The Efficacy of Therapeutic Faradic Stimulation in patients with Myofascial Pain Syndrome of the Trapezius and Levator Scapula Musculature.

Mini-dissertation in partial compliance with the requirements for the Masters Degree in Technology: Chiropractic, in the Department of Chiropractic at the Durban Institute of Technology.

By

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I, Hayley Anne Bedell-Sivright, declare that this dissertation represents my own work, both in conception and execution.

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DEDICATION

This work is dedicated to my wonderful parents, Rose and Revell, whose love, support and encouragement throughout my Chiropractic Journey and throughout life have allowed me to get to where I am today. I love you.

A special thank-you to my mum who has always been at my rescue whenever I've needed a helping hand or a shoulder to lean on.
You've been fantastic, thanks mum.

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ABSTRACT

The purpose of this study was to determine the efficacy of Therapeutic Faradic Stimulation in patients with Myofascial Pain Syndrome of theTrapezius and Levator Scapula musculature.

This study was a quantitative pilot placebo controlled clinical trial. The sample size used was 60 patients selected from the Durban Metropolitan Area. Only patients between the ages of 30 and 50, who were office workers and were diagnosed with active trigger points in either the Trapezius and/or the Levator Scapula muscles were accepted into this study.

The sample was divided into 3 groups of 20. One group received Faradic Stimulation in the form of the Transeva, another group received Placebo Transeva and the third group received Pulsed Ultrasound. Each patient received 2 research treatments with a maximum of 72 hours between treatment 1 and 2, and the third free Chiropractic treatment being a week later.

Data (both subjective and objective) were obtained from the patients at the first and second consultations, prior to treatments and at the third follow up before treatment. Subjective data were obtained with the Short form McGill pain questionnaire, the Numerical Pain Rating Scale and the CMCC Neck Disability Index. Objective data were obtained from the Pressure Algometer and the CROM Cervical Range of Motion Instrument.

Statistical Analysis of the data was conducted using the SPSS (version 9) software suite. This Statistical software program was manufactured by SPSS Inc, 444N. Michigan Avenue, Chicago, Illinois, USA. Various Descriptive and Inferential Statistical techniques were used. The Descriptive procedures used were various tables and graphs and a few summary statistics including but not limited to means, proportions and percentages. Inferential Statistics included

various Hypothesis testing techniques. Due to the size of our samples, namely 20 in each group, non-parametric Statistical Tests were used. All the tests were set at type 1 error at 5%, or mentioned differently α = 0.05. If our p value as reported was less than 0.05 we declared a significant result and our Null Hypothesis was rejected.

Evaluation of the statistical analyses revealed significant improvements with regards to subjective and objective data for mostly the Attenuated Faradic Treatment (Transeva) group. Although significant Placebo and Ultrasound effects were obtained initially after the first treatment, the Transeva group showed more favourable results between consultations two and three, giving a good indication of the progression of the treatment regimen.

Comparison between groups showed a significant difference with regards to CMCC Neck Disability Index scores, NPRS 101 questionnaires, CROM extension and right lateral flexion readings and Algometer readings.

It was concluded that the Transeva is an effective form of treatment for the active trigger points of Myofascial Pain Syndrome of the Trapezius and Levator Scapula musculature in terms of both subjective and objective clinical findings. Suggestions were made to double-blind further studies as this will aid in reducing researcher bias toward a favoured treatment protocol. This study and observations made by the author with respect to Myofascial Transeva treatment are hoped to contribute to the limited literature available on this modality.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDICES

CHAPTER 1
INTRODUCTION

1.1 THE PROBLEM

Myofascial pain syndrome (MFPS) has been described as a common health problem affecting a substantial portion of the population, which affects the individual in every aspect of life (Esenyel et al. 2000; Fishbain et al. 1987). Myofascial pain syndrome results from trigger points, which Esenyel et a.l (2000) and Chaitow and DeLany (2002) define as a hyper-irritable location within a taut band of skeletal muscle that is painful when compressed and can give rise to characteristic referred pain, tenderness and tightness.

Myofascial pain syndrome encompasses the largest group of unrecognized and under-treated acute and chronic medical disorders of muscular origin, deemed the most overlooked cause of disability in clinical practice (Skootsky, 1989. Auleciems,1995) This has resulted in numerous studies that have been conducted at the Technikon Natal / Durban Institute of Technology on the treatment of myofascial pain syndrome: Christie (1995); Hutchings (1998); Mac Dougall (1999); Pooke (2000), and Chettiar (2001), to name a few. Despite remarkable advances in this field, disparity still exists in the understanding, evaluating and managing of this common musculo-skeletal condition (Bruce, 1995).

As is indicated in the research previously completed, there are several non-invasive therapies used in the treatment of myofascial pain syndrome. One of these is electrical stimulation (Hubbard and Berkoff, 1993). Within this category lies faradism which is widely used in the treatment of muscular-, tendon-, joint-

and neuro-pathologies that cause a sustained involuntary wavelike muscular contraction to affect the patients presenting complaint. (Greene, 2003).

Due to the similarity in the waveform of the faradic therapeutic modality (the Transeva) in relation to the unattenuated faradic wave pattern (Appendix P) (as used by Graham, 1893, DeFranca 1988 and Sanya 2000), it could be assumed that the biphasic effects of faradism hold true for the Transeva. This along with the increased use of the attenuated faradic unit (Lewis, 2003; White R, 2003; Rawlens, 2003; Greene, 2003), indicates that this unit should be researched in order to identify its potential uses. In addition as the review of current literature does not show any studies that have established the efficacy of the attenuated faradic waveform (i.e. Transeva) in the treatment of myofascial pain syndrome in particular, this study aims to develop the clinical science related to the management of myofascial pain syndrome, with this relatively untested intervention such that it may be more formally investigated.

1.2 OBJECTIVES OF THIS RESEARCH

This study was to assess the efficacy of the attenuated faradic waveform (i.e. Transeva), by evaluating the use of therapeutic faradism compared to sham faradism and pulsed Ultrasound. This was evaluated in terms of subjective and objective clinical findings in patients with myofascial pain syndrome of the trapezius and levator scapula musculature.

Objective 1

The first objective of this study was to evaluate the effect of therapeutic Faradic stimulation, sham Faradism and pulsed Ultrasound in terms of subjective clinical findings utilizing a Short form McGill pain questionnaire (Appendix G) (Melzack, 1975), the numerical pain rating scale101 (appendix H) (Jensen et al-1986), and

the CMCC neck disability index questionnaire (appendix I) (Vernon and Mior, 1991)

Hypothesis 1:

The hypothesis was that the attenuated faradic current would decrease the overall intensity of pain, from severe or moderate to mild or no pain recorded by the Short-form Mcgill Pain Questionaire. It would record lower readings out of 100 according to the Numerical Rating Scale-101 Questionaire; and the ability to manage everyday life would be made easier measured by the CMCC Neck Disability Index.

Objective 2

The second objective of this study was to evaluate the effect of therapeutic Faradic stimulation, sham Faradism and pulsed Ultrasound in terms of objective clinical findings utilizing a digital algometer (appendix J1) (Fisher-1987) and the CROM (appendix J2).

Hypothesis 2:

The hypothesis was that the attenuated faradic current would decrease the pain threshold and intensity of the active Trapezius and Levator Scapulae trigger points diagnosed, recorded by the algometer; and would increase the cervical range of motion measured by the CROM readings of cervical flexion, extension, lateral flexion and rotation.

Objective 3

The third objective of this study was to compare the trends that are evident between the subjective and the objective findings in order to ascertain whether there was any relationship between the objective and subjective results achieved

Hypothesis 3

The hypothesis was that the objective CROM measures would show an increase in the patients range of motion and that the patients trigger points were not as active as measured by the algometer readings, also that the patients intensity of pain would be decreased according to McGill pain Questionaire and their everyday life actions would be made easier according to the CMCC Neck Disability index.

Rationale

The main goals of myofascial trigger point therapy are to relieve pain and spasm of the involved muscles (Esenyl et al. 2000). Hou et al. (2002) state that despite all research done on MFPS the clinical efficacy of treatment has not been well established. The effects of faradism have been shown to be effective in the treatment of MFPS (Graham, 1893; Defranca, 1988; Sanya A O, 2000), but this is not certain due to the multiple aspects of problems diagnosed (joint and myofascial components) and in some research, the multiple treatment interventions used.

Further to this as, no clinical trial has been documented, a placebo- controlled clinical study would be appropriate to establish its clinical efficacy.

Therefore the aim of this research was to evaluate the effects of treatment with faradic stimulation on myofascial trigger points in the upper fibres of Trapezius muscles and the Levator Scapulae muscles.

1.3 ASSUMPTIONS OF THIS STUDY

Due to the similarity in the waveform of the attenuated faradic therapeutic modality (the Transeva) in relation to the unattenuated faradic wave pattern (Appendix P) (as used by Graham, 1893; DeFranca 1988 and Sanya 2000), it could be assumed that the biphasic effects of faradism hold true for the Transeva.

1.4 POTENTIAL BENEFITS OF THIS STUDY

The muscle contraction-relaxation action caused by the Transeva causes an increase not only in the arterial circulation, but at the same time aids the venous and lymphatic return to such an extent that products of inflammation collecting in the tissues are not allowed to become stagnant, so the prevention of adhesions is still further assisted (Greene, 1993). This is supported by Graham who concluded that the faradism affords the quickest means of relief after stretching or tearing injuries to muscles (Graham, 1893). The adhesion reduction may be related to pain relief as decreased adhesions allow for increased range of motion and subjective improvement in ability due to the increased mobility of the muscle within its sheath.

It is hoped that this study will provide important information with regards to the efficacy of Faradic stimulation compared to Pulsed Ultrasound for the treatment of myofascial syndrome, as it would provide the chiropractor or any other manual therapist with more knowledge of simple, effective, non-invasive treatment that is cost effective, for MFTP's in terms of pain relief and an increase in muscle range of motion.

In view of the fact that there is little information on the effects of treatment with Faradism on the myofascial syndrome, it is hoped that further studies will be conducted into the use of the Transeva on other muscular and soft tissue conditions and comparing the Transeva to other Faradic Current types.

CHAPTER TWO
LITERATURE REVIEW

The purpose of this review of related literature is to summarise the theories and facts surrounding myofascial pain syndrome and its treatment. Currently there is no information available to clarify the role of the Transeva in the treatment of myofascial pain syndromes. The following aspects were discussed: -

- Myofasciitis of the Trapesius and Levator Scapula musculature in office workers
- The Transeva
- Ultrasound

2.1 MYOFASCIAL PAIN SYNDROME

Muscular pain is the most common work-related injury and the second most common cause of visits by patients to physicians (Hubbard, 1998:16).

One of the contributors to muscular pain being myofascial pain syndrome (MFPS), which has been described as a common health problem affecting a substantial portion of the population, which affects the individuals in every aspect of their lives (Esenyel et al. 2000; Fishbain et al.1987). Myofascial pain syndrome results from trigger points, which Esenyel et al. (2000) and Chaitow and DeLany (2002) define as a hyperirritable location within a taut band of skeletal muscle that is painful when compressed and can give rise to characteristic referred pain, tenderness and tightness.

2.1.1 Aetiology of Myofascial Pain Syndrome

Travell and Simons (1999) explain that a “myofascial trigger point is a hyper-irritable locus within a taut band of skeletal muscle, located in the muscle tissue and/or its associated fascia”. The mechanical stresses which tend to cause acute myofascial trigger points include wrenching movements, motor vehicle accidents, falls, dislocations or a direct blow on the muscle (Travell, Simons and Simons 1999). According to Auleciems (1995) trigger points are microscopic lesions resulting from overuse, disuse or misuse of a muscle or group of muscles. According to Baldry (1989), the activation of trigger points may occur gradually, for example when a muscle is subjected to repeated episodes of minor trauma or is repeatedly overloaded. Baldry (1989) also cites unusual exercise as a main cause of trigger point genesis. Conditions believed to perpetuate or exacerbate the severity of myofascial pain syndrome including biomechanical stress, nutritional inadequacies, pharmaceutical agents, metabolic and endocrine imbalance, chronic infections and psychological factors (Chaitow and DeLany, 2002 1:45).

Due to the fact that the patients who participated in my study all worked in an office for a minimum of three to four hours a day, according to Sauter et al. (1991), Bergqvist et al. (1995) the following office ergonomic variables have been isolated as potential contributors to disorders:

-Screen distance, horizontal and vertical position.

-Keyboard and mouse vertical position and distance.

-Seat height and depth.

-Relative size of back support.

-Backrest inclination.

-Resting of the wrists whilst typing.

2.1.2 Mechanisms of trigger point development

Hong and Simons (1998) proposed a hypothetical mechanism utilising spontaneous electrical activity (SEA) as a mechanism of recording activity within a MFTP region of taut band formation. They proposed that intracellular calcium in certain muscle fibres may be excessively released in response to trauma or abnormal stress. This would lead to an increase in metabolism and uncontrolled shortening of the muscle fibres. As a result of this there is an impairment of local blood perfusion, decreasing the amount of oxygen and nutrients to the area which are thought to be responsible for creating a vicious cycle, which results in a local energy crisis and the formation of taut bands (Hong and Simons, 1998).

2.2 CLINICAL FEATURES

2.2.1 Common symptoms of active myofascial trigger points:

The patient may complain of a pain ranging from a mild ache to an excruciating pain, is either sharp or dull, and is often associated with general fatigue and a decreased range of motion and loss of muscle strength (Han and Harrison, 1997).

Myofascial pain is often referred to a distant site from the MFTP, in a characteristic pattern for that muscle and sometimes patients are even aware of a numbness or paraesthesia rather than pain (Travell, Simons and Simons, 1999 1:20).

Patients often complain of disturbed sleep as a result of myofascial pain syndrome, which can lead to a vicious cycle of in creased pain sensitivity the following day (Travell, Simons and Simons 1999 1:21).

2.2.2 Common signs of active myofascial trigger points:

The diagnostic criteria for myofascial pain syndrome, which is outlined by Schneider (1996) says that to diagnose myofascial pain syndrome, all 5 major criteria should be present and at least 1 of the minor criteria.

Major criteria:

1. Regional pain complaint
2. Pain pattern follows a known distribution of muscular referred pain.
3. Palpable taut band (in accessible muscles).
4. Exquisite focal tenderness at one point or nodule within a taut band.
5. Some restricted range of motion or muscle weakness (when measurable).

Minor criteria:

1. Manual pressure on the MFTP nodule reproduces the chief pain complaint.
2. Snapping palpation of the taut band at the MFTP elicits a local twitch response.
3. Pain is diminished or eliminated by muscular treatment, e.g. therapeutic stretch, ischemic compression or needle injection of the MFTP.

These criteria are principally assessed by palpation of the affected muscles. The application of a sustained deep pressure is the method used most frequently in the diagnosis of MFTP's. When MFTP's are palpated, the pain is either concentrated in the trigger point area or along that muscles distinct referral pattern, which is constant, reproducible, and does not follow a dermatomal or nerve distribution (Han and Harrison, 1997).

2.2.3 Findings on examination and diagnosis:

The criteria for diagnosis of myofascial trigger points have been based on the criteria described by Chettiar (2001) and patients were only accepted into the study if their initial score was 17 or more. The Myofascial Diagnostic Scale (appendix F) was designed to assess the extent to which the patient is suffering from myofascial pain syndrome via a rating of the patient's symptoms. Even though the myofascial diagnostic scale as developed by Chettiar (1999) has not yet been validated, it is the only standardised tool that can be used to consistently measure changes in trigger points.

For the purposes of this research, the palpatory diagnosis had been utilised as the above techniques have validated the palpatory diagnosis as a reliable and valid method of patient assessment in respect of myofascial pain syndrome (Hsieh et al. 2000).

2.3 Treatment of myofascial trigger points

Aulciems (1995) found that when effectively managed, active myofascial trigger points have an excellent prognosis and although myofascial trigger point pain syndrome is usually not curable, it is well controllable.

As a result of a vast amount of research, a large number of different treatments have been shown to be clinically effective in the treatment of MFTP. These treatments include amongst others

- Ischemic compression (Mance et al. 1986),
- Myofascial manipulation (Nook, 2000),
- Spray and stretch (Han and Harrison, 1997: 97),
- Ultrasound (Gam et al, 1998:73),
- Transcutaneous electrical nerve stimulation (Han and Harrison, 1997:97),

- Dry needling (Hong and Simons 1998:256) and
- All Neuromuscular techniques (Chaitow and DeLany, 2003).

2.3.1 The Transeva

The attenuated faradic current produced by the “Transeva” is a short duration interrupted direct current with a pulse duration of 0.1 -1.0 units and a frequency of 50-100 Hz. It is surged to produce a near- normal tetanic-like contraction and relaxation of the muscle (Forster and Palastanga, 1990).When a muscle contracts as a result of electrical stimulation, the changes taking place within the muscle are similar to those associated with voluntary contraction. There is increased metabolism, with a consequent increase in demand for oxygen and foodstuffs and an increased output of waste products, including metabolites. The metabolites cause dilatation of capillaries and arterioles and there is a considerable increase in the blood supply to the muscle (Foster and Palastanga, 1990). As the muscles contract and relax they exert a pumping action on the veins and lymphatic vessels lying within and around them. The valves in these vessels ensure that the fluid they contain is moved towards the heart and if the muscle contractions are sufficiently strong to cause joint movement this also exerts a pumping effect. There is thus increased venous and lymphatic return (Foster and Palastanga 1990). This is supported by Greene (2003) who states that there are many methods of increasing the arterial supply to any particular part, but unless that method improves the return circulation via the veins and lymphatics to the same degree, it might even produce a greater congestion and so result in a diminution of the local circulation and so retard the process of healing (Greene, 1993).

This muscle action caused by the Transeva causes an increase, not only in the arterial circulation, in the venous and lymphatic return to such an extent that products of inflammation collecting in the tissues are not allowed to become stagnant, so the prevention of adhesions is still further assisted. This is

supported by Graham who concluded that the faradism affords the quickest means of relief after stretching or tearing injuries to muscles (Graham, 1893). The adhesions may be related to pain relief as decreased adhesions allow for increased range of motion and subjective improvement in ability due to the increased mobility of the muscle within its sheath.

The term faradism was originally used to signify the type of current produced by a faradic coil, which is a type of induction coil (Forster and Palastanga, 1990). Faradic current lost its appeal because it was a rather painful procedure in the past, but due to modern advancement in recent years, that negate the pain problem, it has now been developed as a therapeutic modality called the Transeva.

The effects of treatment by rhythmic muscular contractions of the Transeva can thus be summarised as follows (Greene, 1993):

1. Muscle elasticity, irritability and contractility (i.e. muscle tone), are rapidly restored to normal.
2. An increase in blood is brought to the muscles and to neighbouring tissues with all the attendant beneficial physio-chemical consequences.
3. Waste tissue products are rapidly cleared away and stagnation of lymph, with its serious sequelae, is prevented.
4. A large supply of oxygen and nourishment is brought to the injured part.
5. Rapid absorption of fluid and extravagated blood and lymph is actively promoted
6. Beneficial chemical and physical changes after muscle activity take place.
7. The movements of muscle do not allow organisation of lymph to take place between their surfaces and thus the danger of adhesions is minimised.
8. As the movements do much to prevent stagnation of lymph in areolar tissue in the joint interspaces, the danger of the areolar tissue losing the suppleness and flexibility necessary for efficient joint action is diminished.

9. If adhesions have formed in the muscles and peri-articular tissues, the adherent surfaces are gently and gradually torn apart by causing increasingly powerful contractions of the muscles.
10. Muscles are prevented from wasting, particularly if treatment is given soon after the injury. Muscles already wasted increase in bulk.
11. No attempt is made to cut short the process of inflammation, but to guide and control the process.

2.3.2 Pulsed Ultrasound

Gam et al. (1998) reported that ultrasound therapy has achieved recognition as a suitable method in physical medicine to treat acute and chronic muscular-skeletal disorders. Ultrasound treatment involves the use of high frequency acoustic energy that is generated using the reverse piezo-electric effect (Esenyel et al. 2000). The biophysical effects resulting with the interaction of ultrasound with tissue are grouped into two categories

- Thermally induced therapeutic effects

These are attributed primarily to heating and are proposed by Lehman and de Lateur (1990) and Kitchen and Bazin (1996), to include the following:

- The increased extensibility of collagen-rich structures such as tendons and joint capsules.
- A decrease in joint stiffness.
- A reduction in muscle pain and spasm.
- The production of a mild inflammatory reaction, inducing a marked increase in blood flow, which helps in the resolution of chronic inflammatory process.

- Non thermal effects

According to Hogan et al. (1982) examples of therapeutically significant non-thermal benefits of ultrasound include:

- Stimulation of tissue regeneration.
- Soft tissue repair.
- Improved blood flow in chronically ischaemic tissue.
- Stimulation of protein synthesis

This has been refined by Kitchen and Bazin (1996), who postulate that the non-thermal effects of ultrasound produce certain phenomena. Cavitation occurs when ultrasound produces micro-sized gas bubbles within the tissues that vibrate, increasing the permeability of the cells to various ions, especially calcium which increases the activity of the cells. The other phenomenon is that the unidirectional activity of the ultrasound waves causes high velocity gradients next to boundries between fluids and structures. This causes increased permeability of cell membranes, increased protein synthesis, increased uptake of calcium by the cells and increased production of growth factors by macrophages. All these effects account for the acceleration of repair following ultrasound therapy.

Therapeutic benefits of the Pulsed waveform of ultrasound seem to be immediate and better sustained over the treatment period as opposed to continuous ultrasound (Pillay, 2003).

Therefore Reid (1992) states that due to the ease of application of therapeutic ultrasound together with its accessibility, it is used and will continue to be used by physical therapists, athletic therapists, podiatrists and chiropractors. Nonetheless Reid (1992) states that the lack of adequate studies in this area has

been a constant theme and is disappointing.

2.3.3 Placebo (sham Transeva):

Placebo is defined as a “dummy treatment” administered to the control group in a controlled clinical trial in order that the specific and non-specific effects of the experimental treatment can be distinguished (Dorland and Newman, 1998). In the case of this research the placebo group will receive sham faradism.
The significance of the placebo group was to provide a control to negate the non-specific effects of treatment.

2.4 Compendium of muscles

The Trapezius Muscle:

The Trapezius muscle is divided into the upper, middle and lower sections, with trigger points occurring most commonly in the upper Trapezius (Travell and Simons, 1999). Sola et al. (1981) and Bruce (1995) also concluded that the upper Trapezius is the muscle most commonly affected by myofascial trigger points. For the purpose of this study, the active trigger points diagnosed in either Trapezius TP1 or TP2 and / or the Levator Scapula TP1 or TP2, where treated.

The following information on the upper Trapezius and Levator Scapula regarding anatomical attachments, trigger point location and referral pain patterns and innervation are according to Travell and Simons (1999:278), and Chaitow and DeLany (2003:320-329)

Attachments:The upper fibres of the Trapezius muscle attach superiorly to the middle third of the superior nuchal line attaching to the midline of the ligamentum

nuchae and to the spinal processes of the first to fifth cervical vertebrae. Distally the fibres converge latterly attaching to the outer third of the clavicle.

Trigger point location:

TP1 is located in the upper free margin of the Trapezius superiorly to both the supraspinatus muscle and the apex of the lung, while TP2 is located caudal and posterior to the free border of the upper Trapezius superior to the upper border of the Scapula.

Referral Pain Pattern:

TP1 characteristic pain is severe posterolateral neck, a temporal headache centering to the orbit. Less common presentations include referred pain to the angle of the ipsilateral jaw, molar teeth and pinna of the ear, mimicking dental pain. TP2 is not associated with headaches and the pain is restricted to the posterior neck, stopping at the mastoid.

Innervation:

The muscle is innervated by the spinal division of the XI cranial nerve, which supplies mainly motor fibres, the second to fourth cervical nerves supply mainly sensory fibres to the muscle.

The Levator Scapula Muscle

The Levator Scapula muscle is one of the most commonly involved shoulder-girdle muscles, with respect to Myofascial Pain (Travell, Simons and Simons,1999 1:491). Trigger points within this muscle develop in two locations, a primary trigger point at the angle of the neck, where the muscle emerges beneath the anterior border of the upper Trapezius, and a second trigger point just above the muscle's attachment to the superior angle of the Scapula. (Travell, Simons and Simons, 1999 1:491).

Attachments:

This muscle attaches above to the Transverse processes of the first four cervical vertebrae, and attaches below to the medial Scapular border between the superior angle and the medial end of the spine of the Scapula.

Referred pain:

From these trigger points pain is concentrated at the angle of the neck, with some spill over pain along the vertebral border of the Scapula. Involvement of this muscle results in a stiff neck that consistently limits neck rotation due to pain.

Innervation:

This muscle is supplied by the branches of the third and fourth cervical nerves via the cervical plexus and sometimes by fibres from the dorsal Scapular nerve derived from C5 root.

2.5 Conclusion

With reference to the fact that myofascial pain syndrome is a common problem and seems to affect the Trapezius and Levator Scapula muscles most commonly, it is reasonable that an effective form of treatment is necessary.

Therefore in order to assess the efficacy of the attenuated faradic waveform (i.e. Transeva) in order to assess its ability to treat myofascial pain syndromes, this study evaluated the use of therapeutic faradism compared to sham faradism and pulsed ultrasound in terms of subjective and objective clinical findings in patients with myofascial pain syndrome of the Trapezius and Levator Scapula musculature.

Chapter3
Research Design and Methods

3.1 Study Design

This study was a quantitative pilot Placebo- controlled clinical trial.

The purpose was to compare and evaluate the efficacy of the modified faradic current in the form of the Transeva, in terms of subjective and objective clinical findings, for the treatment of Myofascial Pain Syndrome.

3.2 Advertising

Advertisements (APPENDIX L) were placed on office notice boards, at gymnasia, in local newspapers and on the DIT Campus which informed the public of the study. The study was limited to those patients presenting to the chiropractic clinic at the Durban Institute of Technology in response to advertisements or referrals.

Patients were obtained via advertising in the form of pamphlets and posters (see Appendix L), or by referrals.

3.3 Sample selection

As a result of the advertising process, a non-probability convenience sampling technique was applied to this study.

3.4 Sample size

This study involved 60 patients divided into 3 groups. There were 20 patients in group A and 20 patients in group B and 20 in group C.

3.5 Sample allocation

Once accepted into the study, each patient was randomly assigned to a treatment group (either group A for the Transeva treatment, group B for Placebo treatment in the form of sham faradic current (Transeva), or group C for the pulsed Ultrasound treatment). This included selection by assigning consecutive patients who presented to the clinic into either Group A, Group B or group C by means of drawing out of a hat.

3.6 Research - Patient procedure

Telephonic interview: Patients were required to initially contact the chiropractic department telephonically in order to find out if they met the study requirements.

Telephonically they were asked:

- Their age.
- What type of work they did.
- Questions pertaining to the exclusion criteria.

If they met the inclusion criteria they were told briefly what the study was about and what was required of them.

Patient assessment:

Once patients met the telephonic requirements, the prospective patients were invited to attend a consultation at the Chiropractic Clinic, where they were screened to determine if they met the studies' inclusion criteria. This was achieved if a positive diagnosis of myofascial pain syndrome of the Trapezius or Levator Scapular muscles was made by the researcher based on a case history (APPENDIX C), a physical examination (APPENDIX D) and regional examination (APPENDIX E) of the cervical spine and neck musculature in order to determine if they were eligible for the study. The patients then had to read the letter of information (APPENDIX A) and then sign the letter of consent (APPENDIX B) before they were allowed to participate.

The assessment ensured that the patient was accepted into the study on the basis of the following criteria:

3.7 Inclusion and exclusion criteria

a. Inclusion criteria

1.Patients of either gender had to be between the ages of 30 and 50. Individuals of either sex and of any age can develop myofascial Trigger points (Travel and Simons, 1999), but patients between the ages of 30 to 49 are more commonly plagued by the condition, which then decreases with age (Han and Harrison, 1997:90). With advancing age follows reduced activity and the stiffness and reduced range of motion become more prominent factors in trigger point presentation (Travell Simons and Simons, 1999 1:13).

2. Patients had to have a trigger point in either their Trapezius or Levator Scapulae muscles. These muscles were selected for inclusion as myofascial trigger points are common in the postural muscles of the neck

and shoulder (Gatterman, 1990:285; Hubbard, 1998:18; Travel and Simons, 1999 1:279, Sciotti et al. 2000:259 and Chaitow and DeLany, 2002:21)

3. The criteria for diagnosis of myofascial trigger points was based on the criteria described by Chettiar (1999) and patients were only accepted into the study if their initial score was 17 or more. The Myofascial Diagnostic Scale (appendix F) was designed to assess the extent to which the patient was suffering from myofascial pain syndrome via a rating of the patient's symptoms. Even though the myofascial diagnostic scale as developed by Chettiar (1999) had not yet been validated, it was the only standardised tool that could be used to consistently measure changes in trigger points.

4. Patients needed to sign an informed consent (APPENDIX B) and read the letter of information (APPENDIX A) before inclusion into the study.

b. Exclusion criteria:

1. Patients taking any form of medication that would influence the results of the study ie. Analgesics, muscle relaxants, non-steroidal anti-inflammatory druds or steroids. A washout period of 48hours, recommended by Poul et al. (1993), would be applied.

2. Any patients outside the ranges 30 to 50 years of age (see in inclusion criteria).

3. Individuals with fresh fractures, to avoid unwanted motion; active haemorrhage; phlebitis; and cardiac pacemakers were excluded from the study (Kahn, 1994: 76).

4. Patients who had received any faradic treatment in the past three months, to ensure maximal naivety of the participating patients and to ensure that the Placebo treatment was not perceived as a sham (Mouton, 1996).

5. Patients were asked to refrain from any other treatment protocol for MFPS, including drugs and manual interventions (Poul et al. 1993). They were also expected not to alter their current lifestyle or to enter into any new activity. All patients were instructed not to ice, stretch or rub the muscles treated after the treatment and during the duration of the study.

3.8 Location and diagnosis of the Myofascial Trigger Points' of the Upper Trapezius Muscle and Levater Scapula Muscle

Travell, Simons and Simons (1999) discuss two main regions for the presence of MFTP's, as found in the upper Trapezius muscle fibres, namely MFTP 1 and MFTP 2 and in the Levator Scapular muscle fibres namely MFTP 1 and MFTP 2.

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

Referred pain from this MFTP is unilateral, along the posterior aspect of the neck to the mastoid process. When severe, this pain may extend to the side of the head and temple as well as the back of the orbit, it may include the angle of the jaw. It is a common cause of tension neck ache and temporal headaches (Travell, Simons and Simons, 1999 1:278).

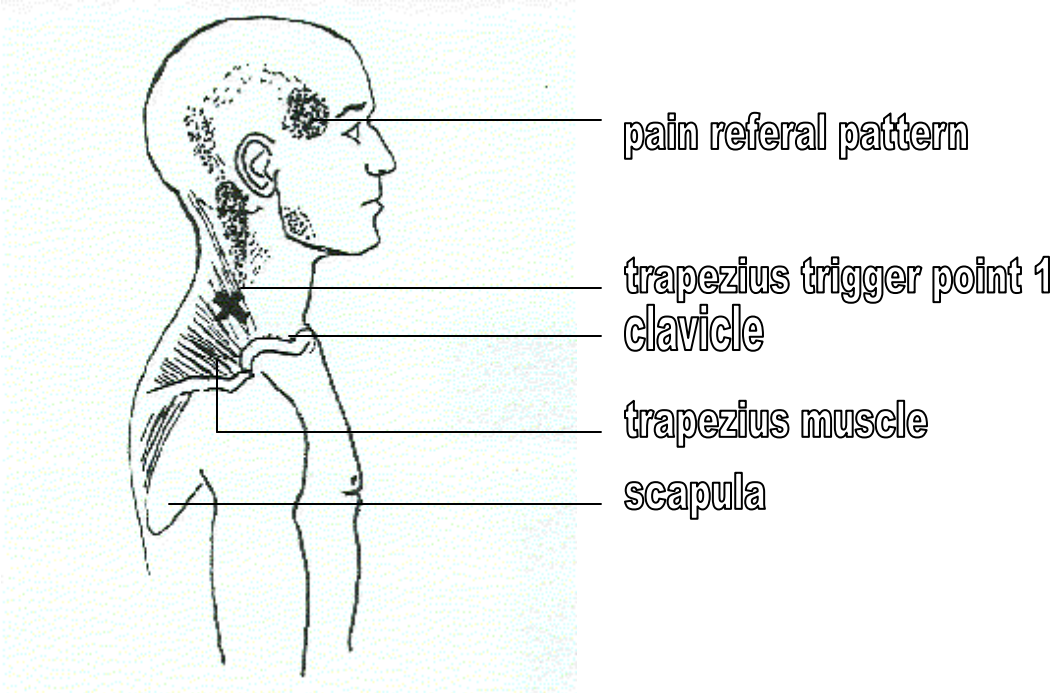


Figure 1: Illustration showing Trapezius MFTP 1 with referral pain pattern

(Shacksnovis, 2005)

Trapezius MFTP 2 is located close to MFTP1, but is slightly posterior and inferior, just caudal to the free border of the upper Trapezius.

Palpation of this trigger point is performed in a similar manner as for MFTP1, but larger patients may require flat palpation. Referred pain from this MFTP also lies posterior to that of MFTP1, blending with its distribution behind the ear (Travell, Simons and Simons 1999 1:278).

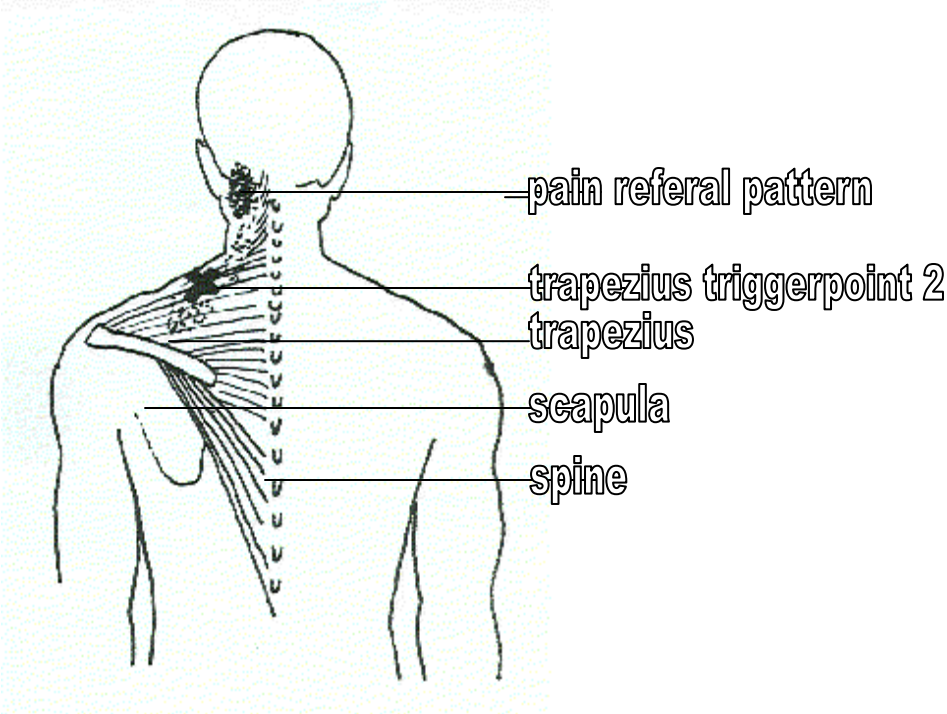


Figure 2: Illustration showing Trapezius MFTP 2 with referral pain pattern

(Shacksnovis, 2005)

Levator Scapula MFTP 1

This is a primary trigger point at the angle of the neck, where the muscle emerges beneath the anterior border of the upper Trapezius

Levator Scapula MFTP 2

A second trigger point just above the muscles' attachment to the superior angle of the scapula. (Travell,Simons and Simons,1999).

Referred pain from these Levator Scapula trigger points is concentrated at the angle of the neck, with some spill-over pain along the vertebral border of the scapula. Involvement of this muscle results in a stiff neck that consistently limits neck rotation due to pain.

In addition to the location and the referred pain pattern, the following criteria were utilised in order to determine the presence of the above MFTP's. The criteria for diagnosis of myofascial trigger points had been based on the criteria described by Chettiar (1999) and patients were only accepted into the study if their initial score was 17 or more. The Myofascial Diagnostic Scale (appendix F) was designed to assess the extent to which the patient is suffering from myofascial pain syndrome via a rating of the patient's symptoms.

3.9 Interventions

GROUP A:

According to Forster and Palastanga (1990), the faradic current is a short duration interrupted direct current with a pulse duration of 0.1-1ms and a frequency of 50-100 Hz. Due to the similarity in waveform of the Transeva in relation to the unattenuated faradic wave pattern, it could be assumed that the biphasic effects of faradism hold true for the Transeva.

Therefore Group A patients received faradic treatment for 20 minutes with a pulse duration of 0.1-1ms and a frequency of 50-100 hz (Forster and Palastanga,1990). The patient, after passing a full sensory neurological examination including a sharp-blunt and light-crude touch test with their eyes closed, was positioned prone lying with the saline-soaked negative pad placed under their thighs. The area to be treated had Ultrasound gel applied as a transmission medium for the faradic current. The mobile electrode was moved from place to place over the lubricated treatment area until the hand holding the mobile electrode felt the muscular contraction. Bony prominences

were avoided and the surge control was then adjusted to give about 90-100 contractions per minute. As the patient became accustomed to this degree of muscular contraction, usually one to two minutes, the intensity was increased, but always slowly to the amount desired to induce muscular contraction. During treatment the mobile electrode always remained in full contact with the skin, but the electrode was moving all the time. It could not be strapped in one place therefore preventing a large number of consecutive contractions to those muscles with myofascial trigger points in the area. The duration of the treatment was 20 minutes. At the conclusion of the treatment, the intensity was reduced gradually to zero. The machine was then switched off (Greene, 1993).

Group B:

Patients falling into group B of the study received Placebo treatment in the form of sham faradic current over the Trapezius and Levator Scapula musculature. Each patient was prepared and positioned as if receiving legitimate faradism. The patients were at no time given any indication that the treatment they received was Placebo.

Group C:

These patients received Pulsed Ultrasound treatment over the Trapezius and Levator Scapula musculature after passing a sensory neurological examination, including a hot-cold and sharp-blunt test with their eyes closed. The patients were at no time given any indication that the treatment they received was Ultrasound, Therapeutic Faradism (Transeva) or Placebo Transeva. Ultrasound gel was used as a transmission medium between the skin overlying the affected area and the Ultrasound head. The unit intensity was set at 1.2 w/cm^2 and the duration of treatment was 6 minutes as it was

administered manually on the body surface (Kitchen and Bazin, 1996; Kahn, 1994).

Ultrasound has been used successfully in various research studies done at the DIT (Van Lingen, 1998; Du Plessis, 2002; Gray,2002; Pillay, 2003) to establish clinical efficacy of an outlined protocol. The treatment procedure for the Ultrasound and the Transeva is similar in that they both use a mobile electrode over the body surface with a lubricant gel. This contributes to the effects of a single-blind study.

3.10 Intervention frequency

Group A, B and C received two treatments with a maximum of 72 hours in-between each treatment. As no research has been done to establish the number of treatments that are required for a patient with myofascial pain syndrome to respond to the Transeva, I used the advice from Greene (2003) who mainly uses the Transeva for her treatments as a physiotherapist for any muscular pain.

3.11 Measurement tools

a. Subjective measurements:

1. Short form McGill pain questionnaire(S-F MPQ) (APPENDIX G) was used, as this is easy to understand and quick to use and it provides information on the sensory, affective and overall intensity of pain according to Melzack (1975). It consists of 15 descriptors of pain, rated on an intensity scale as 0=none, 1=mild, 2=moderate or 3=severe, and it provides information on the sensory affective and overall intensity of pain (Melzack, 1975). The S-FMPQ was

chosen as a measurement for this study as it is sensitive, quick to administer and easy to understand by patients. On completion of the questionnaire, the points are added up to form a final maximum score out of 45 for each consultation.

2. A Numerical pain rating scale (NPRS) (APPENDIX H) was also used which asks the patient to rate their pain intensity on a numerical scale of 0 – 100. In a study of by Jensen et al. (1986), comparing 6 methods on 75 chronic pain patients, the NRS was deemed the most practical index to use for its simplicity and ease of administration. The two scores were added together and then averaged. The NRS is a scale that asks the patient to rate their pain intensity out of 100 where 0= the least amount of pain and 100= the most amount of pain. This is a practical index to use, as it is easy to administer and score (Jensen et al.1986). On completion of the scale, the mean score of the least and the worst was found by adding them together.

3. The CMCC Neck Disability Index was used to show subjective information regarding the extent to which the patient's lifestyle was affected by the pain experienced. The questionnaire was developed by Vernon and Mior (1991), and in a study of its reliability and validity, it was found to demonstrate a high degree of test-retest reliability and internal consistency. The CMCC Neck Disability Index consists of ten sections dealing with different aspects of the patients' lifestyle. Each section had six options, with the first scorring "0" and the next five increasing progressively by a value of "1" to a maximum of "5". All the scores were added together and were expressed out of the maximum score (50). These questionnaires were completed at the initial, second and third follow-up consultations so that any improvements in the condition could be recorded and assessed.

b. Objective measurements

1. Pressure algometer - Wagner FDK20 Force Dial (Wagner Instuments, P.O. Box 1217, Greenwich, CT, 06836, U.S.A.).

Algometer readings (APPENDIX J1) were taken to measure changes in pressure pain threshold for each patient over the course of each of the research treatments. This form of measurement has been proven to be useful for the assessment of treatment results (Fischer, 1987:207).

The procedure according to Fischer (1987):

- The dial on the gauge was set to zero.
- The disc was placed on the point of maximum sensitivity.
- Pressure was increased at 1kg/cm2/sec.
- The patient was asked to indicate by saying “yes” at the point where the pain was first perceived.
- The pressure was stopped at this point and a reading was taken.

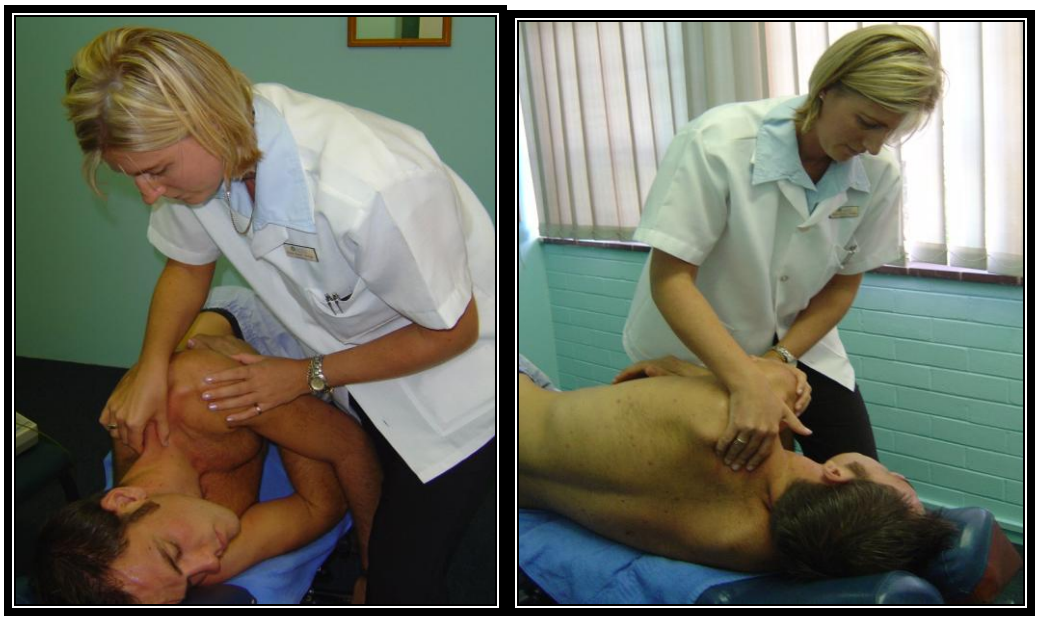
According to Reeves et al. (1986), as quoted by Han and Harrison (1997), pressure algometry is a diagnostic tool used to quantify the pressure pain threshold for each patient over the course of each treatment. This is the measurement of minimum pressure that induces pain, which is useful in the assessment of the results and is a reliable tool for quantifying MFTP sensitivity (Reeves et al. 1986, Fischer 1987 and Han and Harrison 1997).

> Algometer readings are to be taken to measure changes in pressure pain threshold for each patient over the course of research treatments. This form of measurement has been proven to be useful for the assessment of treatment results (Fischer 1987:207)

2. The CROM:Cervical Range of Motion Instrument (Performance Attainment Associates; Patient no. 4,777,965 & 4,928,709) is a device with a magnetic yoke and gravity goniometers which measure the cervical range of motion in the frontal and sagittal planes. Research by Youdas et al. (1991) concluded that after testing 337 subjects that inter tester and intra tester reliability using the CROM device were accurate to an intra class coefficient of greater than 80. CROM readings included flexion, extension, rotation and lateral flexion as these ranges of motion were influenced by the Trapezius and Levator Scapula musculature.

c. Measurement frequency:

Measurements (both subjective and objective) of the patients were taken prior to each of the two treatments and at the third follow up.



Plates 1(left) and 2(right): Demonstration of patient/practitioner for palpation of trigger points in the upper fibres of Trapezius Muscle by pincer palpation (plate 1) and trigger points in the Levator Scapula Muscle by flat palpation (plate 2)

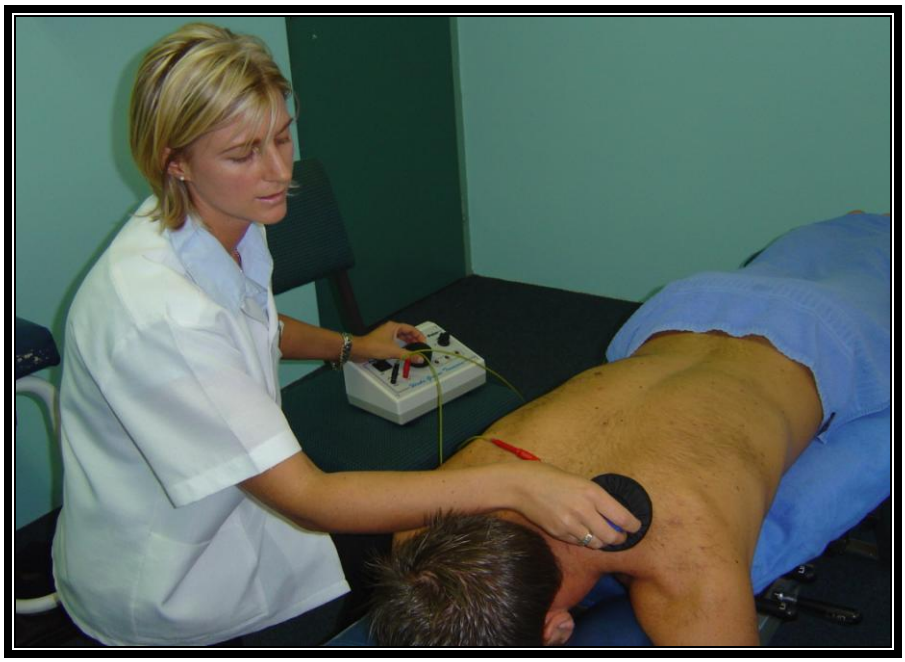


Plate 3: Demonstration of patient/practitioner for the Transeva/ Transeva Placebo treatment of the upper fibres of Trapezius muscle.

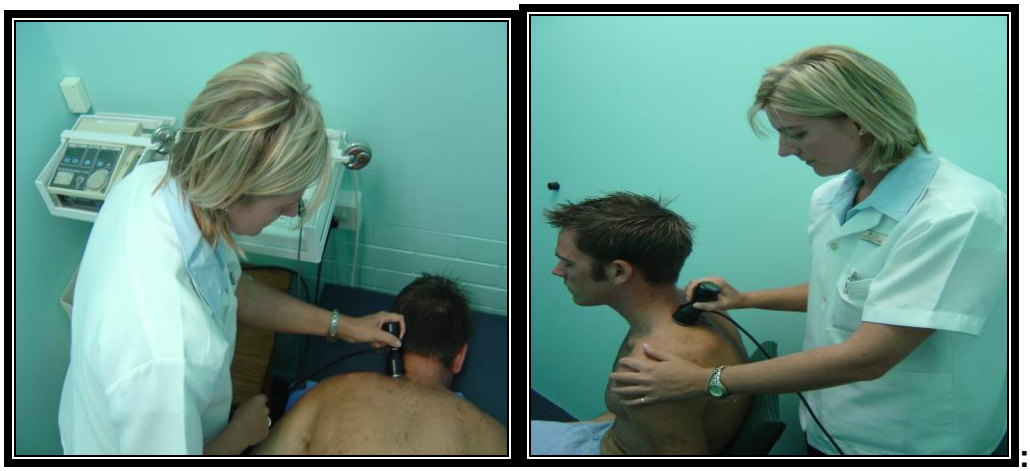


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Plate 4: Demonstration of patient/practitioner for the Ultrasound treatment of the upper fibres of Trapezius muscle in seated (plate on right), and prone (plate on left) position

3.12 Statistical analysis

Statistical Analysis was conducted using the SPSS (version 11.5) software suite. This Statistical software program was manufactured by SPSS Inc, 444N. Michigan Avenue, Chicago, Illinois, USA. Various descriptive and inferential statistical techniques were used. The descriptive procedures used were various tables and graphs and a few summary statistics including but not limited to means, proportions and percentages. Inferential Statistics included various Hypothesis-testing techniques. Due to the size of our samples, namely 20 in each group, we used non-parametric Statistical Tests. All our tests were set at our type 1 error at 5%, or mentioned differently $\alpha = 0.05$. If our p value as reported was less than 0.05 we declared a significant result and our Null Hypothesis was rejected.

Objective (Intra Group Tests)

We had 2 objective and 3 subjective measurement scales. For each type of scale we conducted a Freidmann Test to test for a significant difference in population means between all three readings. If these tests proved to be significant they were followed up by multiple Wilcoxon Test for matched pairs. The former test was revealed if there was a significant difference between any of our 3 means and the latter indicated where that significant difference occurred. The above analysis was conducted for all three treatment groups.

Objective 1 (Inter Group Tests)

We calculated the different values between all readings, for each subjective measurement scale within each group. These common differences were then compared across groups per each measurement scale using the Kruskal Wallis, which allowed one to test for significant differences in population mean differences between all three groups. If these tests proved to be significant they were followed up by various Mann Whitney U -Tests. The former test revealed if there was a significant difference between any of our 3 means and the latter indicated where that significant difference occurred.

Objective 2 (Inter Group Tests)

We calculated the different values between all readings, for each objective measurement scale within each group. These common differences were then compared across groups for each measurement scale using the Kruskal Wallis, which allowed one to test for significant differences in population mean differences between all three groups. If these tests proved to be significant they were followed up by various Mann Whitney U –Tests. The former test would reveal if there was a significant difference between any of our 3 means and the latter indicated where that significant difference occurred.

Chapter 4

Statistical report

4.1 Introduction

This chapter involved the results and discussion of demographic data as well as the results and discussion of the statistical analysis of the subjective and objective data. These were further evaluated in terms of intra- and inter-group comparisons.

Evaluation of the intra-group results between the first and third consultations (overall measurement interval) gave an indication of the overall effectiveness of the treatment regime. Evaluation of the results between the first and second consultations gave an indication of the initial effectiveness of the treatment regimen, whilst evaluation of the results between consultations two and three, gave an indication of the progression of the treatment regimen.

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

KEY:	CMCC	CMCC Neck Disability Index
	NPRS	Numerical pain rating scale (APPENDIX H)
	SFMQ	Short Form Mc Gill Questionaire
	CROM	Cervical range of motion
	ALG	Algometer readings
	GROUP A	Transeva treatment
	GROUP B	Placebo Transeva
	GROUP C	Pulsed Ultrasound treatment

4.2 Descriptive Statistics :

Group A

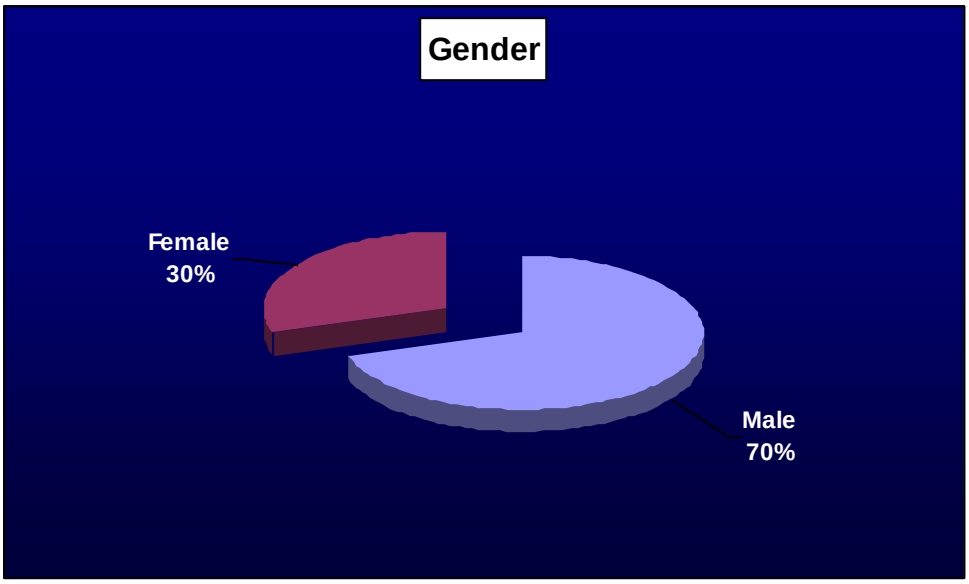

Figure 3: Sample Segmentation of Gender.

Statistics for Pie Chart above: Male=14 and Female=6.

Descriptive Statistics[a]

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	20	30.00	49.00	38.9000	6.91223
Valid N (listwise)	20				

a. GR = 1.00

Table 4.0 Descriptive Statistics for Age.

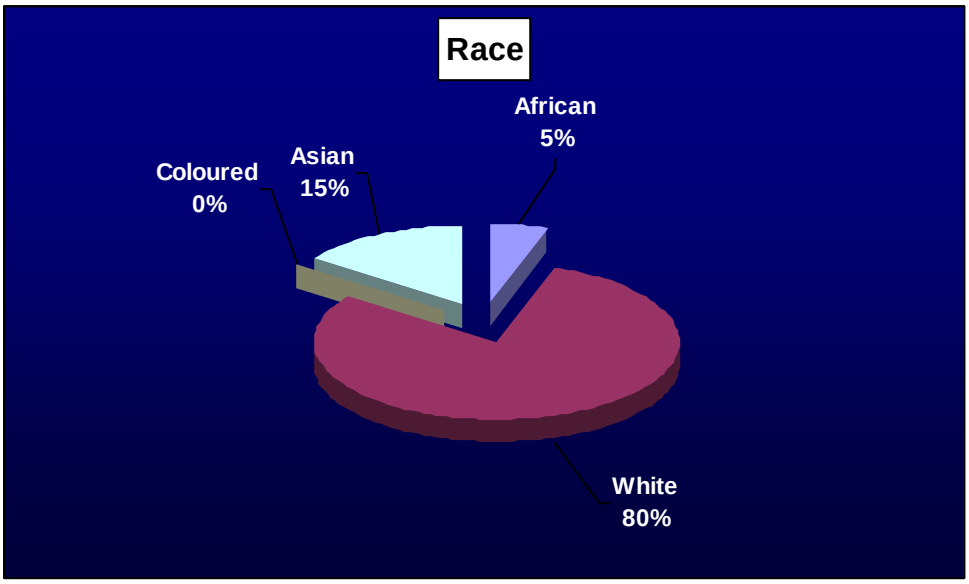

Figure 4: Sample Segmentation of Race.

Statistics for Pie Chart above: African=1, Asian=3, White=16 and Coloured=0.

OCCUP[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bookkeeper	1	5.0	5.0	5.0
	Buyer	1	5.0	5.0	10.0
	Clerical	1	5.0	5.0	15.0
	Clothing manu	1	5.0	5.0	20.0
	Coating insp	1	5.0	5.0	25.0
	Ind folder maker	1	5.0	5.0	30.0
	IT	1	5.0	5.0	35.0
	Lecturer	1	5.0	5.0	40.0
	Marketing	1	5.0	5.0	45.0
	Mech Eng	1	5.0	5.0	50.0
	Sales consult	1	5.0	5.0	55.0
	Sales Exec	1	5.0	5.0	60.0
	Sales Mgr	2	10.0	10.0	70.0
	Secretarial	1	5.0	5.0	75.0
	Stevedore	1	5.0	5.0	80.0
	Student	2	10.0	10.0	90.0
	Teacher	1	5.0	5.0	95.0
	Tuckshop conv	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

a. GR = 1.00

Table 4.1 Frequency Distribution Table of Occupation.

Group B

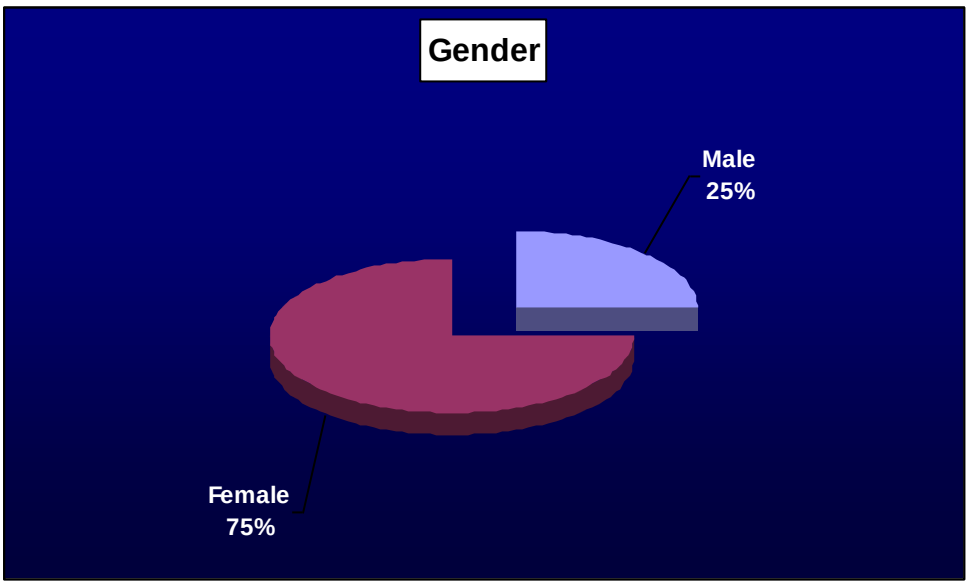

Figure 5: Sample Segmentation of Gender.

Statistics for Pie Chart above: Male=5 and Female=15.

Descriptive Statistics[a]

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	20	30.00	50.00	38.9500	7.72879
Valid N (listwise)	20				

a. GR = 2.00

Table 4.2 Descriptive Statistics for Age.

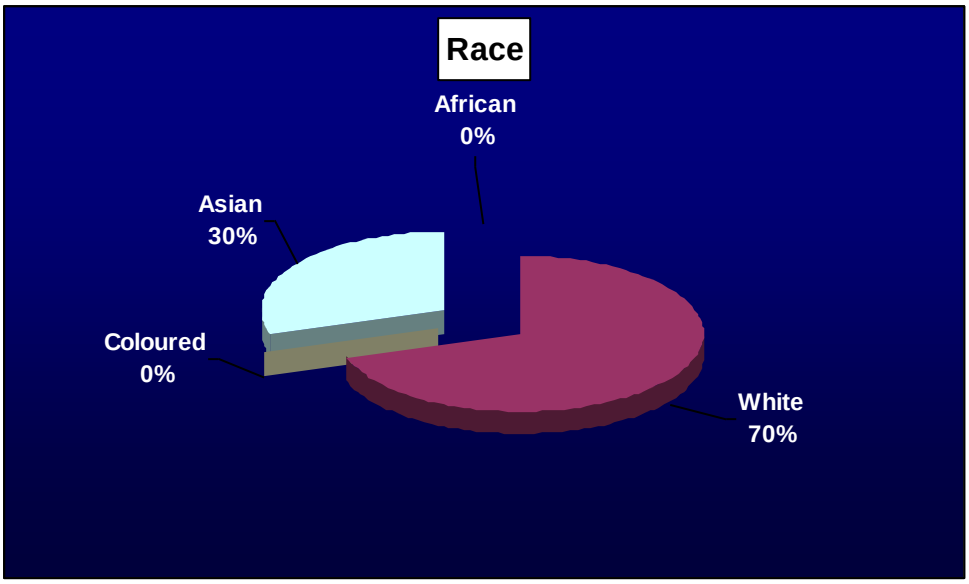

Figure 6: Sample Segmentation of Race.

Statistics for Pie Chart above: African=0, Asian=6, White=14 and Coloured=0.

OCCUP[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Designer	1	5.0	5.0	5.0
	Fashion Sales	1	5.0	5.0	10.0
	Fin Advisor	1	5.0	5.0	15.0
	Fin broker	1	5.0	5.0	20.0
	Home Admin	2	10.0	10.0	30.0
	Human Resources	1	5.0	5.0	35.0
	Ins broker	1	5.0	5.0	40.0
	Jeweller	1	5.0	5.0	45.0
	Lecturer	1	5.0	5.0	50.0
	Marketing exec	1	5.0	5.0	55.0
	Motor dealer	1	5.0	5.0	60.0
	Sales Exec	1	5.0	5.0	65.0
	Secretarial	4	20.0	20.0	85.0
	Teacher	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

a. GR = 2.00

Table 4.3 Frequency Distribution Table of Occupation.

Group C

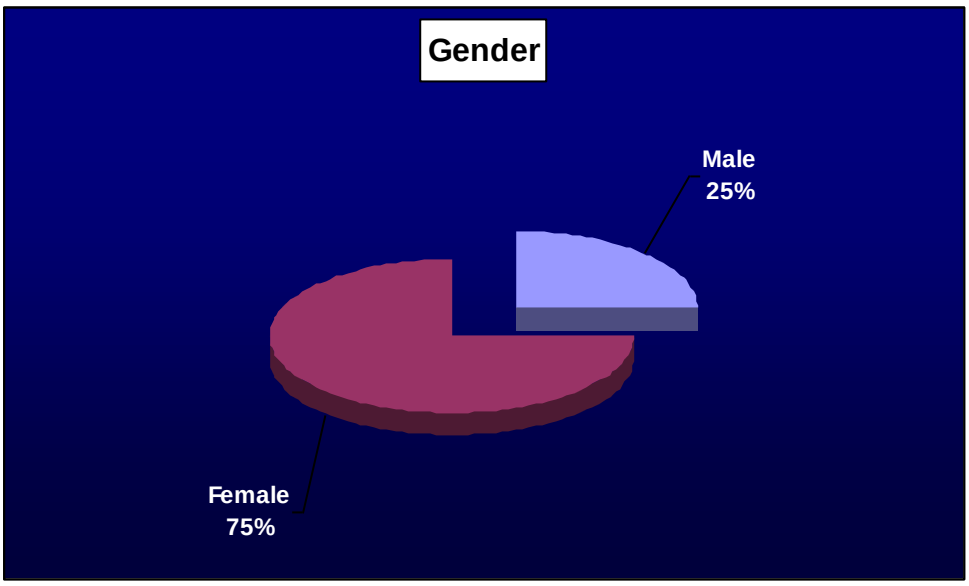

Figure 7: Sample Segmentation of Gender.

Statistics for Pie Chart above: Male=5 and Female=15.

Descriptive Statistics[a]

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	20	30.00	48.00	39.4500	5.61460
Valid N (listwise)	20				

a. GR = 3.00

Table 4.4 Descriptive Statistics for Age.

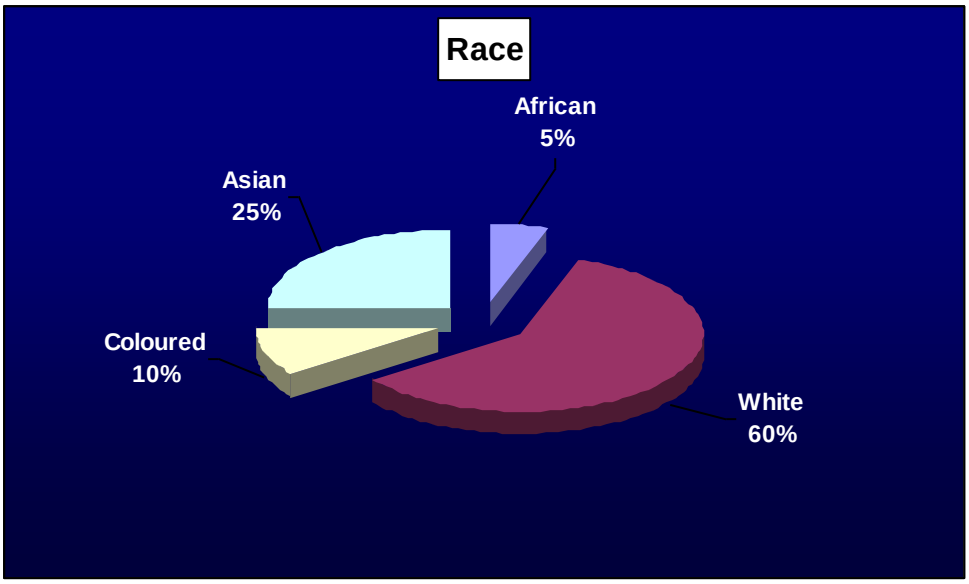

Figure 8: Sample Segmentation of Race.

Statistics for Pie Chart above: African=1, Asian=5, White=12 and Coloured=2.

OCCUP[a]

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Admin	2	10.0	10.0	10.0
	Admin clerk	1	5.0	5.0	15.0
	Bank Super	1	5.0	5.0	20.0
	Bookseller	1	5.0	5.0	25.0
	Cashier	1	5.0	5.0	30.0
	Fin adv	1	5.0	5.0	35.0
	Home admin	1	5.0	5.0	40.0
	Hotel admin	1	5.0	5.0	45.0
	IT consult	1	5.0	5.0	50.0
	Lecturer	1	5.0	5.0	55.0
	LEcturer	1	5.0	5.0	60.0
	Psychologist	1	5.0	5.0	65.0
	Sales Mgr	1	5.0	5.0	70.0
	Secretary	1	5.0	5.0	75.0
	Supervisor	1	5.0	5.0	80.0
	Switchboard	1	5.0	5.0	85.0
	Teacher	3	15.0	15.0	100.0
	Total	20	100.0	100.0	

a. GR = 3.00

Table 4.5 Frequency Distribution Table of Occupation.

In conclusion it can be seen that :

Group A consists of 70% male and 30% female, has a mean age of 38.9 years and is mostly White (80%) and Asian (15%) and has various occupational groups.

Group B consists of 25% male and 75% female, has a mean age of 38.9 years and is mostly white (70%) and Asian (30%) and has various occupational groups.

Group C consists of 25% male and 75% female, has a mean age of 39.45 years and is mostly white (60%) and Asian (25%) and has various occupational groups.

Therefore all three groups are fairly similar from a demographic point of view; however, group 1 is mostly male whereas the other 2 groups are dominated by females.

The research study was not a true reflection of the demographic representation of South Africa's population, as there where only 2 African patients who took part in the study. Therefore the results of this study suggest that there is a limited exposure of certain parts of the population to treatments such as the Transeva, which is not utilised as part of traditional African healing methods or associated with hospital care where most patients are exposed almost exclusively to medication or some form of drug therapy for pain control (Prout, 1996). Prout concludes that the notion of cultural bias is a more flexible, realistic and useful way of conceptualising variations in household health practices and beliefs (Prout,1996) Therefore there seems to be a need to educate parts of our society so that all may benefit in that part of health care that chiropractic provides.

In addition to this the researcher also realises that there could have been an influence in terms of the advertising for participants for this study, whereby the nature of the advert and the placement of the advert may have inadvertently biased the sample according to ethnicity.

The predominance in the number of female subjects that took part could possibly be due to the predominance of office workers/secretaries that suffered from neck pain. Han and Harrison state that myofascial pain syndrome is more common in females, thus this study shows congruency with literature regarding the sex distribution of the above condition (Han and Harrison 1997).

Of the various occupation groups accepted into the study, one common factor which was congruent with the inclusion criteria was that they all did some office work in a day and all reported that working at a desk or in front of a computer was the activity most commonly associated with aggravating their condition. Poor posture associated with prolonged sitting at a desk may explain the high prevalence of neck pain with these patients (Han and Harrison 1997). Furthermore this is congruent with and supports the findings of Peek (2005), where he found in his ergonomics related study that there was a significant correlation with neck pain and office ergonomics.

4.3 Inferential Statistics

4.3.1 Intra Group Tests

4.3.1a Subjective :

CMCC

Descriptive Statistics

GR		N	Mean	Std. Deviation	Minimum	Maximum
A	CMCC1	20	10.7500	5.99012	2.00	27.00
	CMCC2	20	7.5000	5.16568	.00	21.00
	CMCC3	20	5.3500	4.95533	.00	18.00
B	CMCC1	20	10.4000	5.66057	2.00	20.00
	CMCC2	20	8.3000	6.68935	.00	20.00
	CMCC3	20	7.5500	4.81746	.00	17.00
C	CMCC1	20	11.5000	6.37842	2.00	24.00
	CMCC2	20	8.8500	5.17357	1.00	20.00
	CMCC3	20	8.0000	5.03671	.00	19.00

Table 4.6 Descriptive Statistics for CMCC by Group.

Friedmann Test

Group A P value = 0.000
Group B P value = 0.001
Group C P value = 0.000

Since the p values in all three groups above are less than 0.05 which equals the significance level, then the Null hypothesis can be rejected in all three cases and the study can conclude that at least one of the population means are significantly different to the others again in all three cases. As to where these differences are occurring will be analyzed below by applying multiple Wilcoxon Tests for matched pairs.

Test Statistics[b]

GR		CMCC2 - CMCC1	CMCC3 - CMCC1	CMCC3 - CMCC2
A	Z	-3.822[a]	-3.931[a]	-3.151[a]
	Asymp. Sig. (2-tailed)	.000	.000	.002
B	Z	-2.342[a]	-3.413[a]	-.786[a]
	Asymp. Sig. (2-tailed)	.019	.001	.432
C	Z	-2.788[a]	-2.849[a]	-1.381[a]
	Asymp. Sig. (2-tailed)	.005	.004	.167

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

Table 4.7 Wilcoxon Tests Results for CMCC by Group.

In the case of group A all three p values are less than 0.05 which allows us to reject the Null hypothesis in all three cases and conclude that there is a significant difference in population means, in other words CMCC scores change significantly in each of the sequential visits.

The results obtained for group A is consistent with the literature that indicates a treatment effect is present when the Transeva is applied (Forster and Palastanga 1990, Greene 2003). It is therefore conceivable that the patients should improve throughout the course of the applied treatment.

In the case of group B only two p values are less than 0.05 which allows us to reject the Null hypothesis in the two cases and conclude that there is a significant difference in population means here, in other words CMCC scores change significantly from visit 1 to 2 and visits 1 to 3 but not from visits 2 to 3.

This group represented the Placebo Transeva group. Due to the application of this detuned modality, it is possible that the improvements initially seen here could be due to :

- Mechanical stimulation of the superficial nerve endings by means of the head of the detuned Transeva, stimulate inhibitory interneurons causing an increase in mechano-receptive activity and reduce the

amount of pain signal transmitted, as per the “Gate control theory” (Melzack and Wall,1965).

- “Placebo Effect” –by the psychological thought of being treated which results in perceived patient improvement which is not based on a physiological response associated with healing. This effect is negated with time as the patient does not respond physiologically to the treatment and maintains the same level of dysfunctional ability. (Mouton, 1996)
- “Hawthorne” effect”– the effect by which when the patient sees you as a Doctor, they try to please the Doctor with a well intentioned but false subjective improvement that does not correlate with their objective response and therefore the results average out at a false mean. This effect is negated with time as the patient does not respond physiologically to the treatment and maintains the same level of dysfunctional ability. (Mouton, 1996)

In the case of group C only two p values are less than 0.05 which allows us to reject the Null hypothesis in the two cases and conclude that there is a significant difference in population means here, in other words CMCC scores change significantly from visit 1 to 2 and visits 1 to 3 but not from visits 2 to 3.

This group represented the pulsed Ultrasound group. Due to the application of this modality, it is possible that the improvements initially seen here could be due to:

- Mechanical stimulation of the superficial nerve endings by means of the head of the Ultrasound, causing an increase in mechano-receptive activity as per the “Gate control theory” (Melzack and Wall,1965)
- Micro-massage effect of the vibration according to the mechanisms by which vibration minimizes pain may include

both peripheral and central mechanisms (Melzack and Wall,1965 ;Kitchen and Bazin, 1996)

- Thermal effect (Kitchen and Bazin ,1996)
- Degree of penetration of the therapeutic effect is possibly relative to patient size. With increased adipose tissue / muscle, the Ultrasound may be less effective. Females generally have a higher percentage body fat than males (Frish, 1997) and after concluding that the Ultrasound and Placebo groups have a higher percentage females, this must be taken into account.

These findings suggest that the Transeva group showed a greater improvement to manage everyday life between all three visits than the Placebo Transeva or Pulsed Ultrasound group over the duration of the research program:

- The Placebo; it stands to reason that it could play a role in all three groups and therefore its effect is negated.
- It would seem that the Ultrasound has limited function, in that it only seems to provide micro-massage and a thermal effect as opposed to both micro-massage and a thermal effect as well as a muscular contractile effect.
- In contrast to the Transeva which acts by this dual mechanism, vascular and neurological:
  - Massage effect as per the Ultrasound
  - Muscle effect – contraction and relation of the muscle:
    - The pumping action of the muscle contraction allows for a synergistic aid to the micro-massage that the Transeva imparts.
    - Relaxation or normalisation of the action potentials of the muscles by means of resetting the calcium channels within the sarcolemma of the muscle (Guyton and Hall, 2000) has an effect on decreasing the tonicity of the muscle. Thereby

allowing for the muscle to be in a more relaxed state post the treatment.

When adding the above results to the demographic profile of the patients, it was noted that there was a higher percentage of Asian population in groups B and C than group A. This could have affected the responses from these patient groups, as a result of a greater psychosocial or cultural bias effect, as defined by Prout (1996).

Numerical Pain Rating Scale

Descriptive Statistics

GR		N	Mean	Std. Deviation	Minimum	Maximum
A	NRS1	20	48.3000	13.78061	20.00	75.00
	NRS2	20	39.2000	14.73485	10.00	60.00
	NRS3	20	28.0000	17.27487	5.00	80.00
B	NRS1	20	47.6000	11.25494	25.00	70.00
	NRS2	20	41.6500	13.09188	25.00	70.00
	NRS3	20	37.3000	13.89093	20.00	65.00
C	NRS1	20	48.0500	15.56134	25.00	75.00
	NRS2	20	43.2000	17.14213	10.00	75.00
	NRS3	20	37.5750	17.05508	7.50	70.00

Table 4.8 Descriptive Statistics for NPRS by Group.

Friedmann Test

Group A P value = 0.000
Group B P value = 0.002
Group C P value = 0.021

Since the p values in all three groups above are less than 0.05 which equals the significance level, then the Null hypothesis can be rejected in all three cases and the study can conclude that at least one of the population means is significantly different to the others again in all three cases. As to where these differences are occurring will be analyzed below by applying multiple Wilcoxon Tests for matched pairs.

Test Statistics[b]

GR		NRS2 - NRS1	NRS3 - NRS1	NRS3 - NRS2
A	Z	-2.867[a]	-3.346[a]	-3.155[a]
	Asymp. Sig. (2-tailed)	.004	.001	.002
B	Z	-2.646[a]	-2.867[a]	-2.085[a]
	Asymp. Sig. (2-tailed)	.008	.004	.037
C	Z	-1.476[a]	-2.512[a]	-1.822[a]
	Asymp. Sig. (2-tailed)	.140	.012	.068

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

Table 4.9 Wilcoxon Tests Results for NPRS by Group.

In the case of group A all three p values are less than 0.05 which allows us to reject the Null hypothesis in all three cases and conclude that there is a significant difference in population means, in other words NPRS scores change significantly in each of the sequential visits.

The results obtained for group A is consistent with the literature that indicates a treatment effect is present when the Transeva is applied (Forster and Palastanga, 1990 and Greene, 2003). It is therefore conceivable that the patients improved throughout the course of the applied treatment by showing a greater reduction in pain intensity over the research program.

In the case of group B all three p values are less than 0.05 which allows us to reject the Null hypothesis in all three cases and conclude that there is a

significant difference in population means, in other words NPRS scores change significantly in each of the sequential visits.

This group represented the Placebo Transeva group. Due to the application of this detuned modality, it is possible that the improvements initially seen here could be due to :

- Mechanical stimulation of the superficial nerve endings by means of the head of the Transeva, causing an increase in mechano-receptive activity as per the “Gate control theory” (Melzack and Wall,1965)
- Mechanical stimulus is temporary (Melzack and Wall,1965)
- There is no flushing effect of increased blood flow to the area and lymphatic removal, therefore the patients will revert to previous levels of pain or show an un-sustained pain pattern as the pain stimulus is still there.

In the case of group C only one p value is less than 0.05 which allows us to reject the Null hypothesis in that case and conclude that there is a significant difference in population means here, in other words NPRS scores change significantly from visit 1 to 3.

This group represented the pulsed Ultrasound group. Due to the application of this modality, it is possible that the improvements initially seen here could be due to:

- Mechanical stimulation of the superficial nerve endings by means of the head of the Ultrasound, causing an increase in mechano-receptive activity as per the “Gate control theory” (Melzack and Wall, 1965).
- Micro- massage effect of the vibration according to the mechanisms by which vibration minimizes pain may include

both peripheral and central mechanisms. (Melzack and Wall,1965)

- Thermal effect (Kitchen and Bazin ,1996)
- Degree of penetration of the Ultrasound wave relative to patient size (adipose / muscle) may be less effective, as there is a higher percentage of females in groups B and C and females generally have a higher percentage body fat (Frish, 1997).

These findings suggest that the Transeva and Placebo groups showed a greater reduction in pain intensity over the research program. A significant improvement within the Placebo group was not expected.

- The Placebo stands to reason as above (see page 45)
- The Ultrasound has limited function in that it only provides micro-massage and thermal effects as above (see page 46)
- Which is in contrast to the Transeva which acts by dual mechanism, both vascular and neurological as above (see page 47)

Again the psychosocial/ Cultural bias in groups B and C versus group A must be a factor to take into consideration with these results (Prout, 1996)

Short Form Mc Gill Questionnaire

Descriptive Statistics

GR		N	Mean	Std. Deviation	Minimum	Maximum
A	SM1	20	13.0500	6.53311	4.00	26.00
	SM2	20	7.7500	5.41805	1.00	19.00
	SM3	20	5.2000	5.35675	.00	19.00
B	SM1	20	11.7000	7.10152	2.00	25.00
	SM2	20	7.0500	4.99974	1.00	16.00
	SM3	20	6.3500	5.01865	.00	18.00
C	SM1	20	12.6500	8.39972	3.00	31.00
	SM2	20	8.9500	5.90695	2.00	27.00
	SM3	20	6.8000	4.61804	.00	16.00

Table 4.10 Descriptive Statistics for SFMQ by Group.

Friedmann Test

Group A P value = 0.000
Group B P value = 0.000
Group C P value = 0.002

Since the p values in all three groups above are less than 0.05 which equals the significance level, then the Null hypothesis can be rejected in all three cases and the study can conclude that at least one of the population means is significantly different to the others again in all three cases. As to where these differences are occurring will be analyzed below by applying multiple Wilcoxon Tests for matched pairs.

Test Statistics[b]

GR		SM2 - SM1	SM3 - SM1	SM3 - SM2
A	Z	-3.871[a]	-3.924[a]	-2.901[a]
	Asymp. Sig. (2-tailed)	.000	.000	.004
B	Z	-3.254[a]	-3.538[a]	-1.089[a]
	Asymp. Sig. (2-tailed)	.001	.000	.276
C	Z	-2.826[a]	-3.184[a]	-1.422[a]
	Asymp. Sig. (2-tailed)	.005	.001	.155

a. Based on positive ranks.

b. Wilcoxon Signed Ranks Test

Table 4.11 Wilcoxon Tests Results for SFMQ by Group.

In the case of group A all three p values are less than 0.05 which allows us to reject the Null hypothesis in all three cases and conclude that there is a significant difference in population means, in other words Short Form McGill scores change significantly in each of the sequential visits.

The results obtained for group A is consistent with the literature that indicates a treatment effect is present when the Transeva is applied (Forster and Palastanga, 1990, Greene 2003). It is therefore conceivable that the patients improved throughout the course of the applied treatment.

In the case of group B only two p values are less than 0.05 which allows us to reject the Null hypothesis in the two cases and conclude that there is a significant difference in population means here, in other words scores from Short Form McGill change significantly from visit 1 to 2 and visits 1 to 3 but not from visits 2 to 3.

This group represented the Placebo Transeva group. Due to the application of this detuned modality, it is possible that the improvements initially seen here could be due to:

- Mechanical stimulation of the superficial nerve endings by means of the head of the Transeva, causing an increase in mechano-receptive activity as seen above (page 45)
- Placebo effect as seen above (page 45)
- Hawthorne effect as seen above (page 45)

In the case of group C only two p values are less than 0.05 which allows us to reject the Null hypothesis in the two cases and conclude that there is a significant difference in population means here, in other words Short Form McGill scores change significantly from visit 1 to 2 and visits 1 to 3 but not from visits 2 to 3.

This group represented the pulsed Ultrasound group. Due to the application of this modality, it is possible that the improvements initially seen here could be due to:

- Mechanical stimulation of the superficial nerve endings by means of the head of the Ultrasound, causing an increase in mechano-receptive activity as per the “Gate control theory” (Melzack and Wall, 1965).
- Micro-massage effect of the vibration according to the mechanisms by which vibration minimizes pain may include both peripheral and central mechanisms (Melzack and Wall,1965).
- Thermal effect (Kitchen and Bazin ,1996).
- Degree of penetration possibly relative to patient size. With increased adipose tissue / muscle, the Ultrasound may be less effective, due to the increased number of females present compared to group A. (as per the above –page 46)

These findings suggest that the Transeva group showed a greater reduction in the quality and intensity of pain over all three visits than the Placebo Transeva or Pulsed Ultrasound group over the duration of the research program:

- The Placebo stands to reason as above (page 45)
- The Ultrasound has limited function in that it only provides micro-massage and thermal effects as above (see page 46)
- Which is in contrast to the Transeva which acts by dual mechanism, both vascular and neurological as above(page 47)

By looking at the demographic results, it was noted that there was a higher percentage of Asian population in groups B and C than group A. This could cause a greater psychosocial or cultural bias effect in these two groups which could have had an effect on the results (Prout, 1996).

4.3.1b Objective

CROM Readings :

FLEXION

Descriptive Statistics

GR		N	Minimum	Maximum	Mean	Std. Deviation
A	CRF1	20	40.00	85.00	66.7500	10.29499
	CRF2	20	50.00	90.00	69.5000	9.98683
	CRF3	20	40.00	90.00	70.2500	10.81848
	Valid N (listwise)	20				
B	CRF1	20	55.00	90.00	71.7500	9.35766
	CRF2	20	55.00	100.00	72.7500	10.69616
	CRF3	20	50.00	90.00	69.5000	10.62519
	Valid N (listwise)	20				
C	CRF1	20	40.00	90.00	68.5000	12.57608
	CRF2	20	40.00	90.00	66.5000	14.51859
	CRF3	20	50.00	85.00	69.0000	9.94723
	Valid N (listwise)	20				

Table 4.12 Descriptive Statistics for CROM (flexion) by Group.

Friedmann Test

Group A P value = 0.219
Group B P value = 0.047
Group C P value = 0.779

Since the p value in only one group above is less than 0.05 which equals the significance level, then the Null hypothesis in this case can be rejected and the study can conclude that at least one of the population means are significantly different to the others in Group B. As to where these differences are occurring in Group B will be analyzed below by applying multiple Wilcoxon Tests for matched pairs. Note that the Null hypothesis in the other 2 groups is not rejected as the p values in these cases are not less than 0.05.

Test Statistics[c,d]

	CRF2 - CRF1	CRF3 - CRF1	CRF3 - CRF2
Z	-.893[a]	-1.208[b]	-1.446[b]
Asymp. Sig. (2-tailed)	.372	.227	.148

a. Based on negative ranks.

b. Based on positive ranks.

c. Wilcoxon Signed Ranks Test

d. GR = 2.00

Table 4.13 Wilcoxon Tests Results for CROM (flexion) by Group.

In the case of group B no p values are less than 0.05, therefore the study cannot reject the Null hypothesis and conclude that there is a significant difference in population means, in other words CROM (flex) scores do not change significantly in each of the sequential visits.

Group A – Is as expected due to the treatment received by its action of dual mechanism.(see above –page 47)

Group B – holds true for Placebo, where there is no treatment effect, yet pain is reduced due to the mechanical stimuli, which is seen in NPRS results.

Group C -The Ultrasound has no flushing effect for the increasing rate of inflammation to allow for quicker resolution of the myofascial trigger point. The worsening effect initially may be due to the irritation of the myofascial trigger point or stimulation of the inflammatory process to increase the rate of healing. The results then return to pre-treatment readings once inflammation has decreased and resolved within 72 hours (Vizniak, 2003).

EXTENSION

Descriptive Statistics

GR		N	Minimum	Maximum	Mean	Std. Deviation
A	CRE1	20	40.00	80.00	58.9000	10.36137
	CRE2	20	40.00	95.00	64.5000	14.13283
	CRE3	20	40.00	100.00	64.5000	14.13283
	Valid N (listwise)	20				
B	CRE1	20	50.00	85.00	67.2500	12.08250
	CRE2	20	50.00	90.00	67.5000	12.61787
	CRE3	20	50.00	90.00	65.5000	12.86570
	Valid N (listwise)	20				
C	CRE1	20	25.00	100.00	67.2500	15.85087
	CRE2	20	30.00	100.00	65.7500	18.08423
	CRE3	20	20.00	100.00	64.5000	19.59457
	Valid N (listwise)	20				

Table 4.14 Descriptive Statistics for CROM (extension) by Group.

Friedmann Test

Group A P value = 0.024
Group B P value = 0.235
Group C P value = 0.673

Since the p value in only one group above is less than 0.05 which equals the significance level, then the Null hypothesis in this case can be rejected and the study can conclude that at least one of the population means are significantly different to the others in Group A. As to where these differences are occurring in Group A will be analyzed below by applying multiple Wilcoxon Tests for matched pairs. Note that the Null hypothesis in the other 2 groups is not rejected as the p values in these cases are not less than 0.05.

Test Statistics[c,d]

	CRE2 - CRE1	CRE3 - CRE1	CRE3 - CRE2
Z	-2.143[a]	-1.978[a]	.000[b]
Asymp. Sig. (2-tailed)	.032	.048	1.000

a. Based on negative ranks.

b. The sum of negative ranks equals the sum of positive ranks.

c. Wilcoxon Signed Ranks Test

d. GR = 1.00

Table 4.15 Wilcoxon Tests Results for CROM(extension) by Group.

In the case of group A only two p values are less than 0.05 which allows us to reject the Null hypothesis in all these cases and conclude that there is a significant difference in population means, in other words CROM (flex) scores change significantly in each of the sequential visits in this group.

Extension does not cause stretch (elongation) of the Trapezius and Levator Scapula muscles, it causes contraction of the muscles and this causes irritation of the trigger points that are present. Thus it stands to reason that irritated trigger points will be associated with a decrease in extension ROM.

Group A –Resulted in a decrease in trigger points due to the dual mechanism (as seen on page 47), and this allows for an increase in Range Of Motion.
Group B –Transeva Placebo group resulted in no treatment effect, thus the trigger point runs its natural history and therefore may get worse with time.
Group C – The Ultrasound group had no flushing effect for the increasing rate of inflammation as the trigger points contracted in extension to allow for resolution of the myofascial trigger point, causing a decrease in extension.

LATERAL FLEXION (RIGHT)

Descriptive Statistics

GR		N	Minimum	Maximum	Mean	Std. Deviation
A	CRLFR1	20	25.00	60.00	43.2500	7.82624
	CRLFR2	20	30.00	60.00	45.0000	7.43392
	CRLFR3	20	35.00	60.00	48.0000	7.50438
	Valid N (listwise)	20				
B	CRLFR1	20	30.00	65.00	45.7500	10.42202
	CRLFR2	20	30.00	60.00	47.0000	10.43779
	CRLFR3	20	30.00	60.00	45.2500	10.57243
	Valid N (listwise)	20				
C	CRLFR1	20	30.00	60.00	45.7500	9.63478
	CRLFR2	20	30.00	60.00	46.0000	9.26226
	CRLFR3	20	30.00	65.00	46.5000	10.64993
	Valid N (listwise)	20				

Table 4.16 Descriptive Statistics for CROM (lat flexion-right) by Group.

Friedmann Test
Group A P value = 0.029
Group B P value = 0.612
Group C P value = 0.835

Since the p value in only one group above is less than 0.05 which equals the significance level, then the Null hypothesis in this case can be rejected and the study can conclude that at least one of the population means are significantly different to the others in Group A. As to where these differences are occurring in Group A will be analyzed below by applying multiple Wilcoxon Tests for matched pairs. Note that the Null hypothesis in the other 2 groups are not rejected as the p values in these cases are not less than 0.05.

Test Statistics[b,c]

	CRLFR2 - CRLFR1	CRLFR3 - CRLFR1	CRLFR3 - CRLFR2
Z	-1.204[a]	-2.583[a]	-2.292[a]
Asymp. Sig. (2-tailed)	.229	.010	.022

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

c. GR = 1.00

Table 4.17 Wilcoxon Tests Results for CROM (lat flexion-right) by Group.

In the case of group A the p values less than 0.05 is just between 1 and 3 which allows us to reject the Null hypothesis in all these cases and conclude that there is a significant difference in population means here, in other words CROM (LFR) scores change significantly in each of the sequential visits.

Group A – trends as before. The Transeva group resulted in a decrease in trigger points due to the dual mechanism (as seen above on page 47), and this allows for an increase in range of motion.

Group B –The Transeva Placebo group had increased movement due to perceived decreased pain (Melzack and Wall, 1965), but with no treatment effect they reverted to previous readings.

Group C –Pulsed Ultrasound group reached a plateau when maximum extension range of motion for those patients was reached.

The technique for measurements was the same and this ensured reproducibility (keeping the shoulders level)

The influence of right handedness may have an effect, causing the right sided trigger points to be worse, therefore the left side has greater contractility (this results in improved response to any treatment modality due to a relatively less severe myofascial trigger point on the left), thereby allowing for improvement in right lateral flexion.

LATERAL FLEXION (LEFT)

Descriptive Statistics

GR		N	Minimum	Maximum	Mean	Std. Deviation
A	CRLFL1	20	20.00	65.00	44.0000	10.58798
	CRLFL2	20	20.00	70.00	46.5000	11.13317
	CRLFL3	20	20.00	70.00	48.7500	11.68388
	Valid N (listwise)	20				
B	CRLFL1	20	25.00	70.00	48.2500	12.16931
	CRLFL2	20	35.00	65.00	51.2500	9.71637
	CRLFL3	20	30.00	70.00	52.2500	10.93943
	Valid N (listwise)	20				
C	CRLFL1	20	20.00	60.00	46.9000	10.64202
	CRLFL2	20	20.00	60.00	46.7500	11.27118
	CRLFL3	20	30.00	60.00	49.7500	8.65645
	Valid N (listwise)	20				

Table 4.18 Descriptive Statistics for CROM (lat flexion-left) by Group.

Friedmann Test

Group A P value = 0.194
Group B P value = 0.023
Group C P value = 0.234

Since the p value in only one group above is less than 0.05 which equals the significance level, then the Null hypothesis in this case can be rejected and the study can conclude that at least one of the population means are significantly different to the others in Group B. As to where these differences are occurring in Group A will be analyzed below by applying multiple Wilcoxon Tests for matched pairs. Note that the Null hypothesis in the other 2 groups is not rejected as the p values in these cases are not less than 0.05.

Test Statistics[b,c]

	CRLFL2 - CRLFL1	CRLFL3 - CRLFL1	CRLFL3 - CRLFL2
Z	-2.377[a]	-2.464[a]	-.974[a]
Asymp. Sig. (2-tailed)	.017	.014	.330

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

c. GR = 2.00

Table 4.19 Wilcoxon Tests Results for CROM(lat flexion-left) by Group.

In the case of group B only two p values are less than 0.05 which allows us to reject the Null hypothesis in all these cases and conclude that there is a significant difference in population means, in other words CROM (LFL) scores change significantly in each of the sequential visits.

Group A – trends as before. The Transeva group resulted in a decrease in trigger points due to the dual mechanism (as above on page 47), and this allows for an increase in range of motion.

Group B – Increased movement due to perceived decreased pain (Melzack and Wall, 1965) but with no actual therapeutic effect it would have been expected for these patients to revert to previous readings. As this did not happen there may have been human errors, i.e. home stretches in a few patients in this group that may have affected the statistical results. Also the initial palpation before readings took place may well have affected the results (White, 2005).

Group C –The Pulsed Ultrasound group resulted in decreased readings. This may be due to the effects of right handedness, causing the right sided trigger points to be worse, and therefore limit lateral flexion to the left.

The technique for measurements was the same and this ensured reproducibility (keeping the shoulders level)

ROTATION RIGHT

Descriptive Statistics

GR		N	Minimum	Maximum	Mean	Std. Deviation
A	CRRR1	20	45.00	90.00	65.2500	12.61526
	CRRR2	20	60.00	100.00	73.0000	10.05249
	CRRR3	20	65.00	100.00	75.0000	9.03211
	Valid N (listwise)	20				
B	CRRR1	20	40.00	100.00	70.0000	14.50953
	CRRR2	20	45.00	90.00	73.5000	9.47295
	CRRR3	20	50.00	100.00	76.2500	13.84833
	Valid N (listwise)	20				
C	CRRR1	20	40.00	100.00	75.2500	17.73155
	CRRR2	20	40.00	100.00	79.0000	18.32456
	CRRR3	20	40.00	100.00	78.7500	17.00426
	Valid N (listwise)	20				

Table 4.20 Descriptive Statistics for CROM (rotation-right) by Group.

Friedmann Test

Group A P value = 0.099
Group B P value = 0.045
Group C P value = 0.387

Since the p value in only one group above is less than 0.05 which equals the significance level, then the Null hypothesis in this case can be rejected and the study can conclude that at least one of the population means are significantly different to the others in Group B. As to where these differences are occurring in Group A will be analyzed below by applying multiple Wilcoxon Tests for matched pairs. Note that the Null hypothesis in the other 2 groups is rejected as the p values in these cases are not less than 0.05.

Test Statistics[b,c]

	CRRR2 - CRRR1	CRRR3 - CRRR1	CRRR3 - CRRR2
Z	-1.671[a]	-2.433[a]	-1.305[a]
Asymp. Sig. (2-tailed)	.095	.015	.192

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

c. GR = 2.00

Table 4.21 Wilcoxon Tests Results for CROM (rotation-right) by Group.

In the case of group A the p values less than 0.05 is just between visits 1 and 3 which allows us to reject the Null hypothesis in all these cases and conclude that there is a significant difference in population means here, in other words CROM (ROT R) scores change significantly in each of the sequential visits.

The effects of right handedness, causing the right sided trigger points to be worse, therefore the left side has greater contractility (this results in improved response to any treatment modality due to a relatively less severe myofascial trigger point on the left), thereby allowing for improvement in right rotation.

Rotation is not the principal movement of either muscle and therefore it is at best an indirect measure of muscle performance / patient improvement.
Scalenii or the Sternocleidomastoid muscles would be more of an indicator, but these muscles were not assessed in the study (Magee 1992).

ROTATION LEFT

Descriptive Statistics

GR		N	Minimum	Maximum	Mean	Std. Deviation
A	CRRL1	20	30.00	90.00	69.7500	14.37057
	CRRL2	20	50.00	90.00	71.7500	11.38732
	CRRL3	20	50.00	100.00	78.0000	13.11889
	Valid N (listwise)	20				
B	CRRL1	20	40.00	100.00	71.0000	16.18967
	CRRL2	20	50.00	100.00	71.5000	13.18891
	CRRL3	20	50.00	90.00	73.5000	13.08877
	Valid N (listwise)	20				
C	CRRL1	20	55.00	110.00	79.2500	14.71439
	CRRL2	20	50.00	105.00	79.0000	15.44089
	CRRL3	20	40.00	110.00	77.2500	17.43220
	Valid N (listwise)	20				

Table 4.22 Descriptive Statistics for CROM (rotation-left) by Group.

Friedmann Test

Group A P value = 0.022
Group B P value = 0.673
Group C P value = 0.659

Since the p value in only one group above is less than 0.05 which equals the significance level, then the Null hypothesis in this case can be rejected and the study can conclude that at least one of the population means are significantly different to the others in Group A. As to where these differences are occurring in Group A will be analyzed below by applying multiple Wilcoxon Tests for matched pairs. Note that the Null hypothesis in the other 2 groups is not rejected as the p values in these cases are not less than 0.05.

Test Statistics[b,c]

	CRRL2 - CRRL1	CRRL3 - CRRL1	CRRL3 - CRRL2
Z	-.638[a]	-2.062[a]	-2.172[a]
Asymp. Sig. (2-tailed)	.523	.039	.030

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

c. GR = 1.00

Table 4.23 Wilcoxon Tests Results for CROM(rotation-left) by group.

In the case of group B only two p values are less than 0.05 which allows us to reject the Null hypothesis in all these cases and conclude that there is a significant difference in population means, in other words CROM (ROT L) scores change significantly in each of the sequential visits.

Group A - Transeva – improves consistently and significantly for all readings even when the “other factors” (see below) affecting the readings have been accounted for.

Group B –Transeva Placebo group resulted in no treatment effect, therefore trigger point runs its natural history course, therefore gets worse with time.

Other factors affecting the readings:

- Use of 2 CROM instruments (due to other students also using the CROM) …may have made a small difference
- Patient’s own home care, they could have self- treated even after being told not to.
- Changes at work / home, resulting in stressor increase / decrease.

Algometer readings

Descriptive Statistics

GR		N	Minimum	Maximum	Mean	Std. Deviation
A	A1	20	1.80	4.90	3.1350	.83620
	A2	20	1.90	5.80	3.5850	.94327
	A3	20	2.10	5.80	3.9900	1.00467
	Valid N (listwise)	20				
B	A1	20	1.00	3.80	2.5400	.86960
	A2	20	.80	3.80	2.5550	.89764
	A3	20	.50	4.70	2.6500	1.03593
	Valid N (listwise)	20				
C	A1	20	1.10	5.50	3.0850	1.21970
	A2	20	.60	6.10	3.2050	1.39453
	A3	20	1.20	7.10	3.3350	1.43757
	Valid N (listwise)	20				

Table 4.24 Descriptive Statistics for Algometer by Group.

Friedmann Test

Group A P value = 0.000
Group B P value = 0.422
Group C P value = 0.137

Since the p value in only one group above is less than 0.05 which equals the significance level, then the Null hypothesis in this case can be rejected and the study can conclude that at least one of the population means are significantly different to the others in Group A. As to where these differences are occurring in Group A will be analyzed below by applying multiple Wilcoxon Tests for matched pairs. Note that the Null hypothesis in the other 2 groups are not rejected as the p values in these cases is not less than 0.05.

Test Statistics[b,c]

	A2 - A1	A3 - A1	A3 - A2
Z	-3.189[a]	-3.930[a]	-3.228[a]
Asymp. Sig. (2-tailed)	.001	.000	.001

a. Based on negative ranks.

b. Wilcoxon Signed Ranks Test

c. GR = 1.00

Table 4.25 Wilcoxon Tests Results for Algometer by Group.

In the case of group A all three p values are less than 0.05 which allows us to reject the Null hypothesis in all three cases and conclude that there is a significant difference in population means, in other words the Algometer scores change significantly in each of the sequential visits.

Group A – Is as expected due to the treatment received by its action of dual mechanism (as seen above on page 47)

Group B – holds true for Placebo, where there is no treatment effect

Group C– The Ultrasound group readings improved due to the Mechanical stimulation of the superficial nerve endings by means of the head of the Ultrasound, causing an increase in mechano-receptive activity as per the “Gate control theory” (Melzack and Wall,1965) and due to other theories discussed on pages 46 and 47.

The micro-massage effects and vascular effects also contribute to the improved readings (Kitchen and Bazin, 1996) as seen above on page 46.

4.3.2 Inter Group Tests
4.3.2 a Subjective :

Note in this case difference scores between visits are calculated i.e : the score for visit 1 minus the score for visit 2 and so on. These difference columns are then compared across groups.

CMCC

Test Statistics[a,b]

	CMCCD12	CMCCD23	CMCCD13
Chi-Square	2.730	1.732	9.101
df	2	2	2
Asymp. Sig.	.255	.421	.011

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.26 Kruskal wallis Test Results for CMCC

Since the p value for the difference scores from visit one and three is less than 0.05 which equals the significance value then one can reject the Null hypothesis here and conclude that of all three groups one has a population mean difference which is significantly different to the other two. As to where that difference occurs, is followed up by the Mann Whitney Tests.

A and B

Ranks

	GR	N	Mean Rank	Sum of Ranks
CMCCD13	A	20	25.90	518.00
	B	20	15.10	302.00
	Total	40		

Table 4.27 Mann Whitney Test-ranks output Results for visits 1 and 2

Test Statistics[b]

	CMCCD13
Mann-Whitney U	92.000
Wilcoxon W	302.000
Z	-2.956
Asymp. Sig. (2-tailed)	.003
Exact Sig. [2*(1-tailed Sig.)]	.003[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.28 Mann Whitney Test-Final Results for visits 1 and 2

B and C

Ranks

	GR	N	Mean Rank	Sum of Ranks
CMCCD13	B	20	21.10	422.00
	C	20	19.90	398.00
	Total	40		

Table 4.29 Mann Whitney Test-ranks output Results for visits 2 and 3

Test Statistics[b]

	CMCCD13
Mann-Whitney U	188.000
Wilcoxon W	398.000
Z	-.328
Asymp. Sig. (2-tailed)	.743
Exact Sig. [2*(1-tailed Sig.)]	.758[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.30 Mann Whitney Test-Final Results for visits 2 and 3

A and C

Ranks

	GR	N	Mean Rank	Sum of Ranks
CMCCD13	A	20	24.65	493.00
	C	20	16.35	327.00
	Total	40		

Table 4.31 Mann Whitney Test-ranks output Results for visits 1 and 3

Test Statistics [b]

	CMCCD13
Mann-Whitney U	117.000
Wilcoxon W	327.000
Z	-2.259
Asymp. Sig. (2-tailed)	.024
Exact Sig. [2*(1-tailed Sig.)]	.024 [a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.32 Mann Whitney Test-Final Results for visits 1 and 3

The three p values are :

Groups A and B p value= 0.003 < 0.05, therefore reject the Null hypothesis.
Groups B and C p value = 0.758 < 0.05, therefore reject the Null hypothesis.
Groups A and C p value = 0.024 < 0.05, therefore reject the Null hypothesis.

Therefore the magnitudinal changes are significantly different in visits 1 and 3 across all three groups and this occurs significantly between groups A and B and groups A and C according to the p values above and in both cases group A is showing significantly higher drops than groups B and C.

Transeva – improves consistently and significantly for all readings when comparing the CMCC (functional ability) readings between groups.
This concludes that there is a greater improvement to manage everyday life in the Transeva group over the treatment regime.

Numerical Pain Rating Scale

Test Statistics[a,b]

	NRSD1_2	NRSD2_3	NRSD1_3
Chi-Square	1.577	4.358	7.005
df	2	2	2
Asymp. Sig.	.454	.113	.030

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.33 Kruskal wallis Test Results for NPRS

Since the p value for the difference scores from visit one and three is less than 0.05 which equals the significance value one can reject the Null hypothesis here and conclude that of all three groups one has a population mean difference which is significantly different to the other two. As to where that difference occurs, is followed up by a few Mann Whitney Tests.

A and B

Ranks

	GR	N	Mean Rank	Sum of Ranks
NRSD1_3	A	20	24.60	492.00
	B	20	16.40	328.00
	Total	40		

Table 4.34 Mann Whitney Test-ranks output Results for visits 1 and 2

Test Statistics[b]

	NRSD1_3
Mann-Whitney U	118.000
Wilcoxon W	328.000
Z	-2.224
Asymp. Sig. (2-tailed)	.026
Exact Sig. [2*(1-tailed Sig.)]	.026[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.35 Mann Whitney Test-Final Results for visits 1 and 2

B and C

Ranks

	GR	N	Mean Rank	Sum of Ranks
NRSD1_3	B	20	21.05	421.00
	C	20	19.95	399.00
	Total	40		

Table 4.36 Mann Whitney Test-ranks output Results for visits 2 and 3

Test Statistics[b]

	NRSD1_3
Mann-Whitney U	189.000
Wilcoxon W	399.000
Z	-.299
Asymp. Sig. (2-tailed)	.765
Exact Sig. [2*(1-tailed Sig.)]	.779[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.37 Mann Whitney Test-Final Results for visits 2 and 3

A and C

Ranks

	GR	N	Mean Rank	Sum of Ranks
NRSD1_3	A	20	24.78	495.50
	C	20	16.23	324.50
	Total	40		

Table 4.38 Mann Whitney Test-ranks output Results for visits 1 and 3

Test Statistics[b]

	NRSD1_3
Mann-Whitney U	114.500
Wilcoxon W	324.500
Z	-2.323
Asymp. Sig. (2-tailed)	.020
Exact Sig. [2*(1-tailed Sig.)]	.020[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.39 Mann Whitney Test-Final Results for visits 1 and 3

The three p values are :

Groups A and B p value= 0.026 < 0.05, therefore reject the Null hypothesis.
Groups B and C p value = 0.779 < 0.05, therefore reject the Null hypothesis.
Groups A and C p value = 0.020 < 0.05, therefore reject the Null hypothesis.

Therefore the magnitudinal changes are significantly different in visits 1 and 3 across all three groups and this occurs significantly between groups A and B and groups A and C according to the p values above and in both cases group A is showing significantly higher drops than groups B and C.

Transeva – improves consistently and significantly for all readings when comparing the NRS (subjective pain rating) readings between groups

Short Form Mc Gill Questionaire

Test Statistics[a,b]

	SMD1_2	SMD2_3	SMD1_3
Chi-Square	2.934	3.765	4.239
df	2	2	2
Asymp. Sig.	.231	.152	.120

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.40 Kruskal wallis Test Results for SFMQ

Since no p values for the differences are less than 0.05 which equals the significance value the study cannot reject the Null hypothesis in any of the three cases, reflecting no significant magnitudinal changes across all three groups for the short form McGill questionnaire. Evaluation of the statistical results of the Kruskal Wallis test, the SFMQ readings did not change significantly across all three groups which implied that there was minimal variance with regards to these particular data collected. Reasons for this can be cultural bias, interpretation/ mis-interpretation of words or meaning. (Prout, 1996 and Sciotti, 2001)

Also measurement tools measure gross improvement and therefore mask small improvements as it cannot record them.

4.3.2b Objective

CROM Readings :

FLEXION

Test Statistics[a,b]

	CRFD2_1	CRFD3_2	CRFD3_1
Chi-Square	2.707	4.814	5.482
df	2	2	2
Asymp. Sig.	.258	.090	.065

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.41 Kruskal wallis Test Results for CROM flexion

Since no p values for the differences are less than 0.05 which equals the significance value the study cannot reject the Null hypothesis in any of the three cases, reflecting no significant magnitudinal changes across all three groups for the CROM (flex) scores.

One would expect there to be a difference between the groups, which can be seen in the significance in CRFD3_1, where it approximates 0.005. Thus it is suggested that this trend may be enhanced in future studies with increased samples sizes or by means of more accurate measurement tools.

EXTENSION

Test Statistics[a,b]

	CRED2_1	CRED3_2	CRED3_1
Chi-Square	4.538	1.391	6.446
df	2	2	2
Asymp. Sig.	.103	.499	.040

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.42 Kruskal wallis Test Results for CROM extension

Since the p value for the difference scores from visit one and three is less than 0.05 which equals the significance value then one can reject the Null hypothesis here and conclude that of all three groups one has a population mean difference which is significantly different to the other two. As to where that difference occurs, is followed up by a few Mann Whitney Tests.

A and B

Ranks

	GR	N	Mean Rank	Sum of Ranks
CRED3_1	A	20	24.65	493.00
	B	20	16.35	327.00
	Total	40		

Table 4.43 Mann Whitney Test-ranks output Results for visits 1 and 2

Test Statistics[b]

	CRED3_1
Mann-Whitney U	117.000
Wilcoxon W	327.000
Z	-2.279
Asymp. Sig. (2-tailed)	.023
Exact Sig. [2*(1-tailed Sig.)]	.024[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.44 Mann Whitney Test final Results for visits 1 and 2

B and C

Ranks

	GR	N	Mean Rank	Sum of Ranks
CRED3_1	B	20	20.80	416.00
	C	20	20.20	404.00
	Total	40		

Table 4.45 Mann Whitney Test-ranks output results for visits 2 and 3

A and C

Ranks

	GR	N	Mean Rank	Sum of Ranks
CRED3_1	A	20	24.33	486.50
	C	20	16.68	333.50
	Total	40		

Table 4.46 Mann Whitney Test-ranks output Results for visits 1 and 3

Test Statistics[b]

	CRED3_1
Mann-Whitney U	123.500
Wilcoxon W	333.500
Z	-2.099
Asymp. Sig. (2-tailed)	.036
Exact Sig. [2*(1-tailed Sig.)]	.038[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.47 Mann Whitney Test-Final Results for visits 1 and 3

The three p values are :

Groups A and B p value= 0.024 < 0.05, therefore reject the Null hypothesis.

Groups B and C p value = 0.883 < 0.05, therefore reject the Null hypothesis.

Groups A and C p value = 0.038 < 0.05, therefore reject the Null hypothesis.

Therefore the magnitudinal changes are significantly different in visits 1 and 3 across all three groups and this occurs significantly between groups A and B and groups A and C according to the p values above and in both cases group A shows significantly higher drops than groups B and C.

This concludes that the Transeva group improves consistently and significantly for all readings when comparing the extension ROM readings between groups. This indicates improvement in muscle contraction of the Trapezius and Levator Scapula.

LATERAL FLEXION-RIGHT

Test Statistics[a,b]

	CRLFRD21	CRLFRD32	CRLFRD31
Chi-Square	.437	6.492	4.100
df	2	2	2
Asymp. Sig.	.804	.039	.129

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.48 Kruskal wallis Test Results for CROM LF right

Since the p value for the difference scores from visit two and three is less than 0.05 which equals the significance value then one can reject the Null hypothesis here and conclude that of all three groups one has a population mean difference which is significantly different to the other two. As to where that difference occurs, is followed up the Mann Whitney Tests.

A and B

Ranks

	GR	N	Mean Rank	Sum of Ranks
CRLFRD32	A	20	24.73	494.50
	B	20	16.27	325.50
	Total	40		

Table 4.49 Mann Whitney Test-ranks output Results for visits 1 and 2

Test Statistics[b]

	CRLFRD32
Mann-Whitney U	115.500
Wilcoxon W	325.500
Z	-2.417
Asymp. Sig. (2-tailed)	.016
Exact Sig. [2*(1-tailed Sig.)]	.021[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.50 Mann Whitney Test-Final Results for visits 1 and 2

B and C

Ranks

	GR	N	Mean Rank	Sum of Ranks
CRLFRD32	B	20	18.58	371.50
	C	20	22.43	448.50
	total	40		

Table 4.51 Mann Whitney Test-ranks output Results for visits 2 and 3

Test Statistics[b]

	CRLFRD32
Mann-Whitney U	161.500
Wilcoxon W	371.500
Z	-1.145
Asymp. Sig. (2-tailed)	.252
Exact Sig. [2*(1-tailed Sig.)]	.301[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.52 Mann Whitney Test Final Results for visits 2 and 3
A and C

Ranks

	GR	N	Mean Rank	Sum of Ranks
CRLFRD32	A	20	23.08	461.50
	C	20	17.93	358.50
	Total	40		

Table 4.53 Mann Whitney Test-ranks output Results for visits 1 and 3

Test Statistics[b]

	CRLFRD32
Mann-Whitney U	148.500
Wilcoxon W	358.500
Z	-1.533
Asymp. Sig. (2-tailed)	.125
Exact Sig. [2*(1-tailed Sig.)]	.165[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.54 Mann Whitney Test-Final Results for visits 1 and 3

The three p values are :

Groups A and B p value= 0.021 < 0.05, therefore reject the Null hypothesis.

Groups B and C p value = 0.3019 < 0.05, therefore reject the Null hypothesis.

Groups A and C p value = 0.165 < 0.05, therefore reject the Null hypothesis.

Therefore the magnitudinal changes are significantly different in visits 2 and 3 across all three groups and this occurs significantly between groups A and B which shows significantly higher drops than the other group combinations.

These results are consistent with theories discussed under intra-group tests. (see above on pages 45-47)

LATERAL FLEXION-LEFT

Test Statistics[a,b]

	CRLFLD21	CRLFLD32	CRLFLD31
Chi-Square	2.649	1.065	.450
df	2	2	2
Asymp. Sig.	.266	.587	.799

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.55 Kruskal wallis Test Results for CROM LF left

Since no p values for the differences are less than 0.05 which equals the significance value the study cannot reject the Null hypothesis in any of the three cases, reflecting no significant magnitudinal changes across all three groups for the CROM (LFL) scores.

With the majority of patients being right-handed, the right side trigger points are worse, therefore with right lateral flexion, muscle contraction allows for full movement to the right and left allows for full stretch. Results conclude that the Transeva has a greater effect on the contractibility of muscles than Placebo or pulsed Ultrasound. With left lateral flexion, muscle contraction is limited by pain or lack of muscle stretch on the right side.

ROTATION-RIGHT

Test Statistics[a,b]

	CRRRD2_1	CRRRD3_2	CRRRD3_1
Chi-Square	1.290	1.765	1.625
df	2	2	2
Asymp. Sig.	.525	.414	.444

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.56 Kruskal wallis Test Results for CROM Rot right

Since no p values for the differences are less than 0.05 which equals the significance value the study cannot reject the Null hypothesis in any of the three cases, reflecting no significant magnitudinal changes across all three groups for the CROM (ROT R) scores.

ROTATION-LEFT

Test Statistics[a,b]

	CRRLD2_1	CRRLD3_2	CRRLD3_1
Chi-Square	.354	5.914	5.467
df	2	2	2
Asymp. Sig.	.838	.052	.065

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.57 Kruskal wallis Test Results for CROM Rot left

Since no p values for the differences are less than 0.05 which equals the significance value the study cannot reject the Null hypothesis in any of the three cases, reflecting no significant magnitudinal changes across all three groups for the CROM (ROT L) scores.

With rotation not being a specific function of either the Trapezius or Levator Scapula muscles (Magee D J. 1992), but rather the Scalenii and SCM muscles, this measurement becomes an indirect measure and therefore is not accurate at measuring the patient improvement.

Algometer :

Test Statistics[a,b]

	AD2_1	AD3_2	AD3_1
Chi-Square	7.228	6.092	17.725
df	2	2	2
Asymp. Sig.	.027	.048	.000

a. Kruskal Wallis Test

b. Grouping Variable: GR

Table 4.58 Kruskal wallis Test Results for Algometer

Since the p value for the difference scores from all visits are less than 0.05 which equals the significance value then one can reject the Null hypothesis in all three cases here and conclude that all three population groups, mean differences across all three groups are significantly different. As to where those differences occur, is followed up the Mann Whitney Tests.

A and B

Test Statistics[b]

	AD2_1	AD3_2	AD3_1
Mann-Whitney U	97.000	113.000	45.000
Wilcoxon W	307.000	323.000	255.000
Z	-2.815	-2.366	-4.212
Asymp. Sig. (2-tailed)	.005	.018	.000
Exact Sig. [2*(1-tailed Sig.)]	.005[a]	.018[a]	.000[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.59 Mann Whitney Test-Final Results for visits 1 and 2

The p values in all three cases are less than 0.05, therefore the magnitudinal differences between all three visits is significantly different across groups A and B.

B and C

Test Statistics[b]

	AD2_1	AD3_2	AD3_1
Mann-Whitney U	186.000	190.000	176.000
Wilcoxon W	396.000	400.000	386.000
Z	-.381	-.272	-.651
Asymp. Sig. (2-tailed)	.703	.786	.515
Exact Sig. [2*(1-tailed Sig.)]	.718[a]	.799[a]	.529[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.60 Mann Whitney Test-Final Results for visits 2 and 3

The p values in all three cases is not less than 0.05, therefore the magnitudinal differences between all three visits are not significantly different across groups B and C.

A and C

Test Statistics[b]

	AD2_1	AD3_2	AD3_1
Mann-Whitney U	137.000	132.000	93.000
Wilcoxon W	347.000	342.000	303.000
Z	-1.710	-1.848	-2.902
Asymp. Sig. (2-tailed)	.087	.065	.004
Exact Sig. [2*(1-tailed Sig.)]	.091[a]	.068[a]	.003[a]

a. Not corrected for ties.

b. Grouping Variable: GR

Table 4.61 Mann Whitney Test-Final Results for visits 1 and 3

The p values in one of the three cases is less than 0.05, therefore the magnitudinal differences between visits 1 and 3 is significantly different across groups A and C.

Therefore, from the above results in all three visits, group A shows significantly higher increases, at all stages, than group B. Group B and group C do not show any significant differences in increases and group A only shows a significant higher increase between visits 1 and 3 than group C.

These results are consistent with theories discussed under intra – group algometer results.

Group A – Is as expected due to the treatment received by its action of dual mechanism, both vascular and neurological.(as seen above on page 47)

Group B – Holds true for Placebo, where there is no treatment effect (As seen above on page 45)

Group C– The Ultrasound group readings improved due to the Mechanical stimulation of the superficial nerve endings by means of the head of the Ultrasound, causing an increase in mechano-receptor activity as per the “Gate control theory” (Melzack and Wall,1965)
The micro-massage effects and vascular effects as seen above (page 46) also contributed to the improved readings. (Kitchen and Bazin ,1996)

Therefore

Transeva showed improvement in the patients’ ability to manage everyday life and showed a greater reduction in the quality and intensity of pain between all three visits than the Placebo Transeva or Pulsed Ultrasound group over the duration of the research program.

Transeva group improved consistently and significantly for all readings when comparing the extension ROM readings between groups. This indicates improvement in muscle contraction of the Trapezius and Levator Scapula.

Transeva group had a decreased pain threshold and intensity of the active Trapezius and Levator Scapula trigger points diagnosed compared to the Ultrasound and the Placebo groups

Thus it would seem that the Transeva by virtue of the dual mechanism is able to achieve greater clinical efficacy than the Transeva Placebo group or the Pulsed Ultrasound group.

Objective 1

The first objective of this study was to evaluate the effect of attenuated therapeutic Faradic stimulation (Transeva), sham Faradism and pulsed Ultrasound in terms of subjective clinical findings.

Hypothesis 1:

The hypothesis is that the attenuated Faradic current would decrease the overall intensity of pain, from severe or moderate to mild or no pain recorded by the Short-form Mcgill Pain Questionnaire and increase the ability to manage everyday life as recorded by the CMCC Neck Disability Index.

Hypothesis one is accepted for CMCC. Rejected for SFMPQ

Objective 2

The second objective of this study is to evaluate the effect of therapeutic Faradic stimulation, sham Faradism and pulsed Ultrasound in terms of objective clinical criteria.

Hypothesis 2:

The hypothesis is that the attenuated faradic current will decrease the pain threshold and intensity of the active Trapezius and Levator Scapular trigger points diagnosed/ recorded by the Algometer; and will increase the cervical range of motion measured by the CROM readings of cervical flexion, extension, lateral flexion and rotation.

Hypothesis two is accepted for the Algometer readings and increased range of motion in extension and right lateral flexion; but rejected for flexion, left lateral flexion and rotation ranges of motion.

Objective 3

The third objective of this study is to compare the trends that are evident between the subjective and the objective findings in order to ascertain whether there is any relationship between the objective and subjective results achieved

Hypothesis 3

The hypothesis is that when the objective CROM measures show an increase in the patients range of motion and when the patients trigger points are not as active measured by the Algometer readings, then the patients intensity of pain should be decreased according to McGill pain Questionaire and their everyday life actions should be made easier according to the CMCC Neck Disability index.

As for hypothesis 1 and 2 above.

4.4 OBSERVATIONS: TRANSEVA TREATMENT

Owing to the fact that no studies prior to this have been conducted on the Transeva and very little information exists on its application and mechanism of action, it is hoped that the following observations made throughout the research program may provide a basis for further studies and contribute to the literature currently available to this modality. These observations did not form part of the data collected and analysed in the study, but are merely observations made by the author and would certainly require further study to determine their validity.

One observation made was that when the Transeva patients came for the third set of readings taken before the free chiropractic treatment, and reported on how much better they were feeling, the Transeva treatment was then continued with the normal chiropractic necessary adjustments in the cervical region. After a phone call a few days later, it was reported that the treatment of both manipulation and the Transeva was most successful.

Although there was no specific data collected to compare the rate of improvement between men and women, the men in the group seemed to report a more rapid rate of improvement than the women. This could not be confirmed statistically, but at least 11 of the 14 men treated reported an 80% (or more) reduction in their pain levels and /or symptoms after the first treatment. None of the women showed as significant a reduction after one treatment. The author suggests that this difference may be due to the larger muscle bulk in men, but this is merely speculative and requires further research.

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

This study consisted of 60 patients, divided into 3 groups of 20 each. Every patient underwent a full case history, physical, and cervical regional examination in order to determine that they fitted the inclusion and exclusion criteria with respect to active Trapezius and / or Levator Scapula trigger points.

Thereafter each patient was placed into either the Transeva, Placebo Transeva, or Pulsed Ultrasound groups at random. Those patients that were in group A were in the Transeva group, those in group B were in the Placebo Transeva group and those in C were in the Pulsed Ultrasound group. All patients then received 2 treatments and had 1 follow up consultation 1 week later.

At set intervals (prior to treatments 1 and 2, and at the follow up consultation) measurements where taken with the CMCC, NPRS, and McGill pain questionnaire (subjective readings), CROM and Algometer (objective readings).

The evaluation of these recordings showed that treatments showed a statistical improvement in terms of subjective and objective clinical findings to conclude that:

-Transeva showed improvement in the patient's ability to manage everyday life and showed a greater reduction in the quality and intensity of pain between all three visits than the Placebo Transeva or Pulsed Ultrasound group over the duration of the research program.

-Transeva group had a decreased pain intensity of the active Trapezius and Levator Scapula trigger points diagnosed compared to the Ultrasound and the Placebo groups.

-Transeva group improves consistently and significantly for all readings when comparing the extension and right lateral flexion ROM readings between groups. This indicates improvement in muscle contraction of the Trapezius and Levator Scapula.

Thus it would seem that the Transeva by virtue of the dual mechanism is able to achieve greater clinical efficacy than the Transeva Placebo group or the Pulsed Ultrasound group.

Schneider (1995) states that Chiropractors who use only osseous manipulative techniques will have great difficulty when attempting to treat patients with Myofascial Pain Syndrome, for the trigger points found in this condition require specific treatment, applied directly to the muscle tissue. This study provides the Chiropractor with a simple, effective, non-invasive modality to add to the choice of myofascial treatments currently available for use in the clinical environment.

6.2 Recommendations for future studies

There seems to be a need to educate parts of our society so that all may benefit in that part of health care that chiropractic provides.

There seems to be a need for studies looking at increasing the number and frequency of treatments to see whether Ultrasound is more effective on a cumulative scale over an increased period.

With regards to the Ultrasound, it is suggested that this trend of results may be enhanced in future studies with increased sample sizes and by means of more accurate measurement tools.

It would be recommended to have a one-month follow-up with the patients to assess continued results.

It has been interesting to note that Transeva Placebo and Pulsed Ultrasound are of similar clinical benefit. These results do not correlate entirely to Pillay ‘s (2003) findings in his Placebo-based research and this invites further investigation into Placebo-Ultrasound in this field.

A more accurate representation of South African population may be obtained by advertising to the broader community and using advertisements in their own language. The non-caucasian races are in the majority in South Africa and more information is needed regarding the epidemiology, etiology and treatment regimens effective for such conditions in all South Africans, which can only be obtained by further research.

In order to eliminate researcher bias towards a favoured treatment, it is recommended that two experienced practitioners be assigned to a treatment protocol each and the researcher takes note only of the readings, being blinded from the treatments being applied to the patients.

Finally since Transeva treatment appears to be more effective than Placebo and Pulsed Ultrasound for the treatment of Myofascial Pain Syndrome of the Trapezius and Levator Scapula, further study suggestions include:

- Comparison of this modality to other forms of Treatment for Myofascial Pain (for example; dry needling, laser, injection or anti-inflammatories)
- Using Myofascial Transeva treatment as part of a treatment protocol, including Chiropractic adjustive techniques and education with regards to home stretching and exercise routines, and comparing this protocol to another.
- Research into the efficacy of the Transeva for the treatment of conditions where soft tissue adhesions and scar tissue contribute to pain and restricted range of motion (for example; chronic tendonitis, capsulitis, fibromyalgia etc)

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APPENDICES

APPENDIX A

August 2003

Dear Participant.

Welcome to my research study in Myofascial Trigger Points

Title: A placebo –controlled clinical trial to determine the efficacy of therapeutic faradic stimulation in patients with myofascial pain syndrome of the trapezius and levator scapula muscles.

Principal investigator: Hayley Bedell-Sivright
Contact details: 031-2042244
Co-investigators: Horace White
Contact details:0312042244 (DIT) / 031 4642490 (Practice)

Charmaine Korporaal
Contact details:031 2042244(DIT) / 0312042611(practice)

Introduction: I am investigating the effect of the transeva for the treatment of trigger points in the upper back region. The Transeva is a modality originally produced by Sir Charles Strong and later manufactured by Winks Greene which produces a rhythmic muscular contraction in the form of a faradic current. It has been found that faradism not only increases the arterial supply to the muscle but also improves the return circulation via veins and lymphatics to the same degree. Trigger points are tender areas in muscles that, when active may refer pain that mimics other painful conditions. Trigger points are very common and are often overlooked as a source of pain. Thus treatment will help in developing more clinically sound treatment protocols within the scope of Chiropractic care.

Procedures: At the initial consultation you will undergo a History, Physical, and a regional examination, after which you will be selected providing you fit the necessary criteria for the research. Once accepted into the study you will receive two treatments with a maximum of 72 hours in-between each treatment and a follow-up evaluation one week later. You will remain in the study as long as you commit to the appointment schedule.

Reasons why you may be withdrawn from the study without your consent:

The participant may not take any form of medication that will influence the results of the study or undergo any other treatment during the duration of the study (i.e. Analgesics, muscle relaxants, NSAIDS, steroids or manual therapy). The participant must not change their life-style and enter into any new activity.
A consent form will be required to be filled out prior to the treatment.

Risks/ Discomforts: You may have slight feelings of muscular stiffness after the treatment has taken place

Benefits: **All treatment will be free of charge and will be conducted at the Durban Institute of Technology Chiropractic Day Clinic. Please be assured that all information will be regarded as strictly confidential.**

Renumeration: **none**

Costs of study: **none**

Confidentiality: **All the information will be coded so identification will not be disclosed.**

Persons to contact for problems/ questions: **Hayley Bedell- Sivright**
Horace White
Charmaine Korporaal

Ethical or procedural questions: **contact FRC- Mr Singh 031 2042701**

By signing the informed consent form you agree to participate in the research study.

_____

Name:

Yours sincerely

Hayley Bedell-Sivright ,	**Horace White ,**	**Charmaine Korporaal**
(Researcher)	(Supervisor)	(co-supervisor)

APPENDIX B

INFORMED CONSENT FORM

(To be completed by patient / subject)

Date **February 2004**

Title of research project	**The efficacy of therapeutic faradic stimulation in patients with myofascial pain syndrome of the trapezius and levator scapula musculature.**

Name of supervisors	**Horace White**	**Charmaine Korporaal**
Tel	**031-2042244**	**031-2042611**
Name of research student	**Hayley Bedell-Sivright**	
Tel	**031-2042205**	

Please circle the appropriate answer

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

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

Please Print in block letters:

Patient /Subject Name:_____

Signature: _____

Parent/ Guardian:_____

Signature:_____

Witness Name:_____

Signature:_____

Research Student Name:_____ Signature:_____

APPENDIX C

DURBAN INSTITUTE OF TECHNOLOGY
CHIROPRACTIC DAY CLINIC
CASE HISTORY

Patient:_____ _____

File # : _____ _____

Sex : _____ Occupation: _____

Intern : _____ _____Signature_____

FOR CLINICIANS USE ONLY:

Initial visit

Clinician: Signature :

Case History:

Examination:

Previous:

Current:

X-Ray Studies:

Previous:

Current:

Clinical Path. lab:

Previous:
Current:

CASE STATUS:

PTT:	Signature:	Date:

CONDITIONAL: Reason for Conditional:
Signature: Date:

Conditions met in Visit No:	Signed into PTT:	Date:
Case Summary signed off:		Date:

Intern's Case History:

1. **Source of History:**
2. **Chief Complaint : (patient's own words):**

3. Present Illness:

	Complaint 1	Complaint 2
< Location		
< Onset : Initial:		
Recent:		
(1) Cause:		
< Duration		
< Frequency		
< Pain (Character)		
< Progression		
< Aggravating Factors		
< Relieving Factors		
< Associated S & S		
< Previous Occurrences		
< Past Treatment		
(a) **Outcome:**		

4. Other Complaints:

5. Past Medical History:

< General Health Status

< Childhood Illnesses

< Adult Illnesses

< Psychiatric Illnesses

< Accidents/Injuries

< Surgery

< Hospitalizations

6. Current health status and life-style:

< Allergies

< Immunizations

< Screening Tests incl. xrays

< Environmental Hazards (Home, School, Work)

< Exercise and Leisure

< Sleep Patterns

< Diet

< Current Medication
Analgesics/week:

< Tobacco
< Alcohol
< Social Drugs

7. Immediate Family Medical History:

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

8. Psychosocial history:

< Home Situation and daily life
< Important experiences
< Religious Beliefs

9. Review of Systems:

< General

< Skin

< Head

< Eyes

< Ears

< Nose/Sinuses

< Mouth/Throat

< Neck

< Breasts

< Respiratory

< Cardiac

< Gastro-intestinal

< Urinary

< Genital

< Vascular

< Musculoskeletal

< Neurologic

< Haematologic

< Endocrine

< Psychiatric

APPENDIX D

DURBAN INSTITUTE OF TECHNOLOGY

CHIROPRACTIC DAY CLINIC
PHYSICAL EXAMINATION

Patient:_____File#:_____Date:_____

Clinician:_____
_____Signature:____
_____
_____

Student:_____
Signature:_____
_____

1. VITALS

Pulse rate:
Respiratory rate:
Blood pressure: R

L

Medication if hypertensive:

Temperature:
Height:
Weight: Any change Y/N If Yes : how much gain/loss
Over what period

2. GENERAL EXAMINATION

General Impression:
Skin:
Jaundice:
Pallor:
Clubbing:
Cyanosis (Central/Peripheral):

Oedema:
Lymph nodes - Head and neck:
- Axillary:
- Epitrochlear:
- Inguinal:
Urinalysis:

3. CARDIOVASCULAR EXAMINATION

1) Is this patient in **Cardiac Failure** ?
2) Does this patient have signs of **Infective Endocarditis** ?
3) Does this patient have **Rheumatic Heart Disease ?**

Inspection - Scars
- Chest deformity:
- Precordial bulge:
- Neck -JVP:

Palpation: - Apex Beat (character + location):
- Right or left ventricular heave:
- Epigastric Pulsations:
- Palpable P2:
- Palpable A2:

Pulses:
- Radio-femoral delay:
- Carotid:
- Radial:
- General Impression:
- Dorsalis pedis:
- Posterior tibial:
- Popliteal:
- Femoral:

Percussion: - borders of heart

Auscultation:- heart valves (mitral, aortic, tricuspid, pulmonary)
- Murmurs (timing,systolic/diastolic, site, radiation, grade).

4. RESPIRATORY EXAMINATION

1) Is this patient in **Respiratory Distress** ?

Inspection - Barrel chest:
- Pectus carinatum/cavinatum:
- Left precordial bulge:
- Symmetry of movement:
- Scars:

Palpation - Tracheal symmetry:
- Tracheal tug:
- Thyroid Gland:
- Symmetry of movement (ant + post)
- Tactile fremitus:

Percussion - Percussion note:

- Cardiac dullness:
- Liver dullness:

Auscultation - Normal breath sounds bilat.:
- Adventitious sounds (crackles, wheezes, crepitations)
- Pleural frictional rub:
- Vocal resonance - Whispering pectoriloquy:
- Bronchophony:
- Egophony:

5. ABDOMINAL EXAMINATION

1) Is this patient in **Liver Failure** ?

Inspection - Shape:
- Scars:
- Hernias:

Palpation - Superficial:
- Deep = Organomegally:
- Masses (intra- or extramural)
- Aorta:

Percussion - Rebound tenderness:
- Ascites:
- Masses:

Auscultation - Bowel sounds:
- Arteries (aortic, renal, iliac, femoral, hepatic)

Rectal Examination - Perianal skin:
- Sphincter tone & S4 Dermatome:
- Obvious masses:
- Prostate:
- Appendix:

6. G.U.T EXAMINATION

External genitalia:
Hernias:
Masses:
Discharges:

7. NEUROLOGICAL EXAMINATION

Gait and Posture - Abnormalities in gait:
- Walking on heels (L4-L5):
- Walking on toes (S1-S2):
- Rombergs test (Pronator Drift):

Higher Mental Function - Information and Vocabulary:
- Calculating ability:
- Abstract Thinking:

G.C.S.: - Eyes:

- Motor:
- Verbal:

Evidence of head trauma:

Evidence of Meningism: - Neck mobility and Brudzinski's sign:
- Kernigs sign:

Cranial Nerves:

I Any loss of smell/taste:
Nose examination:

II External examination of eye: - Visual Acuity:
- Visual fields by confrontation:
- Pupillary light reflexes = Direct:
= Consensual:
- Fundoscopy findings:

III Ocular Muscles:
Eye opening strength:

IV Inferior and Medial movement of eye:

V a. Sensory - Ophthalmic:
- Maxillary:
- Mandibular:

b. Motor - Masseter:
- Jaw lateral movement:

c. Reflexes - Corneal reflex
- Jaw jerk

VI Lateral movement of eyes

VII a. Motor - Raise eyebrows:
- Frown:
- Close eyes against resistance:
- Show teeth:
- Blow out cheeks:

b. Taste - Anterior two-thirds of tongue:

VIII General Hearing:
Rinnes = L: R:
Webers lateralisation:
Vestibular function - Nystagmus:
- Rombergs:
- Wallenbergs:
Otoscope examination:

IX & X Gag reflex:
Uvula deviation:
Speech quality:

XI Shoulder lift:
S.C.M. strength:

XII Inspection of tongue (deviation):

Motor System:

a. Power
- Shoulder = Abduction & Adduction:
= Flexion & Extension:
- Elbow = Flexion & Extension:
- Wrist = Flexion & Extension:
- Forearm = Supination & Pronation:
- Fingers = Extension (Interphalangeals & M.C.P's):
- Thumb = Opposition:
- Hip = Flexion & Extension:
= Adduction & Abduction:
- Knee = Flexion & Extension:
- Foot = Dorsiflexion & Plantar flexion:
= Inversion & Eversion:
= Toe (Plantarflexion & Dorsiflexion):

b. Tone - Shoulder:
- Elbow:
- Wrist:
- Lower limb - Int. & Ext. rotation:
- Knee clonus:
- ankle clonus:

c. Reflexes - Biceps:
- Triceps:
- Supinator:
- Knee:
- Ankle:
- Abdominal:
- Plantar:

Sensory System:

a. Dermatomes - Light touch:
- Crude touch:
- Pain:
- Temperature:
- Two point discrimination:

b. Joint position sense - Finger:
- Toe:

c. Vibration: - Big toe:
- Tibial tuberosity:
- ASIS:
- Interphalangeal Joint:
- Sternum:

Cerebellar function:

Obvious signs of cerebellar dysfunction:
= Intention Tremor:
= Nystagmus:
= Truncal Ataxia:
Finger-nose test (Dysmetria):
Rapid alternating movements (Dysdiadochokinesia):
Heel-shin test:
Heel-toe gait:
Reflexes:
Signs of Parkinsons:

8. <u>SPINAL EXAMINATION:</u>(See Regional examination)

Obvious Abnormalities:
Spinous Percussion:
R.O.M:
Other:

9. <u>BREAST EXAMINATION:</u>

Summon female chaperon.

Inspection - Hands rested in lap:
- Hands pressed on hips:
- Arms above head:
- Leaning forward:

Palpation - masses:
- tenderness:
- axillary tail:
- nipple:
- regional lymph nodes:

APPENDIX E

DURBAN INSTITUTE OF TECHNOLOGY
REGIONAL EXAMINATION - CERVICAL SPINE

Patient: _____ File No: _____

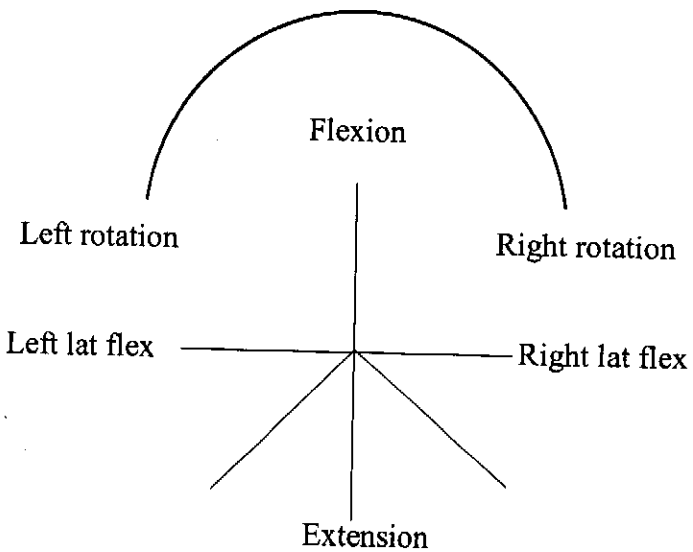
Date: _____ Student: _____

Clinician: _____ Sign: _____

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

Shoulder position
Left :
Right :
Shoulder dominance (hand):
Facial expression:

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



PALPATION:
Lymph nodes
Thyroid Gland
Trachea

ORTHOPAEDIC EXAMINATION:

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

	Right	Left		Right	Left
Doorbell sign			Cervical compression		
Kemp's test			Lateral compression		
Cervical distraction			Adson's test		
Halstead's test			Costoclavicular test		

Hyper-abduction test			Eden's test		
Shoulder abduction test			Shoulder compression test		
Dizziness rotation test			Lhermitte's sign		
Brachial plexus test					

NEUROLOGICAL EXAMINATION:

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

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

MOTION PALPATION & JOINT PLAY:

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

Upper Thoracics:
Motion Palpation:
Joint Play:

BASIC EXAM: SHOULDER:
Case History:

BASIC EXAM: THORACIC SPINE:
Case History:

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

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

APPENDIX F

IYOFACIAL DIAGNOSTIC SCALE

ıtients Name: _____

uscle: _____

eatment No: _____

gns:

1. Soft tissue tenderness

Grade		
0	No tenderness	o
i	Tenderness to palpation WITHOUT grimace	1
ii	Tenderness to palpation WITH grimace or flinch	2
iii	Tenderness with WITHDRAWAL (+ve "Jump sign")	3
iv	Withdrawal (+ve "Jump sign") to non-noxious stimuli (ie. superficial palpation, gentle percussion	4

2. Snapping palpation of the trigger point evokes a local twitch response 4

3. The trigger point is found in a palpable taut band. 4

4. Moderate, sustained pressure on the trigger point causes or intensifies pain in the reference zone 5

Total of 17 _____

APPENDIX G

Short-form McGill Pain Questionnaire (SF-MPQ)

Ronald Melzack (1984)

Date:_____File no.:_____ Visit no:____

Patient name:_____

	NONE 0	MILD 1	MODERATE 2	SEVERE 3
THROBBING				
SHOOTING				
STABBING				
SHARP				
CRAMPING				
GNAWING				
HOT-BURNING				
ACHING				
HEAVY				
TENDER				
SPLITTING				
TIRING-EXHAUSTING				
SICKENING				
FEARFUL				
PUNISHING-CRUEL				

APPENDIX H

Numerical Rating Scale - 101 Questionnaire

ate:_____ **File no:**_____ **Visit no:**_____

atient name: _____

lease indicate on the line below, the number between 0 and 100 that best describes

ıe pain you experience **when it is at its worst**. A zero (0) would mean "no pain at all",

ıd one hundred (100) would mean "pain as bad as it could be".

lease write only **one** number.

0 _____ 100

ease indicate on the line below, the number between 0 and 100 that best describes

e pain you experience **when it is at its least**. A zero (0) would mean "no pain

all" and one hundred (100) would mean "pain as bad as it could be".

ease write only **one** number.

0 _____ 100

APPENDIX I

CMCC NECK DISABILITY INDEX

Patient Name:_____File no.:_____Date:_____

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

Section 1 - Pain Intensity

(2) I have no pain at the moment.
(3) The pain is very mild at the moment.
(4) The pain is moderate at the moment.
(5) The pain is fairly severe at the moment.
(6) The pain is very severe at the moment.
(7) The pain is the worst imaginable at the moment.

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

(h) I can look after myself normally without causing extra pain.
(i) I can look after myself normally but it causes extra pain..
(j) It is painful to look after myself and I am slow and careful.
(k) I need some help but manage most of my personal care.
(l) I need help every day in most aspects of self care.
(m) I do not get dressed, I wash with difficulty and stay in bed.

Section 3 - Lifting

G I can lift heavy weights without extra pain.
G I can lift heavy weights but it gives extra pain.
G Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example on a table.
G Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned .
G I can lift only very light weights.
G I cannot lift or carry anything at all.

Section 4 - Reading

G I can read as much as I want to without pain in my neck.
G I can read as much as I want to with slight pain in my neck.
G I can read as much as I want with moderate pain in my neck.
G I cannot read as much as I want because of moderate pain in my neck.
G I can hardly read at all because of severe pain in my neck.
G I cannot read at all.

Section 6 - Concentration

(b) I can concentrate fully when I want to with no difficulty.
(c) I can concentrate fully when I want to with slight difficulty.
(d) I have fair degree of difficulty in concentrating when I want to.
(e) I have a lot of difficulty in concentrating when I want to.
(f) I have a great deal of difficulty in concentrating when I want to.
(g) I cannot concentrate at all.

Section 7 - Work

(n) I can do as much work as I want to .
(o) I can do only my usual work, but no more.
(p) I can do most of my usual work, but no more.
(q) I cannot do my usual work.
(r) I can hardly do any work at all.
(s) I cannot do any work at all.

Section 8 - Driving

G I can drive my car without any neck pain.
G I can drive my car as long as I want with slight pain in my neck.
G I can drive my car as long as I like with moderate pain in my neck.
G I cannot drive my car as long as I want because of moderate pain in my neck.
G I can hardly drive at all because of severe pain in my neck..
G I cannot drive at all.

Section 9 - Sleeping

G I have no trouble sleeping.
G My sleep is slightly disturbed (<1 hour sleep loss).
G My sleep is mildly disturbed (1-2 hours sleep loss).
G My sleep is moderately disturbed (2-3 hours sleep loss).
G My sleep is greatly disturbed (3-5 hours sleep loss).
G My sleep is completely disturbed (5-7 hours sleep loss).

Section 5 - Headaches	Section 10 - Recreation
G I have no headaches at all. G I have slight headaches which come infrequently. G I have moderate headaches which come infrequently. G I have moderate headaches which come frequently. G I have severe headaches which come frequently. G I have headaches almost all the time.	G I am able to engage in all my recreation activities with no neck pain at all. G I am able to engage in all my recreation activities, with some pain in my neck. G I am able to engage in most, but not all of my usual recreation activities because of pain in my neck. G I am able to engage in a few of my usual recreation activities because of pain in my neck. G I can hardly do any recreation activities because of pain in my neck. G I cannot do any recreation activities at all.

Vernon/Hagino, modified from Foubister et al.,Physiotherapy

APPENDIX J

ALGOMETER READINGS:

Patient Name: _____

File number: _____

		Trigger point 1				Trigger point 2			
Visit	Date	1	2	3	Mean	1	2	3	Mean
Before 1st									
Before 2nd									
@ 3rd									

APPENDIX K

CROM READINGS

VISIT	*FLEXION*	*EXTENSION*	*LAT FLEXION* R L	*ROTATION* R L
Before 1st				
Before 2nd				
@ 3rd				

APPENDIX L

Advertisement

Are you between the ages of **30** and **50,**
work in an office
and suffering from:

Neck, Shoulder or Upper Back Pain

Research is currently being carried out at the Durban Institute of Technology Chiropractic Day Clinic.

Free Treatment is available to those who qualify to take part in this study.

Contact Hayley Bedell-Sivright on 2042205 for more information.

OSCILLOSCOPE READINGS: Faradic Current

Pulse : 0.1-1.0 ms
Intensity: 26 v
Frequency: 50-100 Hz

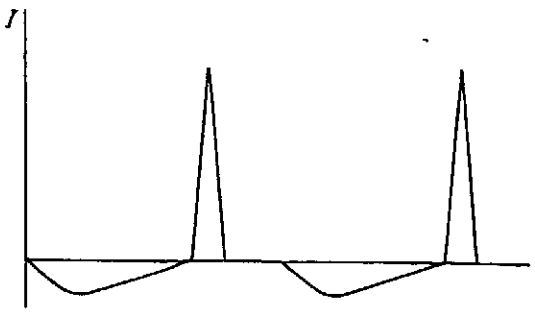


Fig. 3.1 The form of the original faradic current.

OSCILLOSCOPE READINGS: Transeva

Pulse: 0.28 ms
Intensity: 25 v
Frequency: 135 Hz