all three groups improved similarly.

Table 13: Inter – group comparison using Kruskal - Wallis H-Test to analyse results obtained from the CMCC Neck Disability Index readings at treatments 1, 2 and 3.

CMCC Neck Disability Index	P - Value
CMCC 1	0.505
CMCC 2	0.148
CMCC 3	0.100

Conclusions at treatment 1

At treatment one, $p = 0.505$. Therefore the null hypothesis was accepted.

This indicates that there was statistically no difference between the groups at treatment 1, and therefore no bias in group allocation.

Conclusions at treatment 2

At treatment two, $p = 0.148$. Therefore the null hypothesis was accepted.

This indicates that all three groups improved similarly.

Conclusions at treatment 3

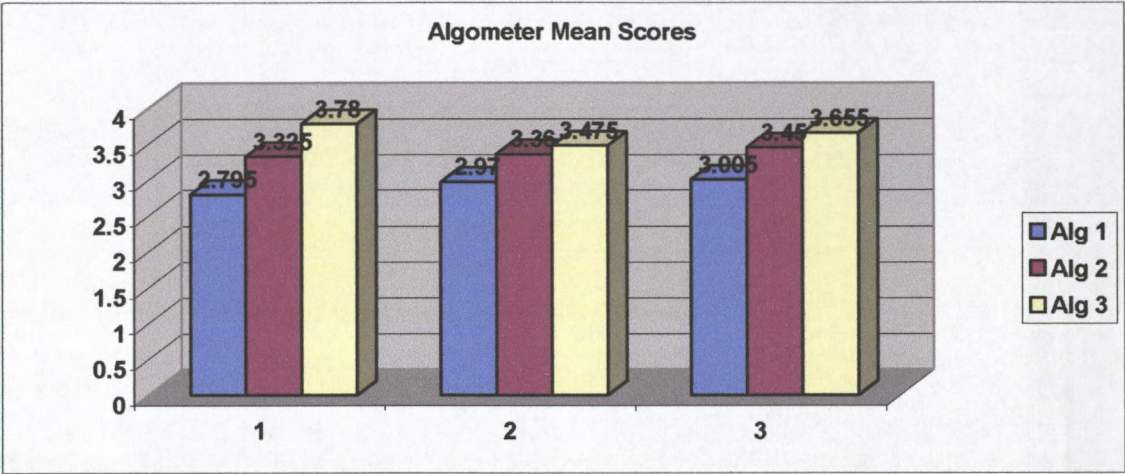
At treatment three, $p = 0.100$. Therefore the null hypothesis was accepted.

This indicates that all three groups improved similarly.

4.5 GRAPHS ILLUSTRATING THE STATISTICAL RESULTS

Graph 1: Algometer Mean Scores

The graph below shows the gradual increase in algometric measurements between the groups at consultations one, two and three.



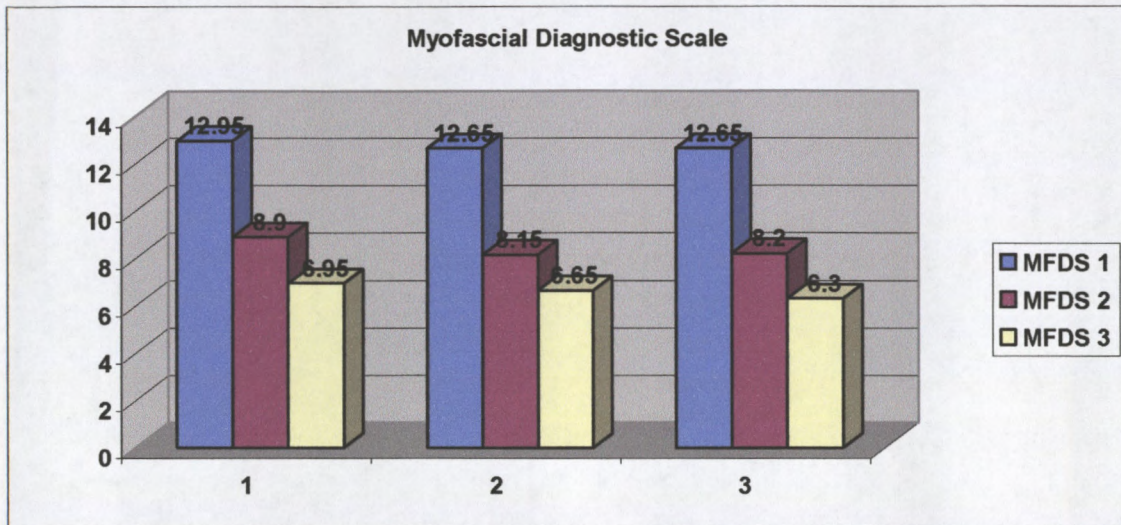
Alg 1 – “blue” = consultation 1

Alg 2 – “maroon” = consultation 2

Alg 3 – “yellow” = consultation 3

Graph 2: Myofascial Diagnostic Scale

The graph below depicts the steady decrease in Myofascial Diagnostic Scale readings between the groups at consultations one, two and three.



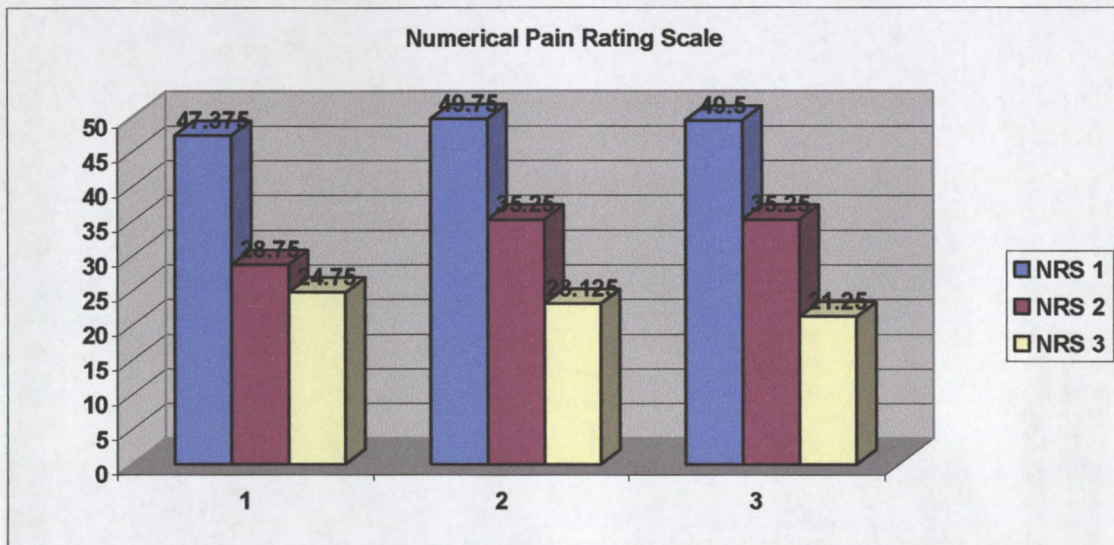
MFDS 1 – “blue” = consultation 1

MFDS 2 – “maroon” = consultation 2

MFDS 3 – “yellow” = consultation 3

Graph 3: Numerical Pain Rating Scale

The graph below depicts the steady decrease in Numerical Pain Rating Scale readings between the groups at consultations one, two and three.



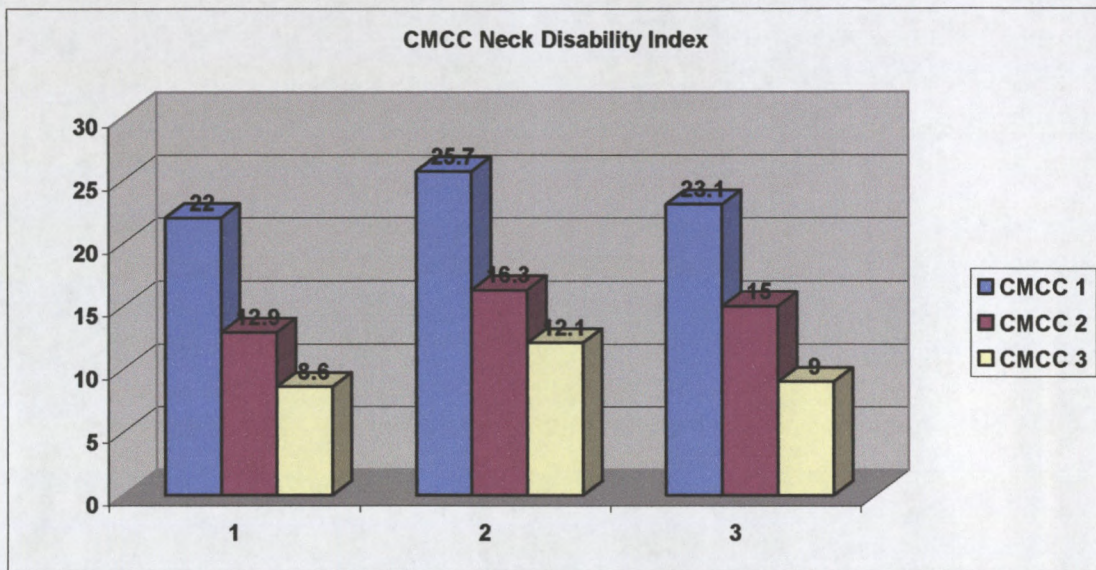
NRS 1 – “blue” = consultation 1

NRS 2 – “maroon” = consultation 2

NRS 3 – “yellow” = consultation 3

Graph 4: CMCC Neck Disability Index

The graph below shows the steady decrease in CMCC Neck Disability Index readings between the groups at consultations one, two and three.



CMCC 1 – “blue” = consultation 1

CMCC 2 – “maroon” = consultation 2

CMCC 3 – “yellow” = consultation 3

CHAPTER FIVE: DISCUSSION OF THE RESULTS

5.1 INTRODUCTION

This chapter provides a discussion of the demographic data, the results of the statistical analysis of the objective and subjective data and the associated findings. Problems encountered with the research study and study design are also discussed. Results discussed are divided into intra- and inter- group comparisons and these are evaluated in terms of objective and subjective findings.

Evaluation of the intra – group results between the first and second consultations (first measurement interval) gives an indication of the initial effectiveness of the treatment regime. Evaluation of the results between the second and third consultation gives an indication of the progression of the treatment regime, whilst evaluation of the results between consultations one and three, (overall measurement interval) will give an indication of the overall effectiveness of the treatment regimen.

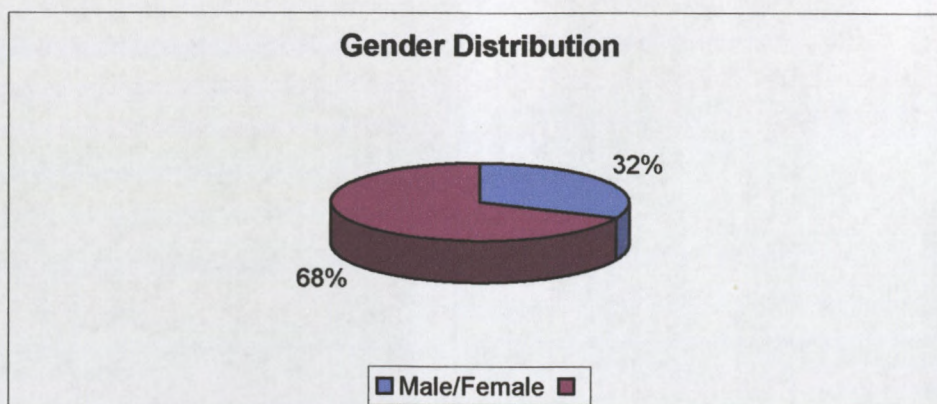
Evaluation of the inter – group results at the first consultation reveals any variance in the objective and subjective findings between the three groups presenting at the start of the study. Similar evaluation at consultations two and three reveal any difference in the overall improvement as well as the rate of improvement between the three groups.

5.2 DISCUSSION OF THE DEMOGRAPHIC DATA

72 candidates applied to participate in the study, of which 60 were accepted. The remaining 12 candidates were excluded from the study for the following reasons: 1 was severely hypertensive, 5 did not fall into the specified age category and 6 reported that they would not be able to attend all three consultations. In addition, 3 patients were dropped from the study due to non – compliance and 3 extra patients were recruited to replace them. Each group was randomly allocated 20 patients, according to availability of the Thera – canes.

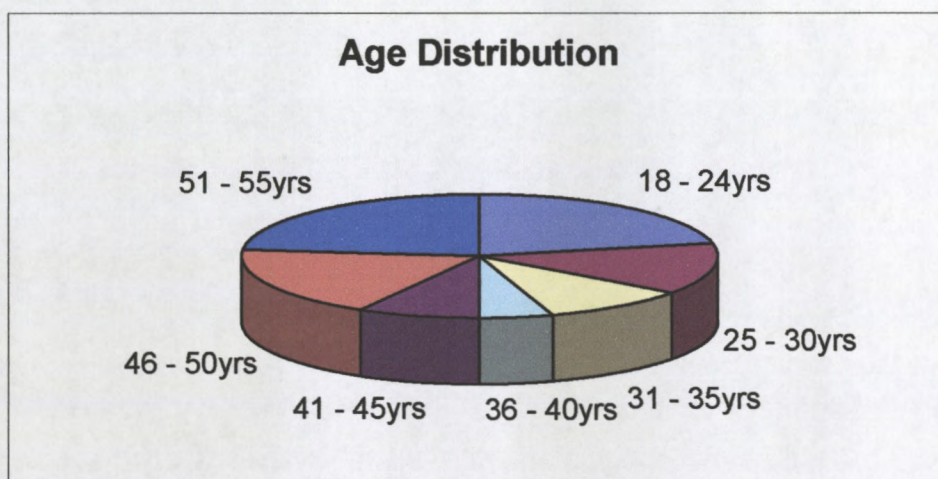
Of the 60 patients that participated in the research programme, 41 were female and 19 were male (Table 1). The gender distribution within groups A, B and C were similar and from the above statement it can be seen that there were half as many males as there were females. This correlates with the statements made by Han and Harrison (1997) and Travell, Simons and Simons (1999), that Myofascial Pain Syndrome is more common in females than in males.

Graph 5



The age range chosen for the study was 18 – 55 years. Group A had a mean range of 39.3 years, group B had a mean range of 39.5 years and group C had a mean range of 36.6 years. The three groups were considered similar and comparable with regards to their ages and this strengthens the statistical results. The mean range for a similar study done by Hanten (2000) was 30.6 years. This is consistent with that found in this study. The highest prevalence was seen between 46 – 55 years of age, which is in keeping with Travell, Simons and Simons's (1999) statement that individuals in their mature years, between 30 and 50 years, are most likely to suffer from this condition.

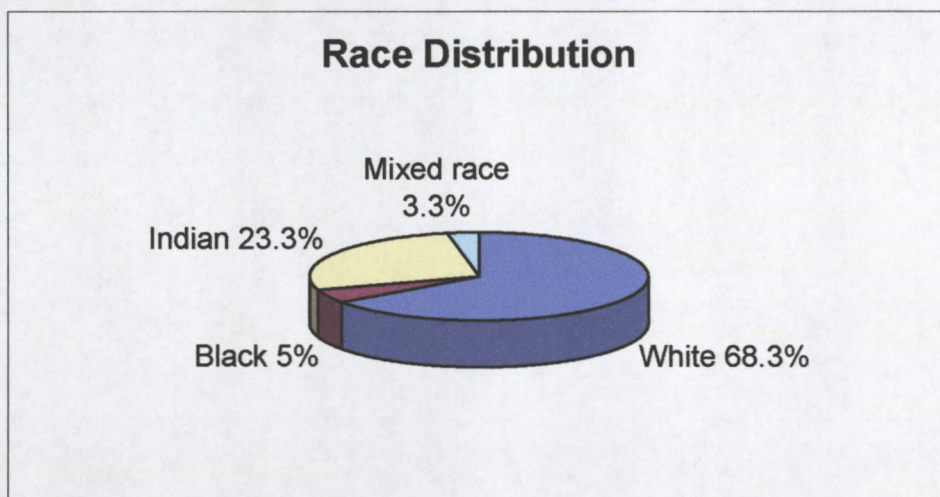
Graph 6



Evaluation of the race groups represented by this study show the majority of patients to be of Caucasian (68.3%) and Indian (23.3%) races respectively (Table 3). Black patients made up 5% of the sample, whilst only 3.3% were of mixed race. This does not give a true representation of the race distribution of the general South African population. It is the author's opinion that the race

group distribution resulted in this way owing to the fact that advertisements were posted in areas most frequented by Caucasian and Indian races. Had more black participants been included in the study, there may well have been a change in the results indicating a higher prevalence in the working class sector due to manual labour, rather than a high prevalence in clerical induced TrPs (working behind a desk or computer), as suggested in the findings below.

Graph 7



Of those patients that were accepted into the study, 26.7% were businessmen/women, 25% were students and 18,3% were housewives. These were the most common occupations recorded (Table 4) and they correlate with the high percentage (28,3%) of patients who reported that the activity most commonly associated with aggravating their condition was sitting at a desk or in front of a computer (Table 5). Han and Harrison (1997) found that poor posture associated with prolonged sitting at a desk, might explain the high prevalence of the condition with these patients

5.3 DISCUSSION OF THE OBJECTIVE RESULTS

5.3.1 Algometer readings

Intra – group comparison

Evaluation of the results from Wilcoxon Signed Ranks Test on algometric measurements taken at the first, second and third consultations revealed a statistically significant improvement between consultations 1 & 2 and 1 & 3 for all three treatment groups (A, B and C), and also between consultations 2 & 3 for group A only.

Groups B and C showed no significant improvement between consultations 2 & 3 for the algometric measurements. This failure to significantly improve could well be due to the fact that no treatment was performed during this period, although the same would then be expected for group A. In another similar study by Webb (2003), also using the Thera – cane as a home treatment device, it was found that even though both treatment groups improved clinically, there was no statistical improvement with regards to algometric measurements throughout the course of the treatment period. It was of Webb's (2003) opinion that the lack of significant improvement was due to the post treatment soreness after performing self – ischaemic compression for five consecutive days. This conclusion should be questioned however, as in the author's study, the treatment for group B involved no ischaemic compression, and was in fact a stretching group, and therefore unlikely to be responsible for the post – treatment soreness.

Both groups B and C performed sustained stretch as part of their home treatment programme. This was the common denominator between the two treatment groups, although group C also used the Thera – cane device in conjunction with the stretches. Whether or not the sustained stretching caused a decrease in the pressure threshold readings, group A was the only group to produce favourable results between consultations 2 and 3. This could indicate that long term results of stretching (after a week), whether performed alone or in conjunction with self – ischaemic compression, are not as effective as the Thera – cane on its own. It was also the author's opinion that the groups that were allocated sustained stretching (on its own or in combination with the Thera – cane) were accustomed to this form of treatment intervention and were less enthusiastic about their prescribed treatments than the participants who received a Thera – cane. This may have contributed to the final outcome, as they may have been less compliant.

These findings do demonstrate however, that all three groups showed an overall increase in pressure threshold levels over the length of the research programme.

Inter – group comparison

Statistical comparison of groups A, B and C using the Kruskal - Wallis H-Test at the initial consultation revealed no significant difference in the algometric measurements between groups, which shows that there was no bias in group allocation (Table 10).

Similar comparison made at consultations 2 and 3 also revealed p – values greater than 0.05. Therefore the null hypothesis was accepted, indicating no significant difference between all readings across the three groups throughout the course of the research programme. This shows that all three groups displayed similar improvement at consultations 2 & 3. This suggests that sustained stretching is as effective as the Thera – cane when used for the same length of time (in this case 5 consecutive days.) Perhaps longer treatment time would alter these results. This is in contradiction with Webb's (2003) findings, where no statistical improvement was found, with regards to algometric measurements, throughout the course of the treatment period.

5.3.2 Myofascial Diagnostic Scale

Intra – group comparison

Evaluation of the statistical results of the Wilcoxon Signed Ranks Test for all three groups revealed a statistically significant improvement between measurements 1 & 2, 2 & 3 and 1 & 3 with regards to the Myofascial Diagnostic Scale (Table 7).

These findings indicate that all three treatment groups showed a reduction in the clinical signs outlined in the Myofascial Diagnostic Scale, over the research programme. This suggests that there is no difference in the treatment outcome between the set of home stretching exercises and the use of self – ischaemic compression as a home therapy tool, with regards to the Myofascial Diagnostic Scale. However, these results may also give an

indication that the Myofascial Diagnostic Scale is somewhat subjective, and that patients responded favorably simply because they received treatment, regardless of the nature of the given treatment (self – ischaemic compression or stretching). In the author's opinion, the validity of the Myofascial Diagnostic Scale as a measurement tool needs to be confirmed.

Inter – group comparison

Comparison between the three treatment groups using Kruskal - Wallis H-Test at the initial consultation, revealed no significant difference between groups, which indicates that there was no bias in group allocation (Table 7).

At consultation two and three, the same statistical test for Myofascial Diagnostic Scale data also revealed no statistically significant difference between any of the three treatment groups. This shows that no one treatment was significantly more effective than the other.

Perhaps a method to improve the accuracy of this test might be to include an independent third person in order to obtain two readings, from which a mean score can be used for a more accurate reading. This might help to overcome the effect of bias from the researcher's point of view and increase the tests objectivity.

5.4 DISCUSSION OF THE SUBJECTIVE RESULTS

5.4.1 Numerical Pain Rating Scale 101

Intra – group comparison

Evaluation of the results of intra – group comparison using the Wilcoxon Sign Ranks Test for the NRS 101 scores taken at the first, second and third consultations, revealed a statistically significant improvement throughout all groups, except between consultations 2 & 3 in group A. However, this result could be attributed to group A's vast improvement from consultations 1 to 2, and this may have subjectively affected their perception of the decrease in their pain at the final consultation (Table 8).

This finding suggests that ischaemic compression on its own proves its effectiveness in a shorter span of time in comparison to groups B and C. However, one would therefore assume that group C would improve at the same rate. The reason they did not, in the author's opinion, was that many of the patients felt inundated with the amount of "work" (double that of the other groups, although this was unknown to them) they had to perform because of personal time constraints.

These findings demonstrate however, that all three groups showed a significant reduction in pain intensity over the period of the research programme.

Inter – group comparison

Comparison between the three treatment groups using Kruskal - Wallis H-Test at consultation one, revealed no significant difference between groups, which indicates that there was no bias in group allocation (Table 8).

At consultation two and three, the same statistical test for NRS 101 data also revealed no statistically significant difference between any of the three treatment groups. This shows again that no one treatment was significantly more effective than the other.

5.4.2 CMCC Neck Disability Index

Intra – group comparison

Evaluation of the statistical results of the Wilcoxon Signed Ranks Test for all three groups revealed a statistically significant improvement between measurements 1 & 2, 2 & 3 and 1 & 3 with regards to the CMCC Neck Disability Index (Table 9).

These findings indicate that all three treatment groups showed a reduction in the disabling effects of Myofascial Pain Syndrome, with regards to neck pain and disability, over the time period of the research programme. This suggests that there was no difference in the treatment outcome between the set of home stretching exercises and the use of self – ischaemic compression as a home therapy tool, with regards to the patients' perception of their disability.

Inter – group comparison

Comparison between the three treatment groups using Kruskal - Wallis H-Test at initial consultation, revealed no significant difference between groups, indicating that there was no bias in group allocation (Table 9).

At consultation two and three, the same statistical test for CMCC Neck Disability Index data also revealed no statistically significant difference between any of the three treatment groups. This shows that all three groups improved similarly at consultations 2 & 3.

5.5 PROBLEMS ENCOUNTERED WITH THE DATA

5.5.1 Objective Data

The algometer was found by the researcher to be fairly user friendly and reliable. However, one problem that was found to have influence on the readings was that the apparatus sensitivity, which is operator dependant, was strongly influenced by the force used, and the time taken by the examiner when applying pressure to the TrP. It was felt that some patients responded too late after the point where they first perceived the pain to have started, as they did not understand the instruction clearly whilst some patients on the other hand, responded to a lower pressure in order to prevent themselves from feeling any further pain. It was also difficult to locate the same TrP area

at each consultation, as the TrPs seemed to “move” slightly between each visit. Perhaps in future a gentian violet marker could be used to mark the initial TrP area. This would decrease the chance of missing the initial TrP, and increase the validity of the algometer readings in the final result.

With regards to the Myofascial Diagnostic Scale, the researcher felt that it may have been subjective. This finding correlates with similar studies done by Walker (2002) and Webb (2003), where they found that there was no way of determining whether the degree of pressure used to elicit tenderness over the TrP area was the same for each patient, and this could have led to researcher bias in favour of a particular treatment group outcome.

The validity of this statement could be tested in an independent study of inter – examiner reliability.

5.5.2 Subjective Data

The NRS 101 questionnaire and the CMCC Neck Disability Index were easy to explain and in the opinion of the researcher, patients were quick to grasp the concept and were efficient in filling in the forms.

5.6 COMPARISON WITH OTHER RESEARCH

In Hantens' (2000) study, 40 patients between the ages of 23 and 58 years with one or more TrP's in their neck and upper back were randomly divided into two groups. Group 1 received a 5 - day home programme of ischaemic

compression (using a Thera – cane) followed by sustained stretch while group 2 received a 5 - day control treatment of active range of motion of the cervical spine. Measurements were obtained before the patients received the home programme instructions and on the third day after they discontinued treatment. TrP sensitivity was measured using a pressure algometer as pressure pain threshold (PPT). Average pain intensity for a 24 - hour period was scored on a visual analogue scale (VAS), and subjects also reported the percentage of time in pain over a 24 - hour period.

Hanten (2000) concluded that a home programme, consisting of ischaemic compression and sustained stretch, was more effective in reducing TrP sensitivity and pain intensity than the control treatment of active range of motion, in individuals with neck and upper back pain ($p < 0.005$). A limitation of the study was that it might have been possible that either the ischaemic compression or sustained stretch produced the results independently, hence the motivation behind the present authors study. From the results obtained by the current author, it can be concluded that it was possible that the ischaemic compression or sustained stretch produced the results autonomously. It was also recommended by Hanten (2000) that functional ability of disability status be measured. The CMCC Neck Disability Index used in this study proved that all three treatment groups showed a reduction in the disabling effects of MPS.

In a randomised clinical trial involving 40 patients, Webb (2003) compared a home programme of ischaemic compression (experiment group) to a clinic programme of ischaemic compression (control group), using a Thera – cane

for myofascial trigger points in the levator scapulae muscle ($p = 0.05$). Each patient received 5 treatments over 5 consecutive days and then reported to the clinic for a one-week follow-up where measurements were taken but no treatment given.

Evaluation of the statistical results showed that both groups responded favourably in terms of subjective findings and objective Myofascial Diagnostic Scale scores. Both groups experienced an improvement in pressure threshold as indicated by the objective algometer reading, however this improvement was not statistically significant. The control group also showed a statistically significant reduction in perceived pain intensity in terms of subjective NRS 101 scores when compared to the treatment group. It was concluded that a home programme of ischaemic compression using a Thera-cane device was an effective form of treatment for patients suffering with active TrPs of Myofascial Pain Syndrome. As can be seen, the current study used the same length of treatment time (5 consecutive days) and Thera – cane device as Webb (2003) did. Similarities can be found between the two studies with regards to the statistical findings.

Owing to the fact that very little research directly related to home treatment protocols (for Myofascial Pain Syndrome) really exists, it is difficult to make precise and significant comparisons with other studies as vastly different factors are being compared.

CHAPTER SIX: CONCLUSION & RECOMMENDATIONS

6.1 CONCLUSION

This study consisted of 60 patients, divided into three groups of 20 each, all of whom were diagnosed with active TrPs of the upper trapezius musculature.

After undergoing a full case history, general physical examination and regional examination, the patients were randomly allocated to one of three treatment groups (A, B or C), according to availability of the Thera – canes.

Group A patients received a home programme of ischaemic compression using a Thera-cane device whilst group B were given a set of sustained stretching exercises. Group C was a combination group and was given a home programme of Ischaemic pressure using the Thera-cane, along with a set of sustained stretching exercised. Each patient performed 5 consecutive days of home treatment and data was collected at the initial consultation, after the 5 treatment days, and later at a one week follow – up consultation.

The hypothesis that a home programme of ischaemic compression would be an effective form of treatment for patients suffering from Myofascial Pain Syndrome (first hypothesis) was supported by the study. The second hypothesis, that a home programme of sustained stretch would be effective for patients suffering from the same syndrome, was also supported by the

study. However, the hypothesis that a combined home programme of ischaemic compression and sustained stretch would have efficacy beyond that of either intervention on their own (third hypothesis) was not supported by the study.

The results of the study suggest that both ischaemic compression and sustained stretch can be used with equal benefit for patients suffering from MPS. It can also be said that a combination of the two treatment interventions is no better than either intervention on their own. Although the patients' perception of their pain, comfort and disability was not significantly different between the three groups, significant changes were seen in all patients with regards to TrP tenderness, pain intensity and functional ability.

The long – term efficacy of ischaemic compression and sustained stretch in the treatment of MPS was unfortunately not considered in this study. This may be achieved in future studies by including a follow – up consultation after a specific and pre – determined time period has elapsed, for example 1 – 3 months after the last consultation, however compliance could be problematic.

In terms of TrP tenderness, disability and pain intensity experienced by the patients, little can be derived from the results of this study as no statistically significant changes were seen between the three groups with all three groups improving to an equal degree.

Overall it appears that significant benefit can be derived from the use of both self – ischaemic compression and sustained stretch in the treatment of Myofascial Pain Syndrome, however many further studies are necessary in order to determine the success of these two forms of treatment. Furthermore it still needs to be established what length of treatment period would be more suitable, and whether or not chronic or acute patients might benefit more from these two forms of treatment intervention.

6.2 RECOMMENDATIONS

The study population used in this research programme was 60 participants (20 participants in each of the three groups). A larger study population may have highlighted smaller variances and reported more accurate results, this can especially be seen in the intra – group results where similar improvement was seen in all three groups. A larger population would also allow for parametric testing, and thus strengthen the results of any future studies.

The race distribution in this study is an inaccurate reflection of the current situation in South Africa. It is recommended that in future studies, advertisements be more widely distributed so as to be more accessible to all race groups. This would improve future understanding of epidemiological factors of all race groups.

It is recommended that any future studies look at performing treatments on alternate days rather than on consecutive days in order to minimize the

possible effect of post treatment soreness, as a result of the ischaemic compression.

It is suggested that further studies that include the Thera – cane as a home treatment tool, consider extending the treatment period to longer than 5 consecutive days, as this may produce more favourable results. This assumption is made from looking at the mean score tables in chapter 5. It was observed how the greatest improvement occurred at the second consultation as compared to the third consultation.

The Myofascial Diagnostic Scale requires further studies to determine its reliability and validity. Until such time, it is recommended that the scale be used only as a method of standardising diagnostic criteria. The scale should not be used in statistical analysis in future studies, and other techniques for objectively assessing TrP sensitivity should be improved on and utilised.

Although a patient diary was used in the study as an attempt to control patient compliance, it is suggested that other forms of control be investigated in order to produce more accurate results. Perhaps with the use of cellular telephone short – message – sending (SMS), one could send daily reminders to patients to perform their self – treatment exercises.

Due to the variable nature of MPS subsequent studies should consider methods of producing a more uniform sample group. One way this could be achieved would be to include only acute or only chronic pain sufferers.

Further study suggestions include:

- Comparing a home programme protocol to other forms of treatment for MPS, i.e. spray and stretch, dry needling, electromodalities.
- Using a home programme protocol in conjunction with other forms of clinical treatment. This may be useful in treating a multi – faceted condition like whiplash injury for example.
- Using more Thera – cane devices would enable the sample group to be more random in nature, as patients would not have to be placed into groups according to availability of the Thera – canes. Perhaps an idea would be to find a local company in South Africa to manufacture the Thera – canes. This would nullify the import costs, and enable patients to buy a Thera – cane at a fraction of the price.

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APPENDICES

**DO YOU SUFFER FROM...
PAINFUL MUSCLE
KNOTS IN THE NECK
AND UPPER SHOULDERS,
CAUSING HEADACHES OR NECK
PAIN?**

**RESEARCH IS BEING
CONDUCTED AT THE
CHIROPRACTIC DAY CLINIC**

**DURBAN INSTITUTE OF TECHNOLOGY
TREATMENT IS FREE, SHOULD YOU QUALIFY
FOR THIS STUDY!**

PLEASE CONTACT **MARLON THORESSON** AT THE CLINIC ON: 031 -

2042205 / 2042512

Appendix A

Letter Of Information

Title of Research:

The relative effectiveness of a home programme of ischaemic compression, sustained stretch and a combination of both for the treatment of myofascial trigger points in the upper trapezius musculature.

NAME OF RESEARCH STUDENT:

Marlon Thoresson (031) 204-2205 or 204-2512

NAME OF RESEARCH SUPERVISORS:

Dr Brian Kruger (031) 5699091

Dear patient

Welcome to my research project. You have been selected to take part in a clinical trial comparing two forms of treatment for myofascial pain syndrome. This is an extremely common condition causing neck and upper back pain and often results in a considerable loss of neck mobility and function.

The aim of this study:

Is to compare the efficacy of two treatment approaches in the management of myofascial pain syndrome.

What will happen during the study period:

You will be allocated into one of three groups by a third party. You will undergo a full case history, physical and cervical spine regional examination prior to treatment. You will then receive written and verbal instructions explaining how to perform the specific home programme selected for you. You will then be required to perform the treatment for five consecutive days. The treatments are safe and are unlikely to cause any discomfort or adverse side effects, as they will follow a protocol similar to that used in clinical practice.

You will perform five treatments over a one-week period and need to attend a one-week follow up consultation. You will be asked to fill in simple questionnaires in order for the progress during the study period to be assessed.

All patient information is confidential and the results of the study will be made available in the Durban Institute of Technology library in the form of a mini-dissertation.

Appendix B

What do you need you to do:

- You will need to refrain from having any other form of treatment for your neck and upper back pain throughout the duration of this study, including the use of analgesics and anti-inflammatory drugs.
- You will be asked to refrain from any strenuous physical activities for the duration of this study as this is known to aggravate the condition.
- You will be asked to inform the researcher if any of the conditions of this study have been breached in any way.
- If you have any of the following conditions you will be excluded from the study, as they are contra-indicated for the treatment protocols used in this research:

Contra-indications to massage or massage type therapy
Anti- coagulant therapy
Fracture/ Dislocation/ Bone Tumours/ Infections

There are minimal risks involved in the treatment offered in this study, however the overall benefits may include decrease pain and discomfort associated with this condition.

Your treatment will be free of charge and you are free to withdraw at any stage if you wish to do so.

Please don't hesitate to ask questions on any aspect of this study. Your full co-operation will assist the Chiropractic profession in expanding its knowledge of this condition.

Thank you.

Yours sincerely,

Marlon Thoresson
(Chiropractic intern)

INFORMED CONSENT FORM

Date:

TITLE OF RESEARCH

The relative effectiveness of a home programme of ischaemic compression, sustained stretch and a combination of both for the treatment of myofascial trigger points in the upper trapezius musculature.

NAME OF RESEARCH STUDENT : Marlon Thoresson (031 – 2018440)

NAME OF RESEARCH SUPERVISOR: Dr Brian Kruger (031 – 5649091)

PLEASE CIRCLE THE APPROPRIATE ANSWER:

1. Have you read the research information sheet? YES / NO
2. Have you had the opportunity to ask questions regarding this study
YES / NO
3. Who have you spoken to? _____
4. Have you received satisfactory answers to your questions? YES / NO
5. Have you had an opportunity to discuss this study? YES / NO
6. Have you received enough information about this study? YES / NO
7. Do you understand the implications of your involvement in this study?
YES / NO
8. Do you understand that you are free to withdraw from this study
9. a) at any time? YES / NO
10. b) without having to give a reason for withdrawing? YES / NO
11. c) without affecting your future health care? YES / NO
12. Do you agree to voluntarily participate in this study? YES / NO

Please ensure that the researcher completes each section with you. If you have answered NO to any of the above, please obtain the necessary information before signing

PATIENT/SUBJECT

Name _____

Signature _____

WITNESS

Name _____

Signature _____

RESEARCH STUDENT

Name _____

Signature _____

Appendix C

DURBAN INSTITUTE OF TECHNOLOGY
CHIROPRACTIC DAY CLINIC
CASE HISTORY

Patient: Date:

File # : Age :

Sex : Occupation:

Intern : Signature:

FOR CLINICIANS USE ONLY:

Initial visit

Clinician: Signature :

Case History:

Examination:

Previous:

Current:

X-Ray Studies:

Previous:

Current:

Clinical Path. lab:

Previous:

Current:

CASE STATUS:

PTT:

Signature:

Date:

CONDITIONAL:

Reason for Conditional:

.....

.....

Signature:

Date:

Conditions met in Visit No:

Signed into PTT:

Date:

Case History signed off:

Date:

Intern's Case History:

1. Source of History:

2. Chief Complaint : (patient's own words):

3. Present Illness:

Complaint 1	Complaint 2

▶ Location

▶ Onset : Initial:

Recent:

▶ Cause:

▶ Duration

▶ Frequency

▶ Pain (Character)

▶ Progression

▶ Aggravating Factors

▶ Relieving Factors

▶ Associated S & S

▶ Previous Occurrences

▶ Past Treatment

▶ Outcome:

4. Other Complaints:

5. Past Medical History:

▶ General Health Status

▶ Childhood Illnesses

▶ Adult Illnesses

▶ Psychiatric Illnesses

▶ Accidents/Injuries

▶ Surgery

▶ Hospitalizations

6. Current health status and life-style:

- ▶ Allergies
- ▶ Immunizations
- ▶ Screening Tests incl. xrays
- ▶ Environmental Hazards (Home, School, Work)
- ▶ Exercise and Leisure
- ▶ Sleep Patterns
- ▶ Diet
- ▶ Current Medication
Analgesics/week:
- ▶ Tobacco
- ▶ Alcohol
- ▶ Social Drugs

7. Immediate Family Medical History:

- ▶ Age
- ▶ Health
- ▶ Cause of Death
- ▶ DM
- ▶ Heart Disease
- ▶ TB
- ▶ Stroke
- ▶ Kidney Disease
- ▶ CA
- ▶ Arthritis
- ▶ Anaemia
- ▶ Headaches
- ▶ Thyroid Disease
- ▶ Epilepsy
- ▶ Mental Illness
- ▶ Alcoholism
- ▶ Drug Addiction
- ▶ Other

8. Psychosocial history:

- ▶ Home Situation and daily life
- ▶ Important experiences
- ▶ Religious Beliefs

9. Review of Systems:

- ▶ General
- ▶ Skin
- ▶ Head
- ▶ Eyes
- ▶ Ears
- ▶ Nose/Sinuses
- ▶ Mouth/Throat
- ▶ Neck
- ▶ Breasts
- ▶ Respiratory
- ▶ Cardiac
- ▶ Gastro-intestinal
- ▶ Urinary
- ▶ Genital
- ▶ Vascular
- ▶ Musculoskeletal
- ▶ Neurologic
- ▶ Haematologic
- ▶ Endocrine
- ▶ Psychiatric

PHYSICAL EXAMINATION SENIOR & RESEARCH

Patient: _____ File#: _____ Date: _____
 _Student: _____ Signature: _____

VITALS

Pulse rate			Respiratory rate	
Blood pressure	R	L	Medication if hypertensive:	
Temperature			Height	
Weight:	Any recent change Y/N	If Yes : how much gain/loss		Over what period

GENERAL EXAMINATION

General Impression	
Skin	
Jaundice	
Pallor	
Clubbing	
Cyanosis (Central/Peripheral)	
Oedema	
Lymph nodes - Head and neck	
- Axillary	
- Epitrochlear	
- Inguinal	
Pulses	
Urinalysis	

SYSTEM SPECIFIC EXAMINATION

CARDIOVASCULAR EXAMINATION

RESPIRATORY EXAMINATION

ABDOMINAL EXAMINATION

COMMENTS

NEUROLOGICAL EXAMINATION: See regionals.

Clinician: _____ **Signature:** _____

DURBAN INSTITUTE OF TECHNOLOGY

REGIONAL EXAMINATION - CERVICAL SPINE

Patient: File No:

Date: Student:

Clinician: Sign:

OBSERVATION:

Posture
 Swellings
 Scars, discolouration
 Hair line
 Body and soft tissue contours

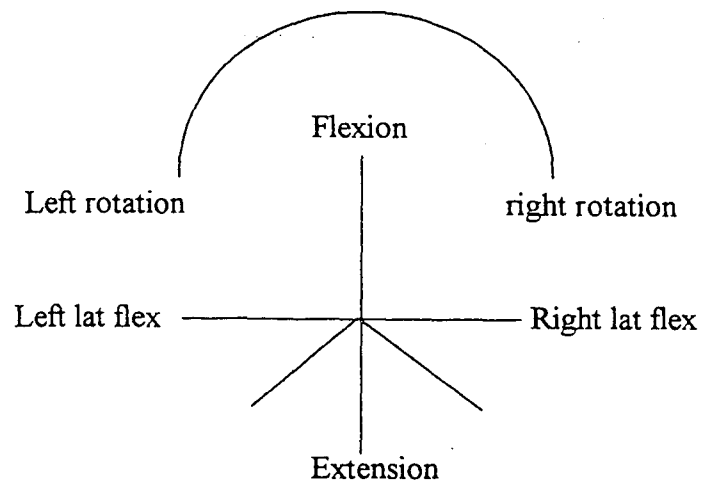
Shoulder position

Left :

Right :

Shoulder dominance (hand):

Facial expression:

**RANGE OF MOTION:**

Extension (70°):
 L/R Rotation (70°):
 L/R Lat flex (45°):
 Flexion (45°):

PALPATION:

Lymph nodes
 Thyroid Gland
 Trachea

ORTHOPAEDIC EXAMINATION:

Tenderness		Right	Left
Trigger Points:	SCM		
	Scalenii		
	Post Cervicals		
	Trapezius		
	Lev scapular		

	Right	Left		Right	Left
Doorbell sign			Cervical compression		
Kemp's test			Lateral compression		
Cervical distraction			Adson's test		
Halstead's test			Costoclavicular test		
Hyper-abduction test			Eden's test		
Shoulder abduction test			Shoulder compression test		
Dizziness rotation test			Lhermitte's sign		
Brachial plexus test					

NEUROLOGICAL EXAMINATION:

Dermatones	Left	Right	Myotomes	Left	Right	Reflexes	Left	Right
C2			C1			C5		
C3			C2			C6		
C4			C3			C7		
C5			C4					
C6			C5					
C7			C6					
C8			C7					
T1			C8					
			T1					
Cerebellar tests:		Left		Right				
Disdiadochokinesis								

VASCULAR:	Left	Right		Left	Right
Blood pressure			Subclavian arts.		
Carotid arts.			Wallenberg's test		

MOTION PALPATION & JOINT PLAY:

Left: Motion Palpation:
Joint Play:
Right: Motion Palpation:
Joint Play:

Upper Thoracics:
Motion Palpation:
Joint Play:

BASIC EXAM: SHOULDER:

Case History:

BASIC EXAM: THORACIC SPINE:

Case History:

ROM: Active:
Passive:
RIM:
Orthopaedic:
Neuro:
Vascular:
Observ/Palpation:

ROM: Motion Palp:
Active:
Passive:
Orthopaedic:
Neuro:
Vascular:
Observ/Palpation:

Appendix G

Myofascial Diagnostic Scale

Patient name:

File no.:

Muscle affected:

Treatment no.:

Trigger point signs

1	Soft Tissue Tenderness		
Grade:	0	No tenderness	0
	I	Tenderness to palpation WITHOUT grimace or flinch	1
	II	Tenderness to palpation WITH grimace or flinch	2
	III	Tenderness with WITHDRAWAL (÷ Jump sign)	3
	IV	Withdrawal (+Jump sign) to non-noxious stimuli (ie. Superficial palpation, gentle percussion)	4
2	Snapping palpation of the trigger point evokes a local twitch response.		4
3	The trigger point is found in a palpable taut band.		4
4	Moderate, sustained pressure on the trigger point causes or intensifies pain in the reference zone.		5
TOTAL			<u>17</u>

NUMERICAL PAIN RATING SCALE 101

PATIENT NAME: _____

FILE NUMBER: _____ DATE: _____

GROUP: _____

Please indicate on the line below the number between 0 and 100 that best describes the pain of your major problem at this point, when it is at its **WORST**. A zero (0) would mean "no pain at all" and one-hundred (100) would mean "pain as bad as it could be."

Please write only one number.

0 _____ 100

Please indicate on the line below the number between 0 and 100 that best describes the pain of your major problem at this point, when it is at its **LEAST**. A zero (0) would mean "no pain at all" and one-hundred (100) would mean "pain as bad as it could be."

Please write only one number.

0 _____ 100

Patient Name: _____ File no.: _____ Date: _____

This questionnaire has been designed to give the doctor information as to how your back pain has affected your ability to manage everyday life. Please answer every section and mark in each section only ONE box as it applies to you. We realize you may consider that two of the statements in any one section could relate to you, but please just mark the box which most closely describes your problem.

<p><u>Section 1 - Pain Intensity</u></p> <p><input type="checkbox"/> I have no pain at the moment.</p> <p><input type="checkbox"/> The pain is very mild at the moment.</p> <p><input type="checkbox"/> The pain is moderate at the moment.</p> <p><input type="checkbox"/> The pain is fairly severe at the moment.</p> <p><input type="checkbox"/> The pain is very severe at the moment.</p> <p><input type="checkbox"/> The pain is the worst imaginable at the moment.</p>	<p><u>Section 6 - Concentration</u></p> <p><input type="checkbox"/> I can concentrate fully when I want to with no difficulty.</p> <p><input type="checkbox"/> I can concentrate fully when I want to with slight difficulty.</p> <p><input type="checkbox"/> I have fair degree of difficulty in concentrating when I want to.</p> <p><input type="checkbox"/> I have a lot of difficulty in concentrating when I want to.</p> <p><input type="checkbox"/> I have a great deal of difficulty in concentrating when I want to.</p> <p><input type="checkbox"/> I cannot concentrate at all.</p>
<p><u>Section 2 - Personal Care (Washing, Dressing ...)</u></p> <p><input type="checkbox"/> I can look after myself normally without causing extra pain.</p> <p><input type="checkbox"/> I can look after myself normally but it causes extra pain.</p> <p><input type="checkbox"/> It is painful to look after myself and I am slow and careful.</p> <p><input type="checkbox"/> I need some help but manage most of my personal care.</p> <p><input type="checkbox"/> I need help every day in most aspects of self care.</p> <p><input type="checkbox"/> I do not get dressed, I wash with difficulty and stay in bed.</p>	<p><u>Section 7 - Work</u></p> <p><input type="checkbox"/> I can do as much work as I want to .</p> <p><input type="checkbox"/> I can do only my usual work, but no more.</p> <p><input type="checkbox"/> I can do most of my usual work, but no more.</p> <p><input type="checkbox"/> I cannot do my usual work.</p> <p><input type="checkbox"/> I can hardly do any work at all.</p> <p><input type="checkbox"/> I cannot do any work at all.</p>
<p><u>Section 3 - Lifting</u></p> <p><input type="checkbox"/> I can lift heavy weights without extra pain.</p> <p><input type="checkbox"/> I can lift heavy weights but it gives extra pain.</p> <p><input type="checkbox"/> Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example on a table.</p> <p><input type="checkbox"/> Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned .</p> <p><input type="checkbox"/> I can lift only very light weights.</p> <p><input type="checkbox"/> I cannot lift or carry anything at all.</p>	<p><u>Section 8 - Driving</u></p> <p><input type="checkbox"/> I can drive my car without any neck pain.</p> <p><input type="checkbox"/> I can drive my car as long as I want with slight pain in my neck.</p> <p><input type="checkbox"/> I can drive my car as long as I like with moderate pain in my neck.</p> <p><input type="checkbox"/> I cannot drive my car as long as I want because of moderate pain in my neck.</p> <p><input type="checkbox"/> I can hardly drive at all because of severe pain in my neck..</p> <p><input type="checkbox"/> I cannot drive at all.</p>
<p><u>Section 4 - Reading</u></p> <p><input type="checkbox"/> I can read as much as I want to without pain in my neck.</p> <p><input type="checkbox"/> I can read as much as I want to with slight pain in my neck.</p> <p><input type="checkbox"/> I can read as much as I want with moderate pain in my neck.</p> <p><input type="checkbox"/> I cannot read as much as I want because of moderate pain in my neck.</p> <p><input type="checkbox"/> I can hardly read at all because of severe pain in my neck.</p> <p><input type="checkbox"/> I cannot read at all.</p>	<p><u>Section 9 - Sleeping</u></p> <p><input type="checkbox"/> I have no trouble sleeping.</p> <p><input type="checkbox"/> My sleep is slightly disturbed (<1 hour sleep loss).</p> <p><input type="checkbox"/> My sleep is mildly disturbed (1-2 hours sleep loss).</p> <p><input type="checkbox"/> My sleep is moderately disturbed (2-3 hours sleep loss).</p> <p><input type="checkbox"/> My sleep is greatly disturbed (3-5 hours sleep loss).</p> <p><input type="checkbox"/> My sleep is completely disturbed (5-7 hours sleep loss).</p>
<p><u>Section 5 - Headaches</u></p> <p><input type="checkbox"/> I have no headaches at all.</p> <p><input type="checkbox"/> I have slight headaches which come infrequently.</p> <p><input type="checkbox"/> I have moderate headaches which come infrequently.</p> <p><input type="checkbox"/> I have moderate headaches which come frequently.</p> <p><input type="checkbox"/> I have severe headaches which come frequently.</p> <p><input type="checkbox"/> I have headaches almost all the time.</p>	<p><u>Section 10 - Recreation</u></p> <p><input type="checkbox"/> I am able to engage in all my recreation activities with no neck pain at all.</p> <p><input type="checkbox"/> I am able to engage in all my recreation activities, with some pain in my neck.</p> <p><input type="checkbox"/> I am able to engage in most, but not all of my usual recreation activities because of pain in my neck.</p> <p><input type="checkbox"/> I am able to engage in a few of my usual recreation activities because of pain in my neck.</p> <p><input type="checkbox"/> I can hardly do any recreation activities because of pain in my neck.</p> <p><input type="checkbox"/> I cannot do any recreation activities at all.</p>

ALGOMETER READINGS:

Patients Name: _____ File Number: _____

Group: _____

VISIT	DATE	READING

Instructions on correct stretching techniques

These instructions apply to the specific treatment of active myofascial trigger points of the upper trapezius musculature.

Perform the following twice a day for 5 days (days 1-5).

Step 1: Sit near the edge of an armless chair with both feet firmly planted on the floor.

Step 2: Gently stretch the appropriate muscle to the point of pain and then back-off slightly.

Step 3: Hold the appropriate stretch for 30 to 60 seconds.

Selected stretches for the upper trapezius musculature.

! R/L Upper trapezius:

Hold on to the edge of the chair on the R/L side to keep the R/L shoulder from elevating. Side bend your head to the L/R. Gently pull your head over to the L/R with your L/R hand.

!

Hold on to the edge of the chair on the R/L side to keep the R/L shoulder from elevating. Side bend your head to the L/R. Rotate your head to the L/R. Flex your neck. You should be looking down at your L/R shoulder. Gently pull your head into the direction of the stretch with your L/R hand.

!

Lace your fingers together and place them behind your head just below the ridge at the base of your skull. Drop your chin to your chest and at the same time lower your shoulders. The goal is to stretch the musculature at the base of the skull, not that at the base of the cervical spine. By keeping your shoulders down and back, the emphasis of the stretch is on the correct musculature.

!

Using an open door with opposing door handles (one on either side), hold the L door handle with your L hand and the R door handle with your R hand.

Place your feet together at the base of the door. Lean back, allowing your arms to straighten. While doing this stretch, make sure your shoulders remain lowered and at the same level.

Instructions on how to use the Thera-Cane

These instructions apply to the specific treatment of active myofascial trigger points of the upper trapezius musculature. Perform the following twice a day for 5 days (days 1-5).

Step 1: Hold the Thera-Cane diagonally across the body with the curved end facing upwards and back, with hands placed as shown in the illustration below.

Step 2: Loop the cane over the left shoulder to work on the right-sided musculature and vice versa for the left side.

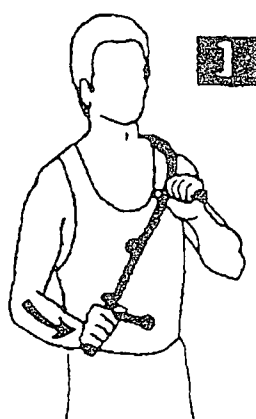
Step 3: Push upper hand down and push lower hand forward 1 to 2 inches for pressure.

Step 4: Apply gradually increasing pressure, and hold that pressure for 35 seconds or until the release is felt.

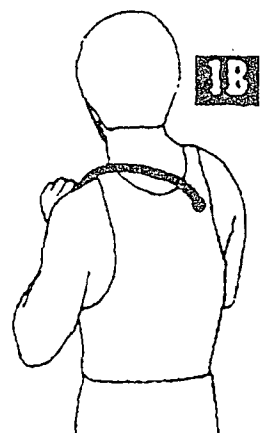
Loop over L shoulder to work on R shoulder blade.

#1 UPPER BACK

Push L hand downward then push R hand forward 1-2 inches for pressure.



Alternate hand position.



Rotate R shoulder blade forward for hard to get points

PATIENT DIARY

Patient Name: _____

File no. _____

PLEASE ANSWER ALL THE QUESTIONS BELOW FOR EACH TREATMENT DAY

TREATMENT DAY	What times were your treatments performed?	Was there any muscle stiffness or bruising before your treatment?	Was there any muscle stiffness or bruising after your treatment?	Were there any difficulties experienced during the treatment sessions?
DAY 1	: AM : PM			
DAY 2	: AM : PM			
DAY 3	: AM : PM			
DAY 4	: AM : PM			
DAY 5	: AM : PM			