

THERAPEUTIC EFFICACY OF  
DRY-NEEDLING TECHNIQUES  
AND SPINAL ADJUSTIVE PROCEDURES  
IN THE MANAGEMENT OF  
MYOFASCIAL TRIGGER POINT  
SYNDROMES

by

Garth Roberts

A dissertation submitted in partial compliance  
with the requirements for  
the Master's Degree in Technology  
in the Department of Chiropractic  
at the Technikon Natal

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WITH THE REQUIREMENTS FOR THE MASTER'S DEGREE  
IN TECHNOLOGY IN THE DEPARTMENT OF CHIROPRACTIC  
AT THE TECHNIKON NATAL

I, GARTH ROBERTS, do hereby declare that this dissertation represents my  
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## DEDICATION

To my friends and family for their continued support and encouragement, and to the profession of chiropractic which has given me the means to fulfil my expectations in primary health care.

To Clare and Dean, you will always be in my thoughts and in my prayers. Thank you for reminding me of the important things in life.

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My sincere thanks to my patients for their compliance and belief in me.

## ABSTRACT

Musculoskeletal disorders are probably the most neglected conditions in modern medical teachings (Travell and Simons, 1983) It is the aim of this randomised uncontrolled comparative study to investigate the efficacy of a combination of chiropractic adjustment procedures and myofascial trigger point therapy in the form of dry-needling techniques, as opposed to myofascial trigger point therapy alone. The rationale being to determine an appropriate approach to the treatment of Myofascial Pain and Dysfunction Syndromes.

The population sample consisted of thirty two individuals selected from patients presenting at the Technikon Natal Chiropractic Clinic with cervical and thoracic myofasciitis. These patients were randomly assigned to two groups consisting of sixteen patients each.

The group receiving dry-needling techniques only was considered experimental Group DN, and the group receiving a combination of chiropractic treatment and dry-needling techniques, the experimental Group C.

All patients were given specific stretch exercises for the affected muscle groups and received patient education and lifestyle advice aimed at preventing re-occurrence of their condition.

Clinical criteria governing the selection of patients for the study were based on those set out by Travell and Simons (1983: 13-17) for patients suffering from Myofascial Pain and Dysfunction Syndrome. In all patients, trigger points were active and were localised to one

or more of the following muscle groups:

the sternocleidomastoid, levator scapulae, trapezius, rhomboid, supraspinatus, infraspinatus, deltoid and/or scalene muscles.

Patients were treated until asymptomatic or for a maximum of nine treatments (whichever one came first). Treatments were given over a three week period and thereafter a follow-up consultation approximately one month later.

Subjective data prior to each consultation was collected using the Numerical Rating Scale, the Pain Disability Index, the CCC Neck Disability Index, the Short-Form Magill Pain Questionnaire and Symptom Diagrams.

Objective data were obtained by measuring the trigger point sensitivity to pressure using an algometer, and by measuring cervical range of motion in degrees by means of a goniometer.

All questionnaires and measurements were completed prior to the consultation and only the data collected at the first, final and follow-up consultation were used for statistical analysis.

All data were analyzed with non-parametric statistical procedures, with the Wilcoxon Signed Rank test used for intra-group comparisons and the Mann-Whitney U test for inter-group comparisons. All results were tested at a 90% and 95% Confidence Interval as follows:

- The Wilcoxon Sign Rank test comparing median responses of the initial with final, initial with follow-up, and final with follow-up consultations was applied to data obtained from the Numerical Rating Scale, CMCC Neck Disability Index, Pain Disability Index, McGill Questionnaire, Algometer scores and the cervical range of motion readings.
  
- The Mann Whitney U test was used for inter group comparisons of the same data sets for the initial, final and follow-up consultations.

It was hypothesised that both myofascial trigger point therapy and a combination of myofascial trigger point therapy and chiropractic treatment would be effective in the management of myofasciitis in terms of patient response. However, it was also hypothesised that the latter would be more effective than the former in the management of myofasciitis and therefore the more appropriate approach in terms of the patient's response to pain, disability and physical findings.

For the purposes of this dissertation, the null hypothesis stated that there was no significant difference between the experimental and control groups. On interpretation of the statistics, it was found that both the experimental group (receiving chiropractic adjustments and dry-needling) and the control group (receiving dry-needling) improved significantly, thus supporting the hypothesis that both treatment protocols would be effective. However, no statistically significant difference between the two groups was ascertained at the final consultation which demands that we accept the null hypothesis and for the purposes of this study accept that both treatment protocols were equally effective.

It is the opinion of the researcher based on clinical observation during the study, that a larger sample size may well have yielded different results.

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## DEFINITIONS OF TERMS

### PATIENT RESPONSE:

Subjective response includes the answers to the relevant questionnaires as well as the associated symptomatology as described by the patient.

Objective response includes the physical findings on examination i.e. range of motion (ROM), algometer and goniometer measurements.

### MYOFASCIITIS:

Pain and tenderness and other phenomena and dysfunction attributed to Myofascial Trigger Points.

### PATIENT EDUCATION:

This is specific instruction given to the patient regarding diet, posture, lifestyle and any factor that may precipitate or perpetuate Myofascial Pain and Dysfunction Syndrome.

### STRETCHING EXERCISES:

These are general exercises designed to stretch cervical and upper thoracic musculature.

### ALGOMETER:

This instrument measures the patient's sensitivity to pressure in terms of kilograms per square centimetre (Kg/cm<sup>2</sup>)

#### **GONIOMETER:**

This instrument was used to measure the range of motion in the cervical spine.

#### **MYOFASCIAL TRIGGER POINT (MFTP):**

As defined in Travell and Simons (1983), a myofascial trigger point is a focus of hyper irritability in a muscle or its fascia that is symptomatic with respect to pain. It refers a pattern of pain at rest and/or in motion that is specific for muscles.

An active TP is always tender, preventing full lengthening of the muscle and causing weakness of the involved muscle.

It refers pain on direct compression and mediates a local "twitch response".

A latent MFTP is an area of hyper irritability within a muscle that does not have a referred pain pattern, twitch response or jump sign and is only painful on direct palpation.

#### **CHIROPRACTIC ADJUSTMENT:**

Spinal manipulative therapeutic procedure which utilized a specific short levers to which a high velocity thrust of controlled amplitude is directed (Gatterman, 1980: 49).

#### **MYOFASCIAL TRIGGER POINT THERAPY:**

For the purpose of this study, this involves dry-needling of the relevant trigger points using a solid acupuncture needle with a stainless steel shaft and a copper coil superiority.

Chapter One

INTRODUCTION

## INTRODUCTION

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"Myofascial trigger points are a frequently overlooked and misunderstood source of the distressingly ubiquitous musculoskeletal aches and pains of mankind" (Travell and Simons, 1983: ix). Myofascial trigger points (TPs) existing as the primary cause of pain or secondary to another disease process are seen on a daily basis in all primary health care practices (Sola *et al.*, 1955). However, until fairly recently, due to the lack of research and controlled clinical trials, myofascial trigger points have been poorly understood. Rene Cailliet in Travell and Simons (1983: v), states that myofascial TPs are often attributed to numerous aetiologies and are often treated with ineffectual methods which invariably lead to failure which is then ascribed to patient noncompliance rather than therapeutic misguidance. It is this vagueness that has led to myofascial trigger points being overlooked in terms of the primary diagnoses and often inappropriately treated.

Myofascial Pain and Dysfunction Syndrome is an extremely common condition presenting to primary health care practices (Sola and Williams, 1956: 91), and unless appropriately treated, they can be severely debilitating for the patient and a significant contributor to absenteeism in the work environment (Good, 1951: 1). It is from this perspective that this study endeavours to analyze the efficacy of myofascial trigger point therapies together with conventional chiropractic treatment protocols in order to provide the primary health care practitioner with a tried and tested method of treatment in their approach to the management of myofascial trigger point syndromes.

A recent study (sample size 20) undertaken to show the efficacy of myofascial trigger point therapy has concluded that the patients receiving myofascial trigger point therapy in the form of dry-needling techniques were significantly more improved than the placebo group and hence myofascial trigger point therapy was seen as a useful adjunct to conventional chiropractic treatment (Jones, 1994: 69). It is the purpose of this study to ascertain whether a multi-disciplinary treatment protocol in the form of conventional chiropractic treatment and myofascial trigger point therapy combined, is an appropriate treatment protocol in the management of myofascial trigger point syndromes.

The perpetuating factors related to Myofascial Pain and Dysfunction Syndrome, i.e. stress, occupation, structural inadequacies, postural stress, chronic infection, metabolic and endocrine inadequacies and nutrient deficiencies are common to all people and therefore the high prevalence of patients presenting with myofasciitis is not surprising (Travell and Simons, 1983: 103). To date, conventional medical treatment involves the injection of cortisone and other chemical components at the site of pain, anti-inflammatory and analgesic prescription, with variable results but very little use is made of needling and stretching techniques (Travell and Simons, 1983: 75). As primary health care practitioners, chiropractors are obligated to provide the most appropriate form of treatment in the management of disease. Quick effective treatment of patients with debilitating myofascial pain will mean they can return to work in good health and continue to be productive members of society.

By evaluating the effectiveness of the chiropractic adjustment, coupled with myofascial trigger point therapy as opposed to only myofascial trigger point therapy, this study proposes

to provide information that will be valuable in determining the management protocol that allows for quick effective relief of myofascial pain and dysfunction. A quick recovery will shorten periods of indisposition, thus minimising disability to the patient and increasing their productivity.

The study consists of two groups, randomly selected. The experimental Group A received myofascial trigger point therapy only and the experimental Group B received a combination of myofascial trigger point therapy and chiropractic management. Data will be collected using objective and subjective means and will then be analyzed to determine the efficacy of the respective treatment protocols and their appropriateness in the treatment of Myofascial Pain and Dysfunction Syndrome.

Chapter Two

REVIEW OF THE  
RELATED LITERATURE

# THE REVIEW OF THE RELATED LITERATURE

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## 2.1 INTRODUCTION

With the continuing progress in medical technology the world can expect better health care facilities and increasing success in the management of disease processes. As a contact practitioner, the chiropractor has an obligation to make use of the advances made in medical science for the optimum care of his patient, but also to contribute to the pool of knowledge that enlightens us as to the nature of disease.

Being primarily concerned with neuromusculoskeletal disorders, one of the conditions frequently treated by chiropractors is the Myofascial Pain and Dysfunction Syndrome. Although this study is limited to muscles of the cervical and thoracic area, there are a total of 400 muscles in the human body and according to Travell and Simons (1983 : 5), any one of them can develop trigger points (TPs) that refer pain and other distressing symptoms, usually to a remote location. Myofascial TPs are extremely common and may become a distressing part of nearly everyone's life at one time or another (Baldry, 1989), and therefore deserve particular attention in chiropractic research.

Judging from the literature cited, it is apparent that until fairly recently there has been much confusion as to the general understanding of Myofascial Pain and Dysfunction Syndromes. In Travell and Simons (1983: 8-10) it is stated that in initial writings of

which Travell was a co-author, the terms muscular rheumatism and non-articular rheumatism were used to describe these myalgic spots which are now commonly referred to as trigger points. Other terms listed by the previous reference include idiopathic myalgia, rheumatic myalgia, fibrositis, rheumatic myopathy, myalgia, nodular fibromyositis, myogelosis, myofibrositis, myodysneuria and myofascitis, to name but a few. Travell and Simons (1983: 9) has coined the term Myofascial Pain and Dysfunction Syndrome which covers all of the above conditions. The term myofasciitis is used interchangeably with Myofascial Pain and Dysfunction Syndrome by this author as it is generally accepted as a diagnostic term that identifies the myofascial pain syndrome due to trigger points (Sola and Williams, 1956: 91-95).

The study proposes to emphasize the importance of Myofascial Pain and Dysfunction Syndrome in everyday primary health care and in doing so offer the practitioner a means of treating it, other than the prescription of pain killing drugs. There are several methods proposed by various authors in the treatment and inactivation of trigger points. Some of these include ultrasound, microamperage stimulation, transcutaneous electrical nerve stimulation, injection of saline or analgesic solutions, massage, dry-needling, spray and stretch (Travell and Simons, 1983: 67 - 71) and manipulative procedures (Vernon *et al*, 1990: 15).

As a student of chiropractic it was decided that manipulative procedures in the form of spinal adjustment, life-style and postural patient education, stretching exercises and dry needling techniques were the appropriate therapeutic approaches available that fell within the realm of chiropractic care. With chiropractic already widely

accepted as effective in the treatment of musculoskeletal disorders (Gatterman, 1990: 52) and dry-needling technique without actually introducing anaesthetic proving highly effective (Murphy, 1989:631) it was decided to conduct a study comparing the efficacies of a combination of chiropractic treatment and dry-needling as opposed to dry-needling alone. Patient education, stretch exercises and lifestyle advice was common to both groups. The value of lifestyle advice and patient education is self evident, with stretching of the relevant postural muscles being a simple, non-invasive and harmless way of relieving pain originating in tense musculature due to myofascial trigger points (Lewitt and Simons, 1984:455).

## 2.2 PRECIPITATING AND PERPETUATING FACTORS

Most authors generally agree on the various aetiologies of myofascial trigger points and with the elimination of one or more of these perpetuating factors, the mere passage of time is often more than enough to elicit recovery.

Gatterman (1990:287) lists trauma, postural strain and repetitive use as precipitating factors with inadequate nutrition, insufficient fitness, joint laxity, allergies, metabolic abnormalities, job frustrations, domestic stress and physical, sexual or psychological abuse as predisposing factors.

Murphy (1989:627) states that trigger points form due to prolonged muscle spasm, direct or indirect injuries, or orthopaedic anomalies that place the muscle in prolonged abnormal function. He emphasizes that very often the initiating factors can

become the perpetuating factors making it impossible to successfully treat the patient until they are removed.

Telling (1935: 690-691) lists septic and toxic influences, muscle injury and climate as the main influences in fibrositis conditions. The reference to climate is notable in that many patients participating in this study were worse for the advent of cold weather.

Travell and Simons (1983: 103) highlight:

- (i) structural inadequacies e.g. short-leg,
- (ii) postural stress e.g. misfitting furniture, poor posture and muscle abuse,
- (iii) nutritional inadequacies, e.g. deficiencies in vitamins B, C and inadequate calcium, potassium and iron,
- (iv) metabolic and endocrine inadequacies e.g. hypometabolism, hypoglycemia, anaemia and hypoxia,
- (v) chronic infection e.g. viral or bacterial, psychological factors e.g. depression, anxiety and tension; other factors include constrictive clothing e.g. tight braziere straps, obesity, allergies, impaired sleep, radiculopathy and chronic visceral disease.

In a study conducted by Goldenberg (1987) it was found that 80% of the patients reported a sleep disturbance which supports Travell and Simons (1983: 103) in listing impaired sleep as either a perpetuating or precipitating symptom.

Much attention has been given to the physical aspects governing the evolution of myofascial pain and dysfunction syndrome with very little mention being made of the psychological factors involved. Travell and Simons (1983:148-150) emphasizes that myofascial pain, as in any other disease, has a psychological component in its development which needs to be addressed by the physician but also notes that treatable causes exist despite the emotional aspects.

To conclude, it appears that the aetiologies are both numerous and varied and in order to effectively approach the management of this condition, it is imperative that all factors are taken into consideration.

### 2.3 INCIDENCE OF MYOFASCIAL PAIN AND DYSFUNCTION SYNDROME

In a study conducted by Goldenberg (1987) he concluded that the prevalence of myofascial pain syndrome in the United States ranged from 3 to 6 million diagnosed cases and was, by his calculation, a gross underestimation. Rubin (1981) and Bennett (1986) support this large incidence in society by stating that myofascial trigger point syndromes are commonly encountered in physical medicine and rehabilitation and that musculoskeletal aches and pains are the common lot of mankind.

Yunus *et al* (1988) lists myofascial pain syndromes as one of the most common rheumatologic conditions predominantly affecting women in the age group 20 to 50 years, however the syndrome is also common among the elderly and less commonly amongst juveniles. Good (1951) refers to rheumatic myalgia which is synonymous with myofascial pain syndromes as the largest problem facing the medical profession of the time with approximately 4% of the British population being afflicted.

Given the fact that voluntary skeletal muscle accounts for 40% or more of body weight, the high prevalence of pain originating from muscles is not surprising (Gatterman, 1990:285) and neither is the incidence of Myofascial Pain and Dysfunction Syndrome within society.

#### 2.4 CLINICAL FEATURES OF MYOFASCIAL PAIN AND DYSFUNCTION SYNDROME

The clinical features of Myofascial Pain and Dysfunction Syndromes are described in Sandman (1981), Yunus *et al* (1988), and Travell and Simons (1983) as follows:

1. An active trigger point will produce a sufficient amount of pain to cause the patient to seek health care.
2. In the presence of trigger points, active or passive stretching of the affected muscle increases pain.

3. The stretch range of motion of the muscle is restricted.
4. An increase in pain is rated when the muscle is contracted against resistance.
5. The ability of the affected muscle to contract with force is reduced.
6. Trigger points exhibit deep tenderness and dysthesia and are exquisitely painful on digital pressure.
7. Pain is commonly referred by active trigger points to a so-called zone of referred pain which is often at some distance to the actual trigger point.
8. Secondary trigger points many arise in adjacent musculature that fall within the pattern of referred pain.
9. Surrounding musculature is tense on palpation.
10. The trigger point itself is found in a taut palpable band of muscle as a sharply delineated circumscribed nodule.
11. A jump sign is elicited with sustained digital pressure over the trigger point. The patient may cry out and physically move away to avoid the pain caused by digital pressure.

12. A twitch response localised to the affected muscle may be elicited with snapping palpation.
13. Autonomic disturbances may be induced in the pain reference zone of a myofascial trigger point. This includes increased vasomotor activity with pallor during stimulation of the trigger point and hyperaemia following its inactivation, lachrymation, and cutis anserina (pilomotor activation).
14. Proprioceptive disturbances raised by trigger points include imbalance, dizziness, tinnitus and distorted perception of weights lifted in hands.
15. Dermatographia or panniculosis in the area overlying active trigger points is common.
16. Pain may be acute or chronic.
17. Latent trigger points are clinically silent but may cause range of motion restriction and weakness of affected muscles and are a common feature of Myofascial Pain and Dysfunction Syndrome.

Non-musculoskeletal symptoms include fatigue, non-restorative sleep, anxiety, paraesthesia, muscle contraction headaches and blurring of vision (Yunus *et al* 1988).

All the clinical features found on examination or by means of the case history in Myofascial Pain and Dysfunction Syndromes are not necessarily common to all patients.

## 2.5 LABORATORY FINDINGS

Travell and Simons (1983: 17) note:

1. No abnormality or significant change attributable to myofascial trigger points has been found.
2. After electromyographic examination of involved muscles, no diagnostic abnormality has been detected.
3. The skin overlying active trigger points has been shown to have areas of increased temperature when investigated by means of thermograms.
4. Increased skin conductance over trigger points areas has been observed (Sola and Williams, 1956).

## 2.6 MECHANISM OF MYOFASCIAL TRIGGER POINT FORMATION

It is over fifty years since Travell first described myofascial trigger points and yet the underlying pathophysiology of trigger points remains largely vague (Hubbard and Berkoff, 1993).

Many factors interact to create myofascial TPs which may develop in muscles that are either acutely or chronically strained. In both cases there will be some degree of tissue damage which may include disruption of the sarcoplasmic reticulum and release of some of the stored calcium (Gatterman, 1990: 291). This results in increased availability of calcium to the myofibrils with sustained contraction of the sarcomere and eventually fatigue. This sustained contraction produces the palpable taut band associated with myofascial TPs. According to Gatterman (1990: 291), the initial tissue damage may cause the disruption of small blood vessels and the release of platelets, which in turn leak substances such as serotonin, which sensitizes nerve endings in the area. Furthermore, connective tissue damage also results in the breakage of mast cells containing histamine, which can also sensitize and stimulate pain endings. Together with the accumulation of metabolites such as prostaglandins, which are also capable of sensitizing nerve endings, it is apparent how a self-perpetuating local muscle condition is created, which is painful, resists stretching, and results in decreased range of motion and generalized disability.

## 2.7 TREATMENT PROTOCOL IN THE MANAGEMENT OF MYOFASCIAL PAIN AND DYSFUNCTION SYNDROME

### 2.7.1 Spinal adjustive procedures

Apart from causing local and referred pain, myofascial TPs in hypertonic muscles are also considered to be responsible for causing joint fixation (Gatterman, 1990: 43). This is due to the ligamentous shortening and articular adhesions that occur with muscle hypertonicity (Gatterman, 1990: 42-43). The concept of restricted segmental movement due to muscle hypertonicity is popular with a number of authors. Downing in Gatterman (1990: 43), describes the palpatory consistency of the muscles of vertebral lesions as having a doughy, inelastic quality with areas of firmer or "knot-like" contractual masses within the muscles. He described these areas as being exquisitely hypersensitive. The above description is consistent with the TPs described more recently in Travell and Simons (1983: 4).

Authors such as Korr (1975) and Sandoz (1981) have theorized that the golgi tendon organs provide the mechanism whereby muscle spasm producing joint fixation is relieved by manipulation and adjustment. The golgi tendon organ receptors act as brakes and limit excessive joint movement by initiating a reflex inhibition of motor activity in muscles operating over the joint. It is feasible that a high velocity adjustive thrust performed at the extreme of the restricted joints range of motion activates the golgi tendon origin inhibiting muscle activity, thereby reducing muscle spasm.

In a multicentre trial by Doran and Newell (1975) where patients were randomly allocated to one of four treatment groups, they compared the effectiveness of manipulation, definitive physiotherapy, corset and analgesic tablets in the treatment of back pain, and found that patients responded well and quickly to manipulation, with lesser clinical success in the other methods of treatment. Results such as these are encouraging in that if patients respond well to the generality of a manipulation, it is reasonable to assume that they will respond even more favourably to the specificity of the chiropractic adjustment. In the above study, Doran and Newell (1975) showed that although manipulation was marginally, though insignificantly, more effective than the other forms of treatment, there was no point in continuing to manipulate patients who showed no early response. This finding supports the belief of the researcher that chiropractors should be making greater use of adjunctive therapies such as dry-needling where early response to the adjustment is absent.

Gatterman (1990: 325) describes the manipulation of fixed joints as essential in the management of myofascial pain syndromes but warns against the danger of repeated manipulation of hypermobile joints which may cause an aggravation of the condition. Although patients may experience relief through the reduction of reflex muscle spasm due to the chiropractic adjustment, this is only temporary and, in cases of hypermobility, care should be taken to avoid the psychological and physical dependency of chiropractic adjustive procedures (Gatterman, 1990: 325).

### 2.7.2 Dry-needling

With increased understanding of neurofascial mechanisms of analgesia, considerable evidence has accumulated in support of the analgesic effect of dry needling in acupuncture which has been advocated by the Chinese for a few thousand years (Cheng, R.S. and Pomeranz, B. 1987). According to Cheng and Pomeranz (1987), dry-needling stimulates at least two endogenous pain relieving systems: one using endorphins and the other serotonin which are the body's natural pain killers. It is deduced that in the needling of myofascial TPs, the endorphin-serotonin pain relieving mechanism will be stimulated in addition to relief due to the mechanical breakdown of the TP within the muscle by manoeuvring of the needle. Various studies have shown the analgesic effect of dry-needling in myofascial trigger points (Lewitt, 1978; Levine, *et al*, 1976; Melzack, 1981; Macdonald *et al* 1983). In Macdonald *et al* (1983), reference is made to the specific needling of trigger points with subsequent relief of pain, which is supported by Travell and Rinzler who state in Levine *et al* (1976), that the needling of trigger point areas for myofascial pain can terminate pain.

Baldry (1991) has proposed that needles only have to be inserted into the tissues overlying trigger points to result in deactivation of the trigger point. He suggests that it is the A-delta fibres which are stimulated on needle insertion and these are located superficially in the skin and sub-cutaneous tissue, thus making deep penetration into the trigger point not necessary.

Levine *et al* (1976) in their study of the analgesic effects of dry-needling found that dry-needling was highly effective in producing transient analgesia as well as lasting relief of pain.

In a report by Melzack (1981) he addresses the gate control theory of pain as the mechanism by which dry-needling of myofascial trigger points achieves prolonged relief and analgesia. Basically the theory proposes that nerve impulses from peripheral fibres must pass through neural mechanisms in the dorsal horns of the spinal cord which act like a gate (Melzack, 1981). At this stage it is pertinent to mention that an earlier study by Melzack *et al* (1977) supports the hyper stimulation analgesia mechanism in the dry-needling of trigger points and also shows a high degree (71%) of correspondence between trigger points and traditional acupuncture points, both in their spatial distribution and associated pain pattern. This would account for the success enjoyed by traditional Chinese medicine in the treatment of myofascial pain syndromes.

In a randomised double-blind study by Garvey *et al* (1989) in which the efficacy of trigger point injection therapy in low back pain was investigated, it was found that needling therapy without injected medication was at least if not more effective as therapy with drug injection. He concluded that trigger point therapy was a useful adjunct in the treatment of low-back strain and that it is the direct mechanical stimulus to the trigger point which gives symptomatic relief equal to that of treatment with injected medication.

The above study has been given support in that research conducted by Kellgren (1938) showed the therapeutic effect of the injection of hypertonic saline into myofascial trigger points (Travell and Simons, 1983: 7).

*Mechanisms of dry-needling:*

Travell and Simons (1983: 79) proposes the following mechanisms contributing to the inactivation of trigger points by dry-needling:

- (1) The stimulation of the trigger point with the needle may cause a mechanical disruption of abnormally functioning contractile elements of nerve endings which are components of the feedback loop sustaining the trigger point activity. This results in the cessation of neuromuscular dysfunction and the relief of spasm and hyper irritability of sensory nerves.
- (2) Local release of intracellular potassium due to damage of muscle fibres by the needle can cause a depolarization block of nerve fibres.

## 2.8 SUMMARY OF THE RELATED LITERATURE

Popular misconceptions concerning Myofascial Pain and Dysfunction Syndrome are that the pain is often psychogenic, the nature of the condition is often self limiting and that patients can cure themselves and hence need not be taken seriously, that the pain experienced is not severe and that once relief of pain by treatment of skeletal

musculature is effected, visceral disease may be ruled out. From the literature cited, it is apparent that the above is not true and myofascial pain syndromes, are on the contrary, severely debilitating conditions.

This study aims to offer greater insight on the clinical perspective in the management of Myofascial Pain and Dysfunction Syndrome by evaluating the efficacy of myofascial TP needling in the alleviation of symptoms and signs as well as to evaluate the efficacy of a combination of chiropractic adjustment and TP needling as opposed to the more conventional approach of the chiropractor towards musculoskeletal disorders, namely spinal manipulative procedures.

Chapter Three

METHODS

# METHODS

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## 3.1 METHODOLOGY

For the purpose of this study two approaches to treatment were selected namely, the dry-needling of myofascial trigger points deemed highly effective (Lewitt, 1979), and chiropractic spinal adjustive procedures. The one group of patients received a combination of the above with the other group receiving dry-needling techniques only. Stretch exercises for affected muscles, lifestyle advice and patient education was common to both groups. It was expected that all patients would derive some benefit from the management protocols selected and for this reason the option of an additional placebo group was declined.

In an article by Goldenberg (1987), he stipulates that the majority of patients require frequent periodic visits in the treatment of myofascial pain syndromes and should be encouraged to participate actively in treatment guidelines. Hence, the criteria for treatment frequency was three consultations per week for a maximum of nine treatments.

A sample size of 32 patients was selected within specific delimitations, all of whom were suffering from cervical and/or thoracic spine Myofascial Pain and Dysfunction Syndrome.

The sample was divided into two groups, each consisting of 16 patients which were randomly chosen (the process of randomization is discussed later in the methodology). The first treatment group received only myofascial TP therapy whilst the second received a combination of myofascial TP therapy and chiropractic adjustment.

Patients were under no circumstances given the option of treatment as this could alter the natural history of the condition due to psychosomatic phenomena.

On arrival at the clinic, the patient was required to sign a patient consent form (Appendix J), thereafter a full evaluation of each patient was undertaken so as to ascertain their eligibility for this study. This evaluation took the form of:

- (a) Case history (Appendix A)
- (b) Physical examination (Appendix B)
- (c) Cervical regional examination (Appendix I)

The physical examination included assessment of range of motion using a goniometer, appropriate orthopaedic and neurological tests to assess the severity of disability and pain and the measurement of the patient's sensitivity to pain with regards to TP pressure by use of an algometer.

If after the history and physical examination the patient had met the requirements for this study, they were then randomly assigned to one of the two groups and given the following questionnaires to complete:

- (a) Numerical Rating Scale (Appendix C)
- (b) CMCC Neck Disability Index (Appendix E)
- (c) Pain Disability Index (Appendix D)
- (d) Short-Form McGill Pain Questionnaire (Appendix F)
- (e) Symptom diagram (Appendix G)

The above forms and measurements were completed prior to commencement of first treatment and thereafter prior to the final and follow-up consultations.

Range of motion assessment by goniometer measurement and pain sensitivity to TP pressure by algometer readings were conducted at the same times as the completion of the questionnaire, scale and indices.

The algometer readings and Numerical Rating Scale were taken prior to consultation. Thereafter the patient was seen three times a week for a maximum of nine treatments. Patients were then given a follow-up consultation after a minimum of two weeks following their final consultation.

The data collected were assessed and a judgement made as to the progress of the patient. Patients that were still relatively "disabled" and symptomatic were offered further treatment but no further information was collected for use in this study.

### 3.2 INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria were that the patient attending Technikon Natal Chiropractic Clinic

of any race, gender or occupation had neck/shoulder girdle pain unilaterally or bilaterally with active trigger points located in the cervical and/or thoracic musculature.

Exclusion criteria were the following:

- patients taking any form of medication that may influence the results of the study, i.e. analgesics, muscle relaxants, NSAIDs or steroids.
- any type of tumour in the cervical or thoracic region.
- any acute condition concerning the spine such as acute flexion-extension injury or acute disc pathology.
- any patient outside the range of 17 - 65 years age.
- any fracture in the thoracic cage, cervical spine or upper limbs.
- any patient displaying signs of vertebral artery insufficiency, i.e. blurred vision, dizziness, nystagmus nausea.

### 3.3 PROCESS OF RANDOMIZATION

Patients entering the study were randomly allocated to either the group receiving a combination of chiropractic and myofascial TP therapy (group C) or the group

receiving myofascial TP therapy only (group DN). This was affected by forming six groups of four, and numbering them from one to six. A dice was then thrown to obtain a number from one to six which was representative of a particular group of experimental and control patients of a specific order. The groups were as follows: (1) CCDNDN (2) CDNCDN (3) CDNDNC (4) DNCCDN (5) DNCDNC and (6) DNDNCC. The dice was thrown eight times to get the order for all 32 patients. This method facilitated an even number of randomly selected patients in the two groups.

All patients entering the study were told that they would be receiving one of two recognised treatment protocols in the management of their condition and were therefore positive about the prospects of recovery.

#### 3.4 TREATMENT PROCEDURES

The spinal adjustive procedures utilised in this study were those taught at the Technikon Natal, Department of Chiropractic, and include the following:

In the cervical spine:

- Wrist Action Cervical Break
- Lateral Atlas Index
- Cervical Break

In the thoracic spine:

- Thumb movement: Bench TM
- Combination Movement
- Crossed Bilateral Pisiform
- Anterior Thoracic Technic

The researcher performed the appropriate technique according to the nature of the fixation located.

The above adjusting procedures are described in *States Manual of Spinal, Pelvic and Extravertebral Technic* (States, 1985: 10-230).

The combination group received both chiropractic adjustment (techniques used are mentioned on page 24) and dry-needling therapy. Dry-needling of active trigger points involved a sterile technique whereby surgical swabs were used to clean the patient's skin before commencing. The type of needle used was a solid acupuncture needle with a stainless steel shaft and a copper coil superiorly so as to facilitate grip, the same used by Jones (1994). Patients were seated or placed in the prone position so as to prevent injury in the possible event of syncope. The point of penetration of the skin was one to two centimetres away from the trigger point in order to facilitate the needle being inserted at a thirty degree angle as advocated by Travell and Simon (1983: 82-85). The needle explored deep and superficial fibres of the muscle with local tenderness and referred pain being elicited on manoeuvring of the needle. The needle was then withdrawn slightly and then re-inserted into the trigger point at a

slightly different angle and in a new direction. This method was repeated until the trigger point had been penetrated from several angles and directions thus allowing maximum coverage of the area of the trigger point. This technique was followed as it was consistent with that advocated by Travell and Simons (1983: 84-85). Special care was taken to minimise the number of times skin penetration occurred so as to minimise distress and pain to the patient. Needles were used only once and then carefully disposed of. The patients in the combination group were given the indicated adjustment prior to the commencement of dry-needling.

The dry-needling group was treated in exactly the same way with the exception of any chiropractic adjustive procedures.

### 3.5 THE DATA

There are two types of data necessary for this research, namely, primary data and secondary data. The nature of these two types of data will be given briefly below.

#### 3.5.1 The primary data

Various types of primary data will be collected in the following manner:

1. A full patient history (Appendix A)
2. Objective assessment of the patient by means of a full physical examination. (Appendix B)
3. The Numerical Rating Scale (Appendix C)
4. The Pain Disability Index (Appendix D)

5. The CMCC Neck Disability Index (Appendix E)
6. Short-form McGill Pain Questionnaire (Appendix F)
7. Symptom Diagrams (Appendix G)
8. Algometer readings measuring sensitivity to pressure
9. Goniometer readings measuring cervical range of motion

#### 3.5.2 The secondary data

This will be obtained from the various books, journals and periodicals cited.

#### 3.5.3 The criteria governing the admissibility of the data

Only the data from the relevant questionnaires completed under the supervision of this researcher (i.e. Garth Roberts) were used.

Only the data collected from patients which have satisfied all the conditions of this proposal were used as set out in the delimitations and research methodology.

#### 3.5.4 Location of the data

All secondary data were obtained directly from the library at the Technikon Natal, Natal University Medical library or via inter-library loans.

The primary data were collected once the study commenced with patients being examined on a regular basis.

### 3.5.5 Location of the sample

The patients participating in this study were obtained from areas within a 60 km radius of Technikon Natal in order to eliminate the possibility of poor compliance in patients not wanting to travel long distances.

Advertising involves the placement of specific notices in local newspapers and was carried out by the Department of Chiropractic. This researcher was active in the canvassing of patients by placing notices at the local sports clubs and gymnasiums.

## 3.6 THE SPECIFIC TREATMENT OF EACH SUBPROBLEM

### 3.6.1 The first subproblem

The first subproblem was to evaluate the efficacy of myofascial TP therapy in patients presenting with myofasciitis, in order to determine a more appropriate method of treatment in patients presenting with myofasciitis.

#### *The data needed*

The data needed were obtained from answers to the questionnaires, indices and scales in the appendices 6.1 - 6.6, and from the results of the physical measurements taken prior to each treatment and at the end of the final treatment. Therefore the data needed were the following:

- (a) answers to the questionnaires
- (b) cervical range of motion measurements using a goniometer

- (c) pain sensitivity to TP pressure using an algometer
- (d) recorded readings from the Numerical Rating Scale.

#### *The location of the data*

Only the information and treatment responses of patients attending the Technikon Natal Chiropractic Day Clinic was used.

#### *The means of obtaining the data*

All data needed was collected by means of questionnaires and objective testing e.g. ROM testing and motion palpation. Each patient completed the questionnaires at the first, final and follow-up consultations. They were also assessed clinically at each consultation. This clinical assessment involved the measurement of the patients ability to perform clinical tests as well as their ability to move through various ranges of motion (ROM).

#### *The treatment of the data*

All questionnaires were screened to ensure they were correctly completed and that all patients met the selection criteria.

Also, all measurements pertaining to active ROM testing of the patients, as well as the results obtained from the physical examination (i.e. specific myofascial examination for trigger points), was screened in order to ascertain the eligibility of the patient for the study.

### *Interpretation of the data*

The response of the patient to treatment facilitates the interpretation of the data. Positive responses on the pain disability indices, scale and questionnaire indicating a decrease in pain and increase in function since commencement of treatment, together with improved ROM and resolved TPs on physical examination, indicated the efficacy of myofascial TP therapy.

### 3.6.2 **The second subproblem**

The second subproblem proposed to determine the effectiveness of chiropractic treatment in patients presenting with myofasciitis, in order to determine a more effective method of treatment for such patients.

#### *The data needed*

As in 3.6.1

#### *The location of the data*

As in 3.6.1

#### *The means of obtaining the data*

As in subproblem one, all data were collected by means of questionnaires and objective clinical tests and examination. All patients completed the questionnaires and were given a clinical examination prior to each treatment and after the final treatment. Precise measures of patients ability to perform clinical tests were recorded.

### *The treatment of the data*

All questions were screened to ensure their correct completion and that all patients met the selection criteria. Also, all findings of the clinical examination were screened in order to ascertain the eligibility of the patient for the study.

### *The interpretation of the data*

The data were interpreted according to the patient's response to treatment. A decrease in pain and disability indicated on the questionnaire together with improved ROM and resolution of trigger points were considered positive aspects in favour of treatment.

#### 3.6.3 **The third subproblem**

The third subproblem aimed to make an objective comparison between the relative successes of the two management programmes in order to establish a more effective mode of treatment preferred for patients presenting with myofasciitis.

### *The data needed*

The data needed were obtained from the interpretation of the data in subproblem one and two.

### *The location of the data*

The data captured from the questionnaires and clinical examinations in

subproblem one and two was used.

#### *The treatment of the data*

Only data which were obtained from the groups of subproblem one and two was used. A comparison was made in order to establish the relative strengths and weaknesses of both forms of treatment and thereby to propose an appropriate method of treatment for patients presenting with myofasciitis.

#### *The interpretation of the data*

Interpretation of the data was made by comparing the data collected in subproblem one and subproblem two, and applying the appropriate statistical tests to establish significancies.

### 3.7 DISCUSSION OF TECHNIQUES, QUESTIONNAIRES, SCALES, INDICES AND EQUIPMENT

#### 3.7.1 Range of Motion (ROM) testing

The range of motion is described by Anderson (1989) as the range, measured in degrees of a circle, through which a joint can be extended and flexed. In patients presenting with Myofascial Pain and Dysfunction Syndrome, there is usually a restriction in the range of motion of the joints that are being acted on by the involved muscles. The exact cervical ROM in flexion, extension, lateral flexion and rotation, was measured by means of a goniometer. Increases in ROM after the initial visit was viewed as being a positive

reflection on the treatment being administered.

### 3.7.2 The Numerical Rating Scale (NRS) (Appendix C)

This is a subjective scale whereby the patients can estimate their levels of pain prior to each treatment and at the final consultation. The recorded data gave the researcher a good idea as to the progress of the patient and the success of the treatment as a decrease in pain is often indicative of an improvement of the condition. The scale used was a modification of the NRS 101 and the BS 11 (the 11 point box scale) (Jensen *et al*, 1986).

The scale consists of a line numbered 0 to 10 with equal distances between each number. No blocks were drawn around the number and the patient was informed that 0 represents no pain and 10 represents maximum pain. A tick or X placed over the appropriate number described the patient's pain level for their consultation.

Initially both this form of the NRS and the Visual Analogue Scale (VAS) were considered. However drawbacks to the VAS were that it involves measurement of the patient's line by the researcher adding a source of error to the scale score. Also in the process of photocopying a length change in the 10cm line may occur making the comparison between distances measured on the original and on the photocopied scale more difficult (Jensen *et al*, 1986). The NRS scale was chosen for its simplicity of administration and scoring and its proven validity and practicality (Jensen *et al*, 1986) and for its

sensitivity (McDowell and Newell, 1987: 238).

### 3.7.3 The Short-Form McGill Pain Questionnaire (SF-MPQ) (Appendix F)

McDowell and Newell (1987:248) state that the status of Melzack's McGill Pain Questionnaire as the leading instrument for describing the various dimensions of pain is unquestionable.

This questionnaire was completed prior to the 1st, final and follow-up consultations. The SF-MPQ serves to give the researcher a descriptive subjective account of the patient's pain which is then scored numerically. It was used in preference to the McGill Pain Questionnaire (long-form) in order to cut down on consultation time and in view of the other data needing to be collected.

Sensory, affective and total pain scores were calculated for each SF-MPQ completed.

The SF-MPQ consists of 15 descriptors (11 sensory and 4 affective) which are rated on an intensity scale as 0 = none, 1 = mild, 2 = moderate or 3 = severe (Melzack, 1987:191). For each questionnaire, three pain scores are derived from the sum of the intensity rank values of the words chosen for sensory, affective and total descriptors.

For detailed information as to the application and description of this

questionnaire refer to Melzack (1987, 1975: 277-299). Personal permission for use of this questionnaire was granted by Professor Melzack of McGill University (Appendix H).

#### 3.7.4 The CMCC Neck Disability Index (Appendix E)

This index furnishes information as to how the patient's pain affected their everyday life. Each patient was instructed to answer the questions in terms of their regional pain, regardless of whether it was specifically located to the neck or thoracic musculature. This questionnaire was completed prior to the 1st, final and follow-up consultations.

The reliability and validity of this index was reported in Vernon and Mior (1991), and is applicable to a wide age range and is unaffected by gender.

#### 3.7.5 The Pain Disability Index (Appendix D)

The Pain Disability Index indicates to the researcher to what degree the patient's affliction interferes with their normal daily functioning. It is subjective and the questions pertain to normal daily activities. The Pain Disability Index was completed prior to 1st, final and follow-up consultations.

It is composed of seven visual analogue scales that rate a subset of activities of daily living. It has been shown to have good reliability and validity to discriminate levels of complaint severity (Vernon and Mior, 1990: 410). Not

being designed for any specific pain complaint it appeared ideal for this study due to its broad applicability. It was expected that results would have an extremely high degree of correlation with the CMCC Neck Disability Index and for this reason was kept in the study in order to show consistency in patient response to questionnaires.

#### 3.7.6 The algometer

An algometer, as defined in Anderson (1989: 18), is an instrument used in the measuring of sensitivity to painful stimuli. The stimulus was direct pressure over the TP of the involved muscle/s. A force dial type was used and applied to the trigger points to the level of tolerance of minimum pressure causing pain or discomfort, where a reading was then taken. As related in the literature review, active myofascial TPs are "exquisitely" painful to pressure palpation and therefore patients with TPs will have a lower pain threshold than people without. A patient's decreasing sensitivity to the pressure applied over the TP area indicated to the researcher that the treatment was working. Readings were taken prior to each treatment and at the follow-up consultation.

For each consultation the sum of the readings for each trigger point were calculated and an average score obtained. Inter and intra group comparisons were made at the first, final and follow-up consultations.

The reliability of pressure threshold measurement using an algometer in

myofascial trigger points has been documented for both its ability to detect location and assess pain sensitivity (Fischer, 1987). Vernon *et al* (1990) confirm the reliability of the pressure threshold measurement and find the algometer suitable for objectively demonstrating and quantitatively measuring tenderness in muscles.

### 3.7.7 The Symptom Diagram (Appendix G)

These were provided for the sole purpose of aiding the researcher in assessing the nature of the patient's condition.

## 3.8 STATISTICAL ANALYSIS

In research detailed information is often difficult to obtain due to high costs involved or because the process of collecting data is too time consuming (Steyn *et al*, 1994: 4). The costs involved in this research were minimal and the data collection and research process was conducted over a two year period allowing for thorough data collection and analysis.

The data derived from the NRS, Pain Disability Index, CMCC Neck Disability Index, SF-MPQ, algometer readings, and goniometer measurements for statistical analysis were obtained from the initial, final and follow-up consultations only, as these were the consultations whereby statistical, by significant or insignificant results would most likely be apparent. The data were analysed using the computer software programme Statgraphics Plus, Version G, supplied by Manugistics.

Wilcoxon Signed Rank tests utilizes the signs of the differences between observed values and the hypothesized median. It assumes the population is asymmetric and is used for intra-group comparisons (Daniel, 1978: 31). All data collected were subject to this test.

The Mann Whitney U test is used for inter-group comparisons and for testing the null hypothesis of equal population parameters (Daniel, 1978: 82). This test was applied to all the data collected.

Chapter Four

RESULTS

# RESULTS

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## 4.0 INTRODUCTION

The results of the various subjective and objective data set statistical analyses are listed in this chapter. All results are listed under the headings of their specific data sets, namely:

- 4.1 Demographic Data
- 4.2 Numerical Rating Scale (NRS)
- 4.3 CMCC Neck Disability Index
- 4.4 Pain Disability Index (PDI)
- 4.5 Short-Form McGill Pain Questionnaire (S-FMPQ)
- 4.6 Algometer Readings
- 4.7 Cervical Range of Motion

The Wilcoxon Sign Rank Test was used for intra-group comparisons and the Mann Whitney U test was used for inter-group comparisons. The tests were conducted at the 5% level of significance (95% confidence interval,  $p < 0.05$ ) and at the 10% level of significance (90% confidence interval,  $p < 0.1$ ).

Although for uniformity it is usual to report results at one confidence interval (e.g.  $p < 0.05$ ), because there were situations where there was no significant difference at the 95%

confidence interval but there was a significant difference at 90% confidence interval, it was worth mentioning due to the small sample sizes used in the study. Since there is no single standard or universal level of significance for testing hypotheses the study reports on results obtained at the 90% confidence interval where they differ from these obtained at the 95% confidence interval as they are of value when drawing inferences as to the efficacy of the two treatment protocols. It should be noted however, that the higher the significance level used for testing an hypothesis, the higher the probability of rejecting a null hypothesis when it is true (Levin, 1987: 332, 374).

No significant difference between the medians is denoted by "NS", while "S" indicates a significant difference.

Combination treatment group (C) refers to the treatment group receiving both chiropractic adjustment and dry-needling procedures, while dry-needling group (DN) refers to the treatment group receiving dry-needling only.

The following abbreviations are used:

C<sub>1</sub> - initial consultation, combination treatment group

C<sub>F</sub> - final consultation, combination treatment group

C<sub>FU</sub> - follow-up consultation, combination treatment group

DN<sub>1</sub> - initial consultation, dry-needling group

DN<sub>F</sub> - final consultation, dry-needling group

DN<sub>FU</sub> - follow-up consultation, dry-needling group

MGS - McGill Sensory

MGA - McGill Affective

MGT - McGill Total

Algom - Algometer

Flex - Forward Flexion

Ext - Extension

L. Lat - Left Lateral Flexion

R. Lat - Right Lateral Flexion

L. Rot - Left Rotation

R. Rot - Right Rotation

#### 4.1 DEMOGRAPHIC DATA OBTAINED FROM THE PATIENTS' FILES

TABLE A: PATIENT AGE GROUP RANGES

RANGE	22-31	32-41	42-51	52-61	62-66
Number of patients	6	9	10	4	3
n = 32	18.8%	28.1%	31.3%	12.5%	9.4%

Patients ranged in age from the youngest being 22 years to the oldest being 65 years. The majority (59.4%) of patients were in the 32 - 51 age group range.

TABLE B: DIVISION OF PATIENT GENDER

	Male	Female
Combination	10	6
Dry-needling	8	8
Total	18	14

The sample of this study was made up of 18 male (56.3%) and 14 female (43.8%) participants.

TABLE C: DIVISION OF PATIENT RACE

	White	Asian	Coloured	Black
Combination	12	4	0	0
Dry-Needling	8	7	1	0
Total	20 (62.5%)	11 (34.4%)	1 (3.1%)	0 (0%)

TABLE D: PATIENTS' OCCUPATION

OCCUPATION	NUMBER OF PATIENTS	n = 32
Dentist	1	3.1%
Accountant	1	3.1%
Shopkeeper	1	3.1%
Engineer	1	3.1%
Teacher	2	6.3%
Lecturer	1	3.1%
Home Executive	3	9.4%
Pensioner	2	6.3%
Student	3	9.4%
Insurance Broker	1	3.1%
Business Person	6	18.8%
Salesman	3	9.4%
Jockey	1	3.1%
Jeweller	1	3.1%
Training Assistant	1	3.1%
Carpet Fitter	1	3.1%
Unemployed	2	6.3%
Customer Service	1	3.1%

Of the sample group, 6 (18.8%) listed their occupation as being businessmen, 3 (9.4%) as salesmen, 3 (9.4%) as students, 3 (9.4%) as home executives. These 4 occupations accounted for 46.9% (15 patients) of the sample group. The remainder of the group consisted of a variety of different occupations all of which are listed in Table D.

#### 4.2 NUMERICAL RATING SCALE (NRS)

TABLE 1: NRS MEDIAN SCORES %

	Initial (I)	Final (F)	Follow-up (F/U)
COMBINATION	8	0	0
DRY-NEEDLING	7.5	1	3

TABLE 2: RESULTS FOR THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>	
NRS $C_I$ and NRS $C_F$	: S
NRS $C_I$ and NRS $C_{F/U}$	: S
NRS $C_F$ and NRS $C_{F/U}$	: NS
<u>DRY-NEEDLING GROUP</u>	
NRS $DN_I$ and NRS $DN_F$	: S
NRS $DN_I$ and NRS $DN_{F/U}$	: S
NRS $DN_F$ and NRS $DN_{F/U}$	: NS

TABLE 3: RESULTS FOR THE MANN WHITNEY U TEST

NRS $C_I$ and NRS $DN_I$	: NS
NRS $C_F$ and NRS $DN_F$	: NS
NRS $C_{F/U}$ and NRS $DN_{F/U}$	: NS

#### 4.3 CMCC NECK DISABILITY INDEX

TABLE 4: CMCC NECK DISABILITY INDEX MEDIAN SCORES %

	Initial	Final	F/U
COMBINATION	45	5	3
DRY-NEEDLING	42	8	18

TABLE 5: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>	
CMCC $C_i$ and CMCC $C_F$	: S
CMCC $C_i$ and CMCC $C_{F/U}$	: S
CMCC $C_F$ and CMCC $C_{F/U}$	: NS
<u>DRY-NEEDLING GROUP</u>	
CMCC $DN_i$ and CMCC $DN_F$	: S
CMCC $DN_i$ and CMCC $DN_{F/U}$	: S
CMCC $DN_F$ and CMCC $DN_{F/U}$	: NS

TABLE 6: RESULTS OF THE MANN WHITNEY U TEST

CMCC $C_i$ and CMCC $DN_i$	: NS
CMCC $C_F$ and CMCC $DN_F$	: NS
CMCC $C_{F/U}$ and CMCC $DN_{F/U}$	: S at $p=0.1$
NS at $p = 0.05$	

4.4 PAIN DISABILITY INDEX (PDI)

TABLE 7: PAIN DISABILITY INDEX MEDIAN SCORES

	INITIAL	FINAL	F/U
COMBINATION	51.5	0.5	0
DRY-NEEDLING	40.5	3.5	17

TABLE 8: RESULTS FOR THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>	
PDI C <sub>i</sub> and PDI C <sub>F</sub>	: S
PDI C <sub>i</sub> and PDI C <sub>F/U</sub>	: S
PDI C <sub>F</sub> and PDI C <sub>F/U</sub>	: NS
<u>DRY-NEEDLING GROUP</u>	
PDI DN <sub>i</sub> and PDI DN <sub>F</sub>	: S
PDI DN <sub>i</sub> and PDI DN <sub>F/U</sub>	: S
PDI DN <sub>F</sub> and PDI DN <sub>F/U</sub>	: S

TABLE 9: RESULTS FOR THE MANN WHITNEY U TEST

PDI C <sub>i</sub> and PDI DN <sub>i</sub>	: NS
PDI C <sub>F</sub> and PDI DN <sub>F</sub>	: NS
PDI C <sub>F/U</sub> and PDI DN <sub>F/U</sub>	: S

4.5 SHORT-FORM MCGILL PAIN QUESTIONNAIRE (S-FMPQ)

4.5.1 S-FMPQ SENSORY

TABLE 10 : MCGILL-SENSORY MEDIAN SCORES

	INITIAL	FINAL	F/U
COMBINATION	73	0	0
DRY-NEEDLING	68.5	33	47

TABLE 11: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>		
MGS $C_1$ and MGS $C_F$	:	S
MGS $C_1$ and MGS $C_{F/U}$	:	S
MGS $C_F$ and MGS $C_{F/U}$	:	NS
<u>DRY-NEEDLING GROUP</u>		
MGS $DN_1$ and MGS $DN_F$	:	S
MGS $DN_1$ and MGS $DN_{F/U}$	:	S
MGS $DN_F$ and MGS $DN_{F/U}$	:	NS

TABLE 12: RESULTS FOR THE MANN WHITNEY U TEST

MGS $C_1$ and MGS $DN_1$	:	NS
MGS $C_F$ and MGS $DN_F$	:	NS
MGS $C_{F/U}$ and MGS $DN_{F/U}$	:	S

#### 4.5.2 S-F MPQ - AFFECTIVE

TABLE 13: AFFECTIVE MEDIAN SCORES

	INITIAL	FINAL	FOLLOW-UP
COMBINATION	67	0	0
DRY-NEEDLING	53.5	0	0

TABLE 14: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>		
MGA C <sub>I</sub> and MGA C <sub>F</sub>	:	S
MGA C <sub>I</sub> and MGA C <sub>F/U</sub>	:	S
MGA C <sub>F</sub> and MGA C <sub>F/U</sub>	:	NS
<u>DRY-NEEDLING GROUP</u>		
MGA DN <sub>I</sub> and MGA DN <sub>F</sub>	:	S
MGA DN <sub>I</sub> and MGA DN <sub>F/U</sub>	:	S
MGA DN <sub>F</sub> and MGA DN <sub>F/U</sub>	:	*

\*No statistical result reported as 9 tied pairs reduced usable data set to 6 paired observations. Such a data set is too small for meaningful statistical analysis, and a median of zero is sufficiently informative.

TABLE 15: RESULTS OF THE MANN WHITNEY U TEST

MGA C <sub>I</sub> and MGA DN <sub>I</sub>	:	NS
MGA C <sub>F</sub> and MGA DN <sub>F</sub>	:	NS
MGA C <sub>F/U</sub> and MGA DN <sub>F/U</sub>	:	NS

4.5.3 S-F MPQ total

TABLE 16: TOTAL MEDIAN SCORES

	Initial	Final	Follow-up
COMBINATION	72.5	0	0
DRY-NEEDLING	68	33	47

TABLE 17: RESULTS FOR THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>	
MGT C <sub>1</sub> and MGT C <sub>F</sub>	: S
MGT C <sub>1</sub> and MGT C <sub>F/U</sub>	: S
MGT C <sub>F</sub> and MGT C <sub>F/U</sub>	: NS
<u>DRY-NEEDLING GROUP</u>	
MGT DN <sub>1</sub> and MGT DN <sub>F</sub>	: S
MGT DN <sub>1</sub> and MGT DN <sub>F/U</sub>	: S
MGT DN <sub>F</sub> and MGT DN <sub>F/U</sub>	: S

TABLE 18: RESULTS FOR THE MANN WHITNEY U TEST

MGT C <sub>1</sub> and MGT DN <sub>1</sub>	: NS
MGT C <sub>F</sub> and MGT DN <sub>F</sub>	: S at p=0.1
MGT C <sub>F/U</sub> and MGT DN <sub>F/U</sub>	: S

#### 4.6 ALGOMETER RESULTS

TABLE 19: ALGOMETER MEDIAN SCORES

	Initial	Final	Follow-up
COMBINATION	1.9	5.9	6.5
DRY-NEEDLING	1.6	6.05	2.6

TABLE 20: RESULTS FOR THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>		
Algom C <sub>I</sub> and Algom C <sub>F</sub>	:	S
Algom C <sub>I</sub> and Algom C <sub>F/U</sub>	:	S
Algom C <sub>F</sub> and Algom C <sub>F/U</sub>	:	NS
<u>DRY-NEEDLING GROUP</u>		
Algom DN <sub>I</sub> and Algom DN <sub>F</sub>	:	S
Algom DN <sub>I</sub> and Algom DN <sub>F/U</sub>	:	S
Algom DN <sub>F</sub> and Algom DN <sub>F/U</sub>	:	S

TABLE 21: RESULTS OF THE MANN WHITNEY U TESTS

Algom C <sub>I</sub> and Algom DN <sub>I</sub>	:	NS
Algom C <sub>F</sub> and Algom DN <sub>F</sub>	:	NS
Algom C <sub>F/U</sub> and Algom DN <sub>F/U</sub>	:	S

## 4.7 CERVICAL RANGE OF MOTION RESULTS

### 4.7.1 Forward flexion

TABLE 22: FORWARD FLEXION MEDIAN SCORES

	Initial	Final	Follow-up
COMBINATION	60	64	65.5
DRY-NEEDLING	58.5	61.5	60

TABLE 23: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>	
FLEX C <sub>I</sub> and FLEX C <sub>F</sub>	: S
FLEX C <sub>I</sub> and FLEX C <sub>F/U</sub>	: S
FLEX C <sub>F</sub> and FLEX C <sub>F/U</sub>	: NS
<u>DRY-NEEDLING GROUP</u>	
FLEX DN <sub>I</sub> and FLEX DN <sub>F</sub>	: S
FLEX DN <sub>I</sub> and FLEX DN <sub>F/U</sub>	: S
FLEX DN <sub>F</sub> and FLEX DN <sub>F/U</sub>	: S

TABLE 24: RESULTS OF THE MANN WHITNEY U TEST

FLEX C <sub>I</sub> and FLEX DN <sub>I</sub>	: NS
FLEX C <sub>F</sub> and FLEX DN <sub>F</sub>	: NS
FLEX C <sub>F/A</sub> and FLEX DN <sub>F/U</sub>	: NS

4.7.2 Extension

TABLE 25 : EXTENSION MEDIAN SCORES

	Initial	Final	Follow-up
COMBINATION	51	60.5	51
DRY-NEEDLING	54	56	56

TABLE 26: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>	
EXT C <sub>I</sub> and EXT C <sub>F</sub>	: S
EXT C <sub>I</sub> and EXT C <sub>F/U</sub>	: S
EXT C <sub>F</sub> and EXT C <sub>F/U</sub>	: NS
<u>DRY-NEEDLING GROUP</u>	
EXT DN <sub>I</sub> and EXT DN <sub>F</sub>	: S
EXT DN <sub>I</sub> and EXT DN <sub>F/U</sub>	: S
EXT DN <sub>F</sub> and EXT DN <sub>F/U</sub>	: NS

TABLE 27: RESULTS OF THE MANN WHITNEY U TEST

EXT C <sub>I</sub>	and	EXT DN <sub>I</sub>	: NS
EXT C <sub>F</sub>	and	EXT DN <sub>F</sub>	: NS
EXT C <sub>F/U</sub>	and	EXT DN <sub>F/U</sub>	: NS

4.7.3 Left lateral flexion

TABLE 28 : LEFT LATERAL FLEXION MEDIAN SCORES

	Initial	Final	Follow-up
COMBINATION	35	44	44
DRY-NEEDLING	37	42	41

TABLE 29: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>			
L.LATC <sub>I</sub>	and	L.LATC <sub>F</sub>	: S
L.LATC <sub>I</sub>	and	L.LATC <sub>F/U</sub>	: S
L.LATC <sub>F</sub>	and	L.LATC <sub>F/U</sub>	: NS
<u>DRY-NEEDLING GROUP</u>			
L.LATDN <sub>I</sub>	and	L.LATDN <sub>F</sub>	: S
L.LATDN <sub>I</sub>	and	L.LATDN <sub>F/U</sub>	: S
L.LATDN <sub>F</sub>	and	L.LATDN <sub>F/U</sub>	: S

TABLE 30: RESULTS OF THE MANN WHITNEY U TEST

L.LATC <sub>I</sub>	and	L.LATDN <sub>I</sub>	: NS
L.LATC <sub>F</sub>	and	L.LATDN <sub>F</sub>	: NS
L.LATC <sub>F/U</sub>	and	L.LATDN <sub>F/U</sub>	: S

#### 4.7.4 Right lateral flexion

TABLE 31: RIGHT LATERAL FLEXION MEDIAN SCORES

	Initial	Final	Follow-up
COMBINATION	36.5	44	44
DRY-NEEDLING	37.5	42	42

TABLE 32: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>				
R.LATC <sub>I</sub>	and	R.LATC <sub>F</sub>	:	S
R.LATC <sub>I</sub>	and	R.LATC <sub>F/U</sub>	:	S
R.LATC <sub>F</sub>	and	R.LATC <sub>F/U</sub>	:	NS
<u>DRY-NEEDLING GROUP</u>				
R.LATDN <sub>I</sub>	and	R.LATDN <sub>F</sub>	:	S
R.LATDN <sub>I</sub>	and	R.LATDN <sub>F/U</sub>	:	S
R.LATDN <sub>F</sub>	and	R.LATDN <sub>F/U</sub>	:	*

\*Due to tied pairs there were only 9 usable pairs in data set making it too small for meaningful analyses.

TABLE 33: RESULTS OF THE MANN WHITNEY U TEST

R.LATC <sub>I</sub>	and	R.LATDN <sub>I</sub>	:	NS
R.LATC <sub>F</sub>	and	R.LATDN <sub>F</sub>	:	S
R.LATC <sub>F/U</sub>	and	R.LATDN <sub>F/U</sub>	:	S

#### 4.7.5 Left rotation

TABLE 34: LEFT ROTATION MEDIAN SCORES

	Initial	Final	Follow-up
COMBINATION	59.5	67.5	67.5
DRY-NEEDLING	60	65	63

TABLE 35: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>				
L.ROT C <sub>I</sub>	and	L.ROT C <sub>F</sub>	:	S
L.ROT C <sub>I</sub>	and	L.ROT C <sub>F/U</sub>	:	S
L.ROT C <sub>F</sub>	and	L.ROT C <sub>F/U</sub>	:	NS
<u>DRY-NEEDLING GROUP</u>				
L.ROT DN <sub>I</sub>	and	L.ROT DN <sub>F</sub>	:	S
L.ROT DN <sub>I</sub>	and	L.ROT DN <sub>F/U</sub>	:	S
L.ROT DN <sub>F</sub>	and	L.ROT DN <sub>F/U</sub>	:	S

TABLE 36: RESULTS OF THE MANN WITNEY-U TEST

L.ROT C <sub>I</sub>	and	L.ROT DN <sub>I</sub>	:	NS
L.ROT C <sub>F</sub>	and	L.ROT DN <sub>F</sub>	:	NS
L.ROT C <sub>F/U</sub>	and	L.ROT DN <sub>F/U</sub>	:	S

#### 4.7.6 Right rotation

TABLE 37: RIGHT ROTATION MEDIAN SCORES

	Initial	Final	Follow-up
COMBINATION	60	67.5	67
DRY-NEEDLING	62	64.5	61

TABLE 38: RESULTS OF THE WILCOXON SIGN RANK TEST

<u>COMBINATION GROUP</u>			
R.ROT C <sub>I</sub>	and	R.ROT C <sub>F</sub>	: S
R.ROT C <sub>I</sub>	and	R.ROT C <sub>F</sub>	: S
R.ROT C <sub>F</sub>	and	R.ROT C <sub>F/U</sub>	: NS
<u>DRY-NEEDLING GROUP</u>			
R.ROT DN <sub>I</sub>	and	R.ROT DN <sub>F</sub>	: S
R.ROT DN <sub>I</sub>	and	R.ROT DN <sub>F/U</sub>	: NS
R.ROT DN <sub>F</sub>	and	R.ROT DN <sub>F/U</sub>	: S

TABLE 39: RESULTS OF THE MANN WHITNEY U TEST

R.ROT C <sub>I</sub>	and	R.ROT DN <sub>I</sub>	: NS
R.ROT C <sub>F</sub>	and	R.ROT DN <sub>F</sub>	: NS
R.ROT C <sub>F/U</sub>	and	R.ROT DN <sub>F/U</sub>	: NS

Chapter Five

DISCUSSION

# DISCUSSION

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## 5.1 INTRODUCTION

This chapter serves to discuss the results presented in Chapter Four in relation to the collection of data and to comment on problems encountered during the course of this study. The results will be discussed under the headings of the various subjective and objective data collected. The author's final conclusions and recommendations for future studies are also discussed.

## 5.2 DISCUSSION OF THE RESULTS

### 5.2.1 The Numerical Rating Scale

The Wilcoxon Sign Rank Test used for intra-group comparisons determined whether there was a significant difference between initial and final, initial and follow-up, and final and follow-up consultations. The results showed that both the treatment groups improved significantly between the initial consultation and final consultation, and between the initial consultation and follow-up consultation (Table 2). However, no statistically significant difference between the final and follow-up consultations was recorded for either group. Median scores for both groups (Table 1) clearly supported the above findings.

The Mann Whitney U Test used for inter-group comparisons showed no statistically significant difference between the combination group and the dry-needling group at the initial, final and follow-up consultations ( $p>0.05$ ).

The results for the Numerical Rating Scale can thus be interpreted as both groups having responded favourably to treatment insofar as their subjective perceived pain intensity. There was no statistically significant difference between the two treatment protocols, however. The null hypothesis was therefore accepted.

#### 5.2.2 The CMCC Neck Disability Index

The Wilcoxon Sign Rank test showed that both groups responded favourably to their respective treatment protocols with statistically significant differences being recorded between initial and final consultation and initial and follow-up consultations. However, no statistically significant difference was shown between final and follow-up consultations for either group (Chapter Four, 4.2).

The Mann Whitney U test used for inter-group comparisons showed no statistically significant difference for initial, final and follow-up consultations for  $p<0.05$ , but did however show a statistically significant difference at the follow-up consultation for  $p<0.1$ .

### 5.2.3 **The pain disability index**

The Wilcoxon Sign Rank test showed a statistically significant difference between initial and final, and initial and follow-up consultations for both combination and dry-needling groups, indicating favourable responses to treatment. No statistically significant difference between final and follow-up was shown for the combination group while a statistically significant difference between final and follow-up was recorded for the dry-needling group, indicating a regression from the final treatment, but still an overall improvement from the initial consultation (see Table 7).

The Mann Whitney U test showed no statistically significant difference for initial and final consultations between the two groups. There was however a statistically significant difference shown for the follow-up consultation indicating a more favourable response in the combination group.

### 5.2.4 **The short-form McGill pain questionnaire**

In the combination group, the Wilcoxon Sign Rank test showed that for the sensory, affective and total scores, there was a statistically significant difference between the initial and final, and the initial and follow-up consultations, with no statistically significant difference shown between the final and follow-up consultations.

The above trend was largely followed in the dry-needling group except between the final and follow-up consultation where a statistically significant

difference was recorded for the total Short-Form McGill pain questionnaire scores. This indicates a regression in the control group since the final consultation.

The Mann Whitney U test showed that for the sensory, affective and total scores there was no statistically significant difference between the combination and dry-needling for the initial consultation. No statistically significant differences were recorded for final and follow-up consultations of the affective scores. However, a statistically significant difference at the follow-up consultation for sensory scores was recorded, while statistically significant differences at both the final and follow-up consultations was recorded for total scores. The latter indicate a more favourable response from the combination group.

#### 5.2.5 The algometer

The Wilcoxon Sign Rank test shows statistically significant differences between initial and final, and initial and follow-up consultations for both groups, thus indicating favourable responses to treatment. No statistically significant difference between final and follow-up consultations was recorded for the combination group, indicating a lasting effect of treatment. However, a statistically significant difference between final and follow-up consultation was shown for the dry-needling group, indicating a deterioration since the final treatment (Tables 19 and 20). This suggests that the dry-needling group, although showing favourable patient response to treatment since the initial consultation, was unable to maintain the level of improvement from final to

follow-up consultation as did the combination group.

The Mann Whitney U test showed no statistically significant difference at the initial and final consultations, but showed a statistically significant difference at the follow-up consultation. The latter indicates a more favourable response in the combination group at the follow-up consultation.

The results obtained for inter- and intra-group comparisons in algometer testing show the combination group to have demonstrated a better response with regard to pain sensitivity to pressure.

#### 5.2.6 Cervical Range of Motion

The Wilcoxon Sign Rank test showed a statistically significant difference between initial and final, and initial and follow-up, consultations for all cervical ranges of motion for both groups, with the exception of right rotation in the dry-needling group, at the follow-up consultation. This indicated a favourable response to treatment with increased cervical active range of motion since the initial treatment for both groups in the former, while the latter indicates a regression in the dry-needling group since the final consultation to the point where there is no longer any statistically significant improvement in right rotation since the initial treatment (Tables 37 and 38).

For the final and follow-up consultations, no statistically significant differences were shown for the combination group, thus indicating a

maintenance of active ROM since the last consultation. However, in forward flexion for the control group, a statistically significant difference was obtained ( $p < 0.05$ ) between final and follow-up consultations indicating a slight regression since the final consultations.

#### 5.2.7 Summary

The overall impressions for all the data sets analysed was that the hypotheses that both groups would show improvement between initial and final, and initial and follow-up treatments was correct.

However, in the combination group no statistically significant difference between the final and follow-up consultation was encountered, indicating a preservation of improvement, whereas in the control group a regression was sometimes seen between final and follow up consultations indicating a deterioration of the patient's condition with respect to the final consultation (Tables 8, 20, 23 29, 35 and 38).

With respect to the Mann Whitney U test for inter-group comparisons, no statistically significant difference was found between the groups at the initial consultation. This was both desired and expected as both groups were randomly selected.

At the final consultation, no statistically significant difference between the groups was elicited for the majority of data sets, indicating a similar level of

improvement for both groups, thus accepting the null hypothesis which states no statistically significant difference between the groups exists and that both treatments are, therefore, equally effective. Notable exceptions to the above were the Short-Form McGill Pain Questionnaire total scores (Table 18) and the right lateral flexion readings (Table 33) which showed a statistically significant difference, indicating that the combination group treatment was more effective, hence the null hypothesis was rejected in these cases.

The inter-group comparisons at the follow-up consultation revealed a rejection of the null hypothesis for the following data sets. These were the CMCC Neck Disability Index (Table 6), the Pain Disability Index (Table 9), the S-F MPQ Sensory scores (Table 12), the S-F MPQ Total scores (Table 18), the algometer scores (Table 21), left lateral flexion (Table 30), right lateral flexion (Table 33) and left rotation (Table 36). The above indicated that there was a statistically significant difference between the two groups at the follow-up consultation which indicated a greater improvement of the combination group for those data sets. However, it should be noted that the five remaining data sets showed no statistically significant difference at the follow-up consultation between the two groups and thus no inferences can be made as to the superiority of either treatment protocol (see Tables 3, 15 24, 27 and 39).

### 5.3 PROBLEMS ENCOUNTERED IN THE STUDY

As with any study involving out-patients, compliance is always the greatest problem. This author had no way of ascertaining the degree to which the patients followed instructions on leaving the clinic. That is, did they follow advice and eliminate activities or factors that perpetuate myofascial trigger points. Patient compliance in studies is an area that deserves individual attention as it has the capacity to alter results and is therefore a tonic that future researchers could devote more time to and possibly make it the subject of a future research project.

In retrospect, the author felt that the quantity of subjective data collected was excessive and that there was a distinct possibility patients may have hurried through answering questionnaires in order to shorten the time spent during consultation. It is the author's recommendation that in future studies the patient is given an obligatory time period in which to complete questionnaires and that they are instructed to make full use of the time.

As encountered by Kretzmann (1995), the reliability of the goniometer (Autogon 2 supplied by Smith and Nephew Rolyan Inc.) used to measure cervical range of motion in this study was questionable. This was due to the necessity of the author to manually manoeuvre the lever arms and visually estimate anatomical landmarks and parallel surfaces as reference points. While this method was entirely unsatisfactory for obtaining accurate results, consistency in method would have ensured that any inaccuracies were distributed evenly between the two groups. Due to the relatively

small sample size, the author was limited to certain statistical tests for analysis of the data.

Future researchers conducting similar studies would be well advised to use larger sample sizes, thus enabling a wider variety of statistical tests to be utilised.

Furthermore, researcher bias, however unintentional, almost certainly does exist, and may be eliminated by conducting blinded, controlled placebo based studies (Haldeman, 1992: 418).

Chapter Six

CONCLUSIONS  
AND  
RECOMMENDATIONS

# CONCLUSIONS AND RECOMMENDATIONS

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## 6.1 CONCLUSIONS

With respect to the results it can be shown that the combination group (receiving chiropractic adjustments and dry-needling) and the dry-needling group (receiving dry-needling) improved statistically significantly with treatment, thus supporting the hypothesis that both treatment protocols would be effective.

The fact that overall no statistically significant difference between the groups was elicited at the final consultation demands that we accept the null-hypothesis which suggests both treatment protocols are equally effective. On inter-group comparison at the follow-up consultation, it becomes apparent that the slight majority of data sets show a statistically significant difference favouring the combination group. This implies that the combination treatment protocol appears to be more clinically effective over longer periods than does the dry-needling treatment protocol.

However, from the above, it must be said that, for the purposes of this study, neither treatment protocol can be advocated as more effective on the basis of the statistics.

## 6.2 RECOMMENDATIONS

It is recommended that the study be repeated with larger sample sizes, which would be more representative of a population, thus enabling a greater variety of statistical analyses to be performed, which would support or refute the findings of this study.

It is this author's opinion that this would show a definitive difference between the two treatment protocols in favour of the combination group. This opinion can be suggested based on trends seen in the follow-up consultation in which the majority of results showed a statistically significant difference favouring the combination group.

A useful adjunct to this study would be the addition of a third treatment group receiving chiropractic adjustment only, and is one which this author hopes to investigate. The author would like to reiterate at this point that further studies should be controlled, randomised and, where possible, blinded to ensure that only inferences drawn from the results have the highest benefit to the patient when applied to the clinical setting.

Finally, it is recommended that all health care practitioners take note of the possible effectiveness of dry-needling in terms of patient recovery and in terms of the inexpensiveness of the technique and its relative simplicity to administer.



# REFERENCES

## REFERENCES

Anderson, D.M. 1989. *Dorland's Pocket Medical Dictionary*. 24th Edition. Philadelphia, W.B. Saunders Co., 669p. ISBN 0-7216-3127-4.

Baldry, P.E. 1989. *Acupuncture Trigger Points and Musculoskeletal Pain*. New York, Churchill Livingstone, ISBN, 2950p. 0-443-039917.

Bennett, R.M. 1986. Current Issues Concerning the Management of Fibrositis/Fibromyalgia Syndrome. *The American Journal of Medicine*. 81 (3A): 15-18.

Cathey, M.A., Wolfe, F., Kleinheksel, S.M. and Donna, H.J. 1986. Socioeconomic Impact of Fibrositis: A Study of 81 Patients with Primary Fibrositis. *The American Journal of Medicine*. 81(3A): 78-82.

Cheng, R.S. and Pomeranz, B. 1987. Electrotherapy of Chronic Musculo-skeletal Pain: Comparison of Electroacupuncture and Acupuncture Like Transcutaneous Electric Nerve Stimulation. *The Clinical Journal of Pain*. 2: 143-149.

Daniel, W.W. 1978. *Applied Nonparametric Statistics*. Boston, USA Houghton Mifflin Company, 503p. ISBN 0-395-25795-6.

Doran, D.M.L. and Newell, D.J. 1975. Manipulation in Treatment of Low Back Pain: A Multicentre Study. *British Medical Journal*. 2: 161-164.

Fischer, A.A. 1987. Pressure Threshold Measurement for Diagnosis of Myofascial Pain and Evaluation of Treatment Results. *The Clinical Journal of Pain*. 2: 207-214.

Garvey, T.A., Marks, M.R. and Wiesel, S.W. 1989. A Prospective Double Blind Evaluation of Trigger Point Injection Therapy for Low Back Pain. *Spine*. 14(9): 962-964.

Gatterman, M.I. 1990. *Chiropractic Management of Spine Related Disorders*. U.S.A. Williams and Wilkins. 437p. ISBN 0-883-03438-3.

Goldenberg, D.L. 1987. Fibromyalgia Syndrome, An Emerging but Controversial Condition, *Journal of American Medical Association*. 257 (20). 2782-2788.

Good, M.G. 1951. Objective Diagnosis and Curability of Non-articular Rheumatism. *The British Journal of Physical Medicine*. 14(1): 1-7.

Haldeman, S. 1992. *Principles and Practice of Chiropractic*. 2nd ed. Connecticut, U.S.A., Appleton and Lange. 641p. ISBN 0-8385-6360-0.

Hubbard, D.R. and Berkoff, G.M. 1993. Myofascial Trigger Points show Spontaneous Needle EMG Activity. *Spine*. 18(3): 1803-1807.

Jensen, M.P., Karoly, P. and Braver, S. 1986. The Measurement of Clinical Pain Intensity: A Comparison of Six Methods. *Pain*. 27: 117-126.

Jones, A.D. 1994. *The Effectiveness of Myofascial Trigger Point Therapy on Myofascial Pain Syndrome Trigger Points*. Masters Diploma Dissertation, Technikon Natal, Durban.

Kellgren, J.H. 1938. A Preliminary Account of Referral Pains Arising From Muscle. *British Medical Journal*. 1: 325-327.

Korr, I.M. 1975. Proprioceptors and Somatic Dysfunction. *Journal of American Osteopathic Association*. 74: 638-650.

Kretzmann, H. 1995. *The Effectiveness of McManis Traction used as an Adjunct to Spinal Manipulative Therapy*. Masters Diploma Dissertation, Technikon Natal, Durban.

Levin, R. 1987. *Statistics for Management*. 4th ed. New Jersey, Prentice-Hall Inc. 890p. ISBN 0-13-845207-5 01.

Levine, J.D., Gormley, J. and Fields, H.L. 1976. Observations of the Analgesic Effects of Needle Puncture (Acupuncture). *Pain*. 2: 149-159.

Lewitt, K. 1979. The Needle Effect in the Relief of Myofascial Pain. *Pain*. 6: 83-90.

Lewitt, K. and Simons, D. 1984. Myofascial Pain: Relief by Foot Isometric Relaxation. *Archives of Physical Rehabilitative Medicine*. Vol. 65: 452-456.

Macdonald, A.J.R., Macrae, K.D., Master, B.R. and Rubin, A.P. 1983. Superficial Acupuncture in the Relief of Chronic Low Back Pain. *Annals of the Royal College of Surgeons of England*. 65: 44-46.

McDowell, I. and Newell, C. 1987. *Measuring Health: A Guide to Rating Scales and Questionnaires*, 1st ed. New York Oxford University Press. ISBN. 0-19-5024101-1.

Melzack, R. 1975. The McGill Pain Questionnaire: Major Properties and Scoring Methods. *Pain* 1: 277-299.

Melzack, R., Stillwell, D.M. and Fox., E.J. 1977. Trigger Points and Acupuncture Points for Pain: Correlations and Implications. *Pain*. 3: 3-23.

Melzack, R. 1987. The Short-Form McGill Pain Questionnaire. *Pain*. 30: 191-197.

Melzack, R. 1981. Myofascial Trigger Points: Relation to Acupuncture and Mechanism of Pain, *Archives of Physical Rehabilitative Medicine*. Vol. 62: 114-117.

Murphy, G.J. 1989. Myofascial Trigger Points. *JCO* 23(9): 627-631.

Rubin, D. 1981. Myofascial Trigger Point Syndromes: An Approach to Management. *Archives of Physical Rehabilitative Medicine*. 62: 107-110.

Sandman, K.B. 1981. Myofascial Pain Syndromes: Their Mechanism, Diagnosis and Treatment. *Journal of Manipulative and Physical Therapeutics*. 4(3): 135-140.

Sandoz, R.W. 1981. Some Reflex Phenomena Associated with Spinal Derangements and Adjustments. *Annals of the Swiss Chiropractic Association*. 7: 60.

Sola, A.E., Rodenberger, M.L., and Gettys, B.B. 1954. Incidence of Hypersensitive Areas in Posterior Shoulder Muscles. *American Journal of Physical Medicine*. 34: 585-590.

Sola, A.E. and Williams, R.Z. 1956. Myofascial Pain Syndromes. *Neurology*. 6: 91-95.

States, A.Z. 1985. *States Manual of Spinal, Pelvic and Extravertebral Technic*. 2nd ed. Edited by Kirk, C.R., Lawrence, D.C., Valvo, N.L. Department of Chiropractic, National College of Chiropractic, Illinois. 245p.

Steyn, A.G., Smit, C.F., Du Toit, S.H. and Strasheim, C. 1994. *Modern Statistics in Practice*. South Africa. J.L. van Schaik Publishers, South Africa. 739p. ISBN 0-627-01989-7.

Telling, W.M. 1935. The Clinical Importance of Fibrositis in General Practice. *British Medical Journal*. April: 689-692.

Travell, J.G. and Simons, D.G. 1983. *Myofascial Pain and Dysfunction: The Trigger Point Manual*. Volume 1. USA, Williams and Wilkins. 713p. ISBN 0-683-08366-X.

Vernon, H.T., Aker, P., Burns, S., Viljakaanen, S. and Short, L. 1991. Pressure Pain Threshold Evaluation of the Effect of Spinal Manipulation in the Treatment of Chronic Neck Pain: A Pilot Study. *Journal of Manipulative and Physiological Therapeutics*. 13(1): 13-16.

Vernon, H.T. and Mior, S. 1990. The Neck Disability Index: A Study of Reliability and Validity. *Journal of Manipulative and Physiological Therapeutics*. 14(7): 409-415.

Yunus, M.B. Kaylan-Raman, U.P. and Kaylan-Raman, K. 1988. Primary Fibromyalgia Syndrome and Myofascial Pain Syndrome: Clinical Features and Muscle Pathology. *Archives of Physical and Rehabilitative Medicine*. 69: 451-454.

APPENDICES

APPENDIX A

CASE HISTORY FORM

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

CASE HISTORY

Patient: \_\_\_\_\_ Date # \_\_\_\_\_

File # \_\_\_\_\_

X-ray # \_\_\_\_\_

Age: \_\_\_\_\_ Sex: \_\_\_\_\_ Occupation: \_\_\_\_\_

Intern: \_\_\_\_\_ Signature: \_\_\_\_\_

FOR CLINICIAN'S USE ONLY

Initial visit clinician

Signature:

Case History:

Examination:

Previous: TN

Current: TN

Other

Other

X-ray Studies:

Previous TN

Current: TN

Other

Other

Clinical path. lab.:

Previous: TN

Current: TN

Other

Other

Case status:

PTT: Conditional:

Signed off:

Final sign out:

Recommendations:

Intern's case history

1. Source of history:
2. Chief complaint: (patient's own words)
  
3. Present illness:
  - Location
  - Onset
  - Duration
  - Frequency
  - Pain (character)
  - Progression
  - Aggravating factors
  - Relieving factors
  - Associated S & S
  - Previous occurrences
  - Past treatment and outcome
  
4. Other complaints:
  
5. Past history:
  - General health status
  - Childhood illnesses
  - Adult illnesses
  - Psychiatric illnesses
  - Accidents/injuries
  - Surgery
  - Hospitalisations

6. Current health status and life-style:

Allergies

Immunizations

Screening tests

Environmental hazards

(home, school, work)

Safety measures

(seat belts, condoms)

Exercise and leisure

Sleep patterns

Diet

Current medication

Tobacco

Alcohol

Social drugs

7. Family history:

Immediate family:

Age

Health

Cause of death

DM

Heart disease

CA

Arthritis

Anaemia

Headaches

Thyroid disease

Epilepsy

Mental illness

Alcoholism

Drug addiction

Other

8. Psychological history:

Home

Daily life

Important experiences

Religious beliefs

9. Review of symptoms:

General

Skin

Head

Eyes

Ears

Nose/sinuses

Mouth/throat

Neck

Breasts

Respiratory

Cardiac

Gastro-intestinal

Urinary

General

Vascular

Musculoskeletal

Neurologic

Haematologic

Endocrine

Psychiatric

APPENDIX B

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC  
PHYSICAL EXAMINATION FORM

PHYSICAL EXAMINATION

Underline abnormal findings in RED and elaborate on back of relevant page, if necessary.

MARK "NAD" if normal.

Patient: \_\_\_\_\_ File # \_\_\_\_\_  
Last name First name

Clinician: \_\_\_\_\_ Signature: \_\_\_\_\_

Intern: \_\_\_\_\_ Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Height: \_\_\_\_\_ Weight: \_\_\_\_\_ Temp: \_\_\_\_\_

Rates: Heart: \_\_\_\_\_ Pulse: \_\_\_\_\_ Respiration: \_\_\_\_\_

Blood pressure: Arms: L / R /

Legs: L / R /

General appearance:

STANDING EXAMINATION

Minor's sign

Skin changes

Posture

erect

Adam's

Ranges of motion:

T/L spine:

Flexion: 90 Fingers to floor

Extension: 50

R.lat.flex.: 30 Fingers down leg

L.lat.flex.: 30 Fingers down leg

Rot. to R.: 35

Rot. to L.: 35

Flex.

L.Rot.            R.Rot.

L.lat.            R.lat.

flex              flex

Ext.

/ = pain-free limitation; // = painful limitation

Romberg's sign

Pronator drift

Trendelenburg's sign

Gait

rhythm

balance

pendulousness

on toes

on heels

tandem

Half squat

Scapular winging

Muscle tone

Spasticity/Rigidity

Shoulder:

Skin

Symmetry

ROM- glenohumeral

scapulo-thoracic

acromioclavicular

elbow

wrist

Chest measurement

inspiration

expiration

visual acuity

Breast examination:

Inspection:

skin

size

contour

nipples

arms overhead

hands against hips

leaning forward

Palpation:

axillary lymph nodes

SEATED EXAMINATION

Spinal posture

head

scalp

skull

face

skin

Eyes:

conjunctiva

sclera

eyebrows

eyelids

lacrimal gland

nasolacrimal duct

alignment

corneal reflex

ocular movement

	L			R		
	III	IV	VI	III	IV	VI

visual fields

accommodation

iris

pupils

red reflex

optic disc

vessels

general background

macula

vitreous

lens

Ears:

auricle

ear canal

drum

auditory acuity

Weber test

Rinne test

Nose:

external

internal

septum

turbinates

olfaction

sinuses (frontal and maxillary):

tenderness

transillumination

Mouth and pharynx:

lips

buccal mucosa

gums and teeth

roof

tongue  
inspection  
movement  
taste  
palpation  
pharynx  
inspection  
CN X

Neck:

posture  
size  
swelling  
scars  
discolouration  
hair line

ROM:

Flexion: 45 chin to larynx  
chin to sternum  
Extension: 55 forehead parallel  
to floor  
L.lat. flex: 40  
R.lat. flex: 40  
L.rot: 70  
R.rot: 70

Flex.

L.Rot.

R.Rot.

L.Lat.

R.Lat.

flex.

flex.

Ext.

lymph nodes

trachea

thyroid

carotid arteries (thrills, bruit)

CN V

CN VII

CN VIII (nystagmus)

CN IX

CN XI

TMJ

Inspection

ROM

deviation

Palpation

crispus

tenderness

Neurological

Dermatomes

C5

C6

C7

C8

T1

Tendon reflexes

biceps

triceps

brachioradialis

Muscle strengths

C5

C6

C7

C8

T1

Co-ordination:

point-to-point

dysdiadochokinesia

Thorax:

Chest:

Inspection:

skin

shape

respiratory distress

rhythm (respiratory)

depth “

effort “

intercostal/supraclavicular retraction

Palpation:

tenderness

masses

respiratory expansion

tactile fremitus

Percussion:

lungs (posterior)

diaphragmatic excursion

kidney punch

Auscultation:

breath sounds

vesicular

bronchial

adventitious sounds

crackles (rales)

wheezes (rhonchi)

voice sounds

broncophony

whispered pectoriloquy

egophony

Cardiovascular:

auscultation (aortic murmurs)

Allen's test

### SUPINE EXAMINATION

JVP

PMI

auscultation heart (L.lat.recumbent)

respiratory excursion

percussion chest (anterior)

breast palpation

The abdomen:

Inspection:

skin

umbilicus

contour

peristalsis

pulsations

hernias (umbilical/incisional)

Auscultation:

bowel sounds

bruit

Percussion:

general

liver

spleen

Palpation:

superficial reflexes

cough

light

rebound tenderness

deep

liver

spleen

kidneys

aorta

intra-/retro-abdominal wall mass

shifting dullness

fluid wave

Acute abdomen:

where pain began and now

cough

tenderness

guarding/rigidity  
rebound tenderness  
Rovsing's sign  
psoas sign  
obturator sign  
cutaneous hyperaesthesia  
rectal exam  
Murphy's sign

**Male genitals and hernias:**

**Inspection:**

skin  
prepuce  
glans  
meatus  
nits/lice  
scrotum  
inguinal/femoral bulges

**Palpation:**

penis (tenderness/induration)  
testes  
epididymis  
inguinal canal  
femoral canal  
cremasteric reflex

Auscultation:

scrotal mass.

Peripheral vasculature:

Inspection:

skin

nail beds

pigmentation

hair loss

Palpation:

pulses - radial, brachial, femoral, popliteal, post tibial, dorsalis pedis

lymph nodes - epitrochlear, femoral (horizontal & vertical)

temperature (feet & legs)

Manual compression test

Retrograde filling (Trendelenberg) test

Arterial insufficiency test

Musculoskeletal:

ROM

hip

flex. 90/120

ext. 15

abd. 45

add. 30

int rot 40

ext rot 45

knee

flex. 130

ext. 0/15

ankle

plantar flex 45

dorsiflex 20

inversion 30

eversion 20

leg length

Neurological:

dermatomes

L1

L2

L3

L4

L5

S1

Muscle strength

hip flexion

knee extension

ankle dorsiflexion

plantar flexion

tendon reflexes

patellar

Achilles

plantar reflex

Rectal examination:

Inspection:

sacrococcygeal & perianal areas

Palpation:

sphincter tone

tenderness

induration

nodules

prostate

seminal vesicles

## MENTAL STATUS

Appearance and behaviour:

level of consciousness

posture and motor behaviour

dress, grooming, personal hygiene

facial expression

affect

Speech and language:

quantity

rate

volume

fluency

aphasia (prn)

Mood:

Thought processes (logical, relevant, organised)

Memory and attention:

orientation (time, place, person)

remote memory

recent memory

new learning ability

Higher cognitive functions:

information and vocabulary (general and specialised knowledge)

abstract thinking

APPENDIX C

NUMERICAL RATING SCALE

PATIENT: .....

FILE NO. ....

DATE: .....

PAIN RATING SCALES

	10	Worst pain ever
	9	
	8	
	7	
Numerical Rating	6	
Scale	5	
	4	
	3	
	2	
	1	
	0	No pain at all

APPENDIX D

PAIN DISABILITY INDEX

The rating scales below are designed to measure the degree to which several aspects of your life are presently disrupted by chronic pain. In other words, we would like to know how much your pain is preventing you from doing what you would normally do, or from doing it as well as you normally would. Respond to each category by indicating the overall impact of pain in your life, not just when the pain is at its worst.

For each of the seven categories of life activity listed, please circle the number on the scale which describes the level of disability you typically experience. A score of zero (0) means no disability at all, and a score of ten (10) signifies that all of the activities in which you would normally be involved have been totally disrupted or prevented by your pain.

1. Family/Home Responsibilities. This category refers to activities related to the home or family. It includes chores and duties performed around the house (e.g. yard work) or errands or favours for other family members (e.g. driving the children to school).

0	1	2	3	4	5	6	7	8	9	10
<hr/>										
no disability										total disability

2. Recreation. This category includes hobbies, sports and other similar leisure time activities.

0	1	2	3	4	5	6	7	8	9	10
<hr/>										
no disability										total disability

3. Social Activity. This category refers to activities which involve participation with friends and acquaintances other than family members. It includes parties, theatre, concerts, dining out and other functions.

0	1	2	3	4	5	6	7	8	9	10
no disability										total disability

4. Occupation. This category refers to activities that are a part of or directly related to one's job. This includes non-paying jobs as well, such as that of a housewife or volunteer worker.

0	1	2	3	4	5	6	7	8	9	10
no disability										total disability

5. Sexual Behaviour. This category refers to the frequency and quality of one's sex life.

0	1	2	3	4	5	6	7	8	9	10
no disability										total disability

6. Self Care. This category includes activities which involve personal maintenance and independent daily living (e.g. taking a shower, driving, getting dressed etc.)

0	1	2	3	4	5	6	7	8	9	10
no disability										total disability

7. Life-Support Activity. This category refers to basic life-supporting behaviours such as eating, sleeping and breathing.

0	1	2	3	4	5	6	7	8	9	10
no disability										total disability

## CMCC NECK DISABILITY INDEX

PATIENT NAME: \_\_\_\_\_ FILE #: \_\_\_\_\_ DATE: \_\_\_\_\_

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

**Section 1 - Pain Intensity**

I have no pain at the moment.

The pain is very mild at the moment.

The pain is moderate at the moment.

The pain is fairly severe at the moment.

The pain is very severe at the moment.

The pain is the worst imaginable at the moment.

**Section 2 - Personal Care (Washing, Dressing etc.)**

I can look after myself normally without causing extra pain.

I can look after myself normally but it causes extra pain.

It is painful to look after myself and I am slow and careful.

I need some help but manage most of my personal care.

I need help every day in most aspects of self care.

I do not get dressed, I wash with difficulty and stay in bed.

**Section 3 - Lifting**

I can lift heavy weights without extra pain.

I can lift heavy weights but it gives extra pain.

Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example on a table.

Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.

I can lift very light weights.

I cannot lift or carry anything at all.

**Section 4 - Reading**

I can read as much as I want to with no pain in my neck.

I can read as much as I want to with slight pain in my neck.

I can read as much as I want with moderate pain in my neck.

I can't read as much as I want because of moderate pain in my neck.

I can hardly read at all because of severe pain in my neck.

I cannot read at all.

**Section 5 - Headaches**

I have no headaches at all.

I have slight headaches which come in-frequently.

I have moderate headaches which come in-frequently.

I have moderate headaches which come frequently.

I have severe headaches which come frequently.

I have headaches almost all the time.

**Section 6 - Concentration**

I can concentrate fully when I want to with no difficulty.

I can concentrate fully when I want to with slight difficulty.

I have a fair degree of difficulty in concentrating when I want to.

I have a lot of difficulty in concentrating when I want to.

I have a great deal of difficulty in concentrating when I want to.

I cannot concentrate at all.

**Section 7 - Work**

I can do as much work as I want to.

I can only do my usual work, but no more.

I can do most of my usual work, but no more.

I cannot do my usual work.

I can hardly do any work at all.

I can't do any work at all.

**Section 8 - Driving**

I can drive my car without any neck pain.

I can drive my car as long as I want with slight pain in my neck.

I can drive my car as long as I want with moderate pain in my neck.

I can't drive my car as long as I want because of moderate pain in my neck.

I can hardly drive at all because of severe pain in my neck.

I can't drive my car at all.

**Section 9 - Sleeping**

I have no trouble sleeping.

My sleep is slightly disturbed (less than 1 hr. sleepless).

My sleep is mildly disturbed (1-2 hrs. sleepless).

My sleep is moderately disturbed (2-3 hrs. sleepless).

My sleep is greatly disturbed (3-5 hrs. sleepless).

My sleep is completely disturbed (5-7 hrs. sleepless).

**Section 10 - Recreation**

I am able to engage in all my recreation activities with no neck pain at all.

I am able to engage in all my recreation activities, with some pain in my neck.

I am able to engage in most, but not all of my usual recreation activities because of pain in my neck.

I am able to engage in a few of my usual recreation activities because of pain in my neck.

I can hardly do any recreation activities because of pain in my neck.

I can't do any recreation activities at all.

**APPENDIX F**  
**SHORT-FORM MCGILL PAIN QUESTIONNAIRE (S-FMPQ)**

Ronald Melzack

PATIENT'S NAME \_\_\_\_\_

DATE \_\_\_\_\_

	<u>NONE</u>	<u>MILD</u>	MODERATE	SEVERE
TROBBING	0) _____	1) _____	2) _____	3) _____
SHOOTING	0) _____	1) _____	2) _____	3) _____
STABBING	0) _____	1) _____	2) _____	3) _____
SHARP	0) _____	1) _____	2) _____	3) _____
CRAMPING	0) _____	1) _____	2) _____	3) _____
GNAWING	0) _____	1) _____	2) _____	3) _____
HOT BURNING	0) _____	1) _____	2) _____	3) _____
ACHING	0) _____	1) _____	2) _____	3) _____
HEAVY	0) _____	1) _____	2) _____	3) _____
TENDER	0) _____	1) _____	2) _____	3) _____
SPLITTING	0) _____	1) _____	2) _____	3) _____
TIRING- EXHAUSTING	0) _____	1) _____	2) _____	3) _____
SICKENING	0) _____	1) _____	2) _____	3) _____
FEARFUL	0) _____	1) _____	2) _____	3) _____
PUNISHING- CRUEL	0) _____	1) _____	2) _____	3) _____

---

PPI

0	NO PAIN	_____	
1	MILD	_____	
2	DISCOMFORTING	_____	_____
3	DISTRESSING	_____	NO PAIN
4	HORRIBLE	_____	
5	EXCRUCIATING	_____	

APPENDIX G

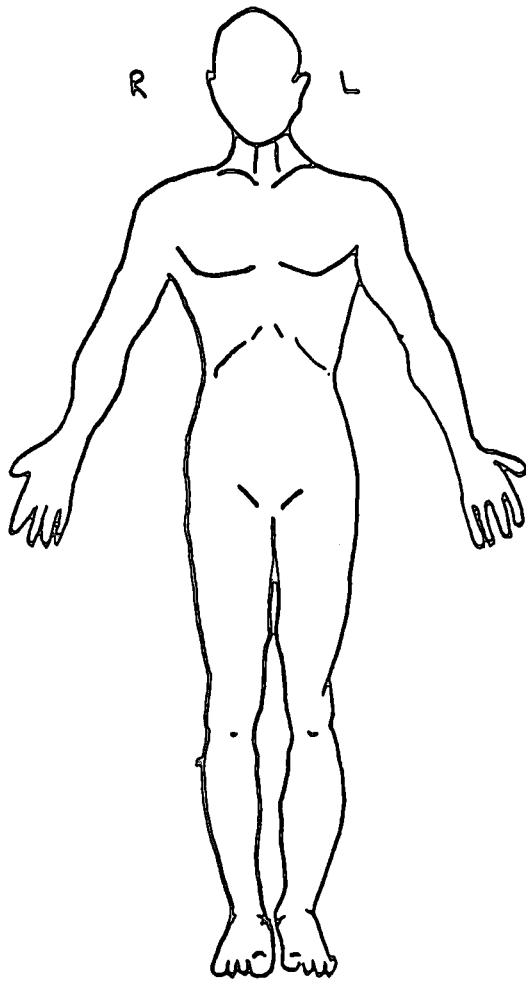
SYMPTOM DIAGRAM

PATIENT NAME: \_\_\_\_\_ FILE#: \_\_\_\_\_ DATE: \_\_\_\_\_

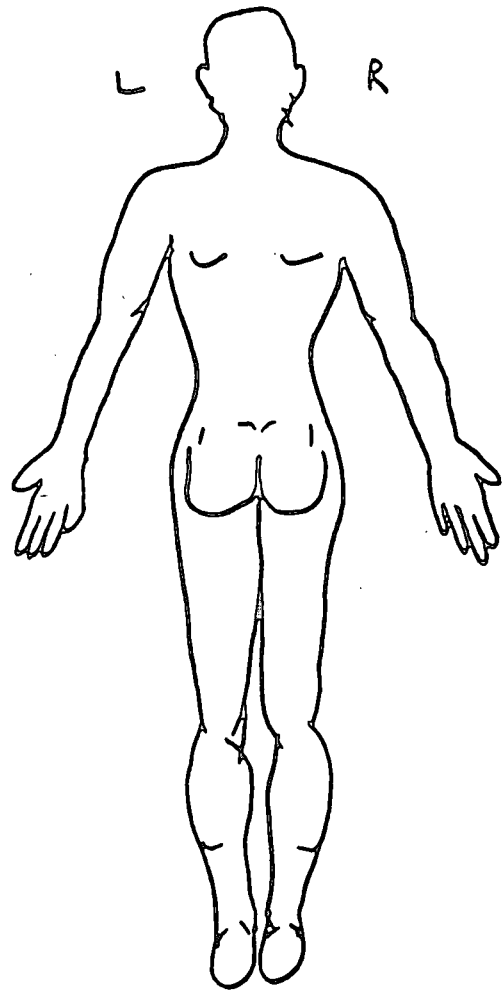
In the diagrams provided below, please mark the areas on your body which you feel best represent the pain(s) or sensation(s) you are experiencing. Please include all areas. Use the symbols provided below. Also, in order to complete the picture, please draw in your face.

SYMBOLS

numbness	===	pins & needles	.....
	===		.....
burning	xxx	stabbing & sharp	////
	xxx		////
dull & aching	+++	stiff & tight	222
	+++		222



FRONT



BACK

APPENDIX H



McGill

**Department of Psychology**

Stewart Biological Sciences Building  
1205 Dr. Penfield Avenue  
Montreal, QC, Canada H3A 1B1

**Département de psychologie**

Pavillon Stewart des Sciences Biologiques  
1205, avenue Dr. Penfield  
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Tel.: (514) 398-6100  
Fax: (514) 398-4896

June 10, 1993

Mr. Garth Roberts  
Technikon Natal Chiropractic Day Clinic  
11 Ritson Road  
Berea  
DURBAN  
4001  
SOUTH AFRICA

Dear Mr. Roberts:

It is a pleasure to give you permission to use The McGill Pain Questionnaire, the long and the short form. I am also enclosing a copy of the Major Properties and Scoring Methods, as well as other publications using the MPQ. Make as many copies of the Questionnaires as you need.

You will also find enclosed a notice that is now going out to users of the MPQ. As you will see, it involves an "honour system" of payment to the International Association for the Study of Pain.

Sincerely,

Ronald Melzack  
Professor

APPENDIX I

CERVICAL REGIONAL EXAMINATION

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

REGIONAL EXAMINATION - CERVICAL SPINE

Observation:

posture

size

swellings

scars

discolouration

hair line

R.O.M.

Flexion 45° chin to larynx

chin to chest

Extension 70° Forehead parallel to ground

L. Rotation 70°

R. Rotation 70°

/ painless limitation

L. lat. flex 45°

// painful limitation

R. lat. flex 45°

Palpation: lymph nodes  
trachea  
thyroid gland

Orthopaedic:

tenderness:

trigger points:

SCM

trapezius

scaleni

levator scapulae

posterior musculature

doorbell sign

cervical compression

Kemp's test

lateral compression

cervical distraction

Adson's test

Halstead's test

costoclavicular test

hyperabduction (Wright's) test

Eden's (traction) test

shoulder abduction test

shoulder depression test

dizziness rotation test

Lhermitte's sign

Brachial plexus tension

O'Donoghue manoeuvre

Neurological:

Dermatomes:

L.

R.

C2

C3

C4

C5

C6

C7

C8

T1

Myotomes:

C1

C2

C3

C4

C5

C6

C7

C8

T1

Reflexes:

C5

C6

C7

Vascular:

BP

L /

R /

Carotids

Subclavian arteries

Wallenberg's test

Jt.play		Left						Right						Jt.play	
P/A	Lat	Fle	Ext	LF	AR	PR		Fle	Ext	LF	AR	PR	P/A	Lat	
							C0								
							C1								
							C2								
							C3								
							C4								
							C5								
							C6								
							C7								
							T1								
							T2								
							T3								
							T4								

APPENDIX J

PATIENT CONSENT FORM

PATIENT CONSENT FORM

Dear Patient,

Welcome to the Technikon Natal Chiropractic Day Clinic and my research study which involves the evaluation of treatment protocols in Myofascial Trigger Point Syndromes. A thorough case history and physical examination will be undertaken together with x-rays if indicated. The management will consist of approximately nine treatments over a 3 week period and thereafter follow-up treatments will be conducted pending the outcome of the initial treatments. Please be as accurate as possible when completing the different questionnaires and charts and be assured that all personal information is strictly confidential.

Your co-operation and participation is greatly appreciated.

This is to confirm that I, the undersigned, give my consent to be questioned, examined, x-rayed and treated for research purposes at Technikon Natal Chiropractic Day Clinic and agree to comply with the requests of the researcher.

\_\_\_\_\_  
Patient (printed name)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness (printed name)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date