"THE EFFECTIVENESS OF MYOFASCIAL TRIGGER POINT THERAPY ON MYOFASCIAL PAIN SYNDROME TRIGGER POINTS"

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ABSTRACT

The efficacy of myofascial trigger point therapy in treatment of myofasciitis was evaluated in a single blind, randomised, placebo controlled trial. The patient population consisted of twenty individuals who presented with one of the following:
upper-back pain, shoulder pain, and neck-pain and or headaches and who were diagnosed as having myofasciitis. Patients with pain in these areas caused by conditions other than myofasciitis were not treated in this study, i.e. the patient`s primary complaint had to be that of a myofascial pain syndrome. Patients who presented with the specific signs and symptoms and diagnostic criteria as set out by travell and simons (1983) were diagnosed as having myofascial trigger point syndrome and accepted into the study.
The sample of 20 patients was randomly divided into two groups of 10, an experimental group and a control group. the control group was treated with a placebo therapy in the form of de-tuned ultrasound in which the machine was not functional. The experimental group was treated with traditional myofascial trigger point therapy, which included dry needling of trigger points, as well as stretch exercises for the affected muscles and patient education regarding the nature, perpetuating factors and the prevention of this condition. These trigger points were located in the Trapezius muscle, Levator Scapulae muscle, Rhomboid muscle, Supraspinatus muscle and/or Infraspinatus muscle.

Patients were treated five times within a three-week period and were then reevaluated one month after the last treatment. Subjective measurements were recorded via the visual analogue scale and disability index. Objective measurements were recorded via goniometer and algometer readings. The above measurements were completed at every consultation before and after the treatment. Further information was obtained from a questionaire designed for this study which was completed on the initial consultation and on the one month follow-up.

The results were analysed by the Mann Whitney U-test and the Wilcoxon sign rank test, as well as frequency tables. The groups results were analysed at various stages of the treatment, as follows: the Mann Whitney U-test was used to analyse the differences between the two groups at consultations one, five and six. The changes within each group were analysed between consultations one and five, five and six, and one and six. The Wilcoxon sign rank test was used in this analysis. The statistical significance level was set at 5% for both of the above tests.

The results indicate that the group receiving the myofascial trigger point therapy improved significantly more, than the placebo group, in both the objective and subjective findings. However the placebo group performed better than was expected. The experimental group maintained their improvement better than the placebo group over the one month period during which they were not treated. We can thus except the hypothesis that myofascial trigger point therapy is a useful adjunct to chiropractic treatment of myofasciitis and myofasciitis related pain.

UITTREKSEL

Die doeltreffendheid van miofassiale snellerpunt- behandeling van miofassitis is in `n enkele blinde, ewekansige, plasebo-beheerde toets beoordeel. Die pasiëntbevolking het bestaan uit twintig individue met bo-rug-, skouer-, nek- en/of hoofpyn wat met miofassitis gediagnoseer is. Pasiënte met pyn op hierdie plekke wat deur siektetoestande anders as miofassitis veroorsaak is, is nie vir hierdie studie behandel nie, m.a.w.,die pasiënt se primere kwaal moes miofassiale pynsindroom wees. Pasiënte met hierdie diagnose het spesifieke tekens en simptome gehad, asook die diagnotiese kriteria beskryf deur Travell en Simons (1983).

Die steekproef van 20 pasiënte is ewekansig in twee groepe van 10 verdeel. Die kontrolegroep het plasebo-behandeling ontvang met `n ultraklank-masjien wat oënskynlik maar nie werklik gefunksioneer het nie. Die toets groep het die tradisionele miofassiale snellerpunt-behandeling ontvang, bestaande uit die droë prik van snellerpunte wat in die spiere van die trapesium, levator scapulae, rhomboïed, supraspinatus en infraspinatus voorkom, sowel as spesifiese strekoefeninge vir die aangetaste spiere. Die toetsgroep het ook inligting ontvang aangaande die aard, perpetuerende faktore en die voorkoming van hierdie siektetoestand. Pasiënte is vyf keer binne `n periode van drie weke behandel en is een maand na die laaste behandeling herevalueer.

Subjektiewe metings via die visuele analoogskaal en gestremdheidsindeks, asook objektiewe metings via goniometer- en algometerlesings is by elke konsultasie voor en na behandeling geneem en aangeteken. Verdere inligting is verkry by wyse van `n vraelys wat vir hierdie studie ontwerp is en wat tydens die aanvanklike konsultasie en die opvolgaksie een maand later ingevul is.

Die resultate is met behulp van die Mann Whitney U-toets, Wilcoxon betekende rangtoets en frekwensietabelle ontleed. Die groepe se resultate is soos volg op verskillende stadiums van die behandeling ontleed: by konsultasies 1, 5 en 6 is die Mann Whitney U-toets gebruik. Die resultate is ook binne beide groepe by konsultasies 1 en 5, 1 en 6, en 5 en 6 ontleed met behulp van die Wilcoxon betekende rangtoets. die statistiese betekenispeil is vir beide bostaande toetse op 5% gestel.

Die resultate dui aan dat die toetsgroep wat die miofassiale snellerpunt-behandeling ontvang het beduidend beter gevaar het as die plasebo-groep in beide die objektiewe en subjektiewe bevindinge, alhoewel die plasebo-groep bo verwagting verbeter het. Die toetsgroep het ook daarin geslaag om hul verbetering beter te handhaaf as die plasebo groep gedurende die daaropvolgende maand waartydens hulle nie behandel is nie.
Miofassiale snellerpunt-behandeling is dus as `n nuttige bykomende terapie bewys in die behandeling van miofassitis en aanverwante pyn.

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LIST OF ABREVIATIONS

cons	consultation
e	experimental
exp	experimental
L	left
mftp	myofascial trigger point
mftpt	myofascial trigger point therapy
MWUT	Mann Whitney U-Test
p	placebo
pla	placebo
R	right
rom	range of motion
tp	trigger point
tp`s	trigger points
u/s	ultrasound
vas	visual analogue scale

CHAPTER ONE

THE PROBLEM AND ITS SETTING

1.1 PROBLEM STATEMENT.

This controlled placebo study proposes to investigate the effects of myofascial trigger point therapy on patients presenting with myofasciitis of selected postural muscles, in terms of the patients subjective response to the treatment as well as the measurable physical findings that may or may not occur in order to establish the efficacy of myofascial trigger point therapy as an adjunct to chiropractic management of myofasciitis.

1.2 SUBPROBLEMS.

(1) The first problem is to evaluate the effects of myofascial trigger point therapy (mftpt), in terms of the patients subjective response to the treatment in order to establish the effectiveness of mftpt. subjectively.

(2) The second problem is to evaluate the effects of mftpt. in terms of the measurable physical changes that may or may not occur in order to determine the objective effectiveness thereof.

(3) The third problem is to integrate the subjective and objective data generated in order to determine the viability of myofascial trigger point therapy as an adjunct to chiropractic management of myofasciitis.

1.3 HYPOTHESES:

(1) It is hypothesised that the patients subjective response to the myofascial trigger point therapy will be favourable.

(2) It is hypothesised that the patients objective response to the myofascial trigger point therapy will be favourable.

(3) It is hypothesised that the integrated data generated from the patients subjective and objective responses will indicate that myofascial trigger point therapy of myofasciitis is an effective adjunct to chiropractic therapy.

1.4 DELIMITATIONS:

(1) Conditions other than myofasciitis of selected postural muscles will not be treated in this study.

(2) Patients presenting with joint dysfunction symptoms will not be treated.

(3) Patients previously treated for the condition may be treated but will not form part of the placebo group.

(4) Patients less than 18 years of age or more than 55 years of age presenting with myofasciitis will be excluded from the study.

(5) Environmental factors, sex, race, occupation, recreational activities, dietary considerations and social factors will not be taken into consideration.

(6) Active trigger points, other than those in the selected postural muscles will not be treated in this study.

(7) Myofascial trigger point therapy of active trigger points will be delimited to dry needling, prescribed stretch exercises and patient education regarding perpetuating factors.

1.5 ASSUMPTIONS:

(1) It is assumed that patient`s recovery is due only to specific myofascial trigger point therapy.

(2) It will be assumed that the patient will be compliant with the doctor`s requests and instructions.

1.6 DEFINITIONS:

Myofascial Trigger Point:-

- an area of hyperirritability that is specific with reference to pain.

- the trigger point refers patterns of pain at rest or on motion that is specific to that muscle.

- an active trigger point is always tender, preventing the lengthening of the muscle, weakening of the muscle and referring pain on direct pressure, mediating a "load twitch" response of the muscle fibres when adequately stimulated.

- a latent trigger point is an area of hyperirritability in a muscle that does not produce spontaneous pain, it is painful only on palpation.

Myofasciitis.

- this is pain, tenderness and referred phenomena that is due to or attributed to active myofascial trigger points.

Myofascial Trigger Point Therapy.

- this includes:- dry needling, injection, spray and stretch, ischaemic compression, ice, exercises and patient education regarding changes to life-style, occupational and recreational activities and perpetuating factors note:- for the purpose of this study please refer to point number 7 of delimitations.

Placebo.

- any component of therapy or therapy that is deliberately or unknowingly used for it's non-specific effect - that is without specific activity for that condition being treated.note:- for the purpose of this study the placebo therapy will be the application of a dysfunctional ultrasound head over the active trigger point.

Chiropractic Therapy.

- any treatment that is performed by a person that is qualified as a chiropractor, more traditionally referring to manipulation or adjustment.

Subjective Changes.

- these changes are those personally perceived by the patient i.e. how they feel with regard to pain and disability.

Objective Changes.

- these changes are noted by the practitioner meaning the physical changes as determined by the algometer reading and the goniometer reading.

Selected Postural Muscles.

- these are the muscles that are involved in the maintenance of posture of the cervical and upper thoracic spine for the purpose of this study the trapezius, levator scapulae, rhomboidius, supraspinatus and infraspinatus are considered.

Stretching Exercises.

- in this study the stretching exercise refers to that specific stretch that is relevant to the specific muscle treated.

Patient Education.

- these are specific instructions that are given to the patient regarding his or her life-style and the perpetuating factors of the condition.

Goniometer.

- this is a specialised piece of equipment that is used to measure the amount of movement that occurs in that area of the body or at a particular joint.

Algometer.

- this is an instrument that reads pounds or kilograms per square centimeter and is used in determining pain threshold.

1.7 IMPORTANCE OF THE STUDY:

Immediate Background To The Problem:-

Research has been conducted proving the existence of myofascial trigger points as a diagnostic entity. The pathomechanics of the condition are not precisely defined and the understood treatment methods available are varied .
A placebo controlled study as proposed in this investigation has not been conducted.

Need For A Solution:-

Because there are a variety of treatment methods for managing myofasciitis it is important to establish a specific treatment procedure to minimise treatment cost in terms of repeated visits, wastage of the doctor`s and the patient`s time and ignorance on the patient`s part as to the cause of the condition. Findings from this study will contribute to the body of knowledge regarding the treatment of myofasciitis.

Description Of The Solution:-

A placebo controlled trial will be undertaken which, if successful, would result in an increased efficacy of the chiropractic management of myofasciitis. The sample population will be divided, randomly, into two groups, the experimental group receiving legitimate mftpt and the control group receiving a placebo therapy. The data captured by the visual analogue scale, questionaire, disability index, algometer and goniometer will then be evaluated according to the patient`s response to the respective treatment. Conclusions will then be drawn about the effectiveness of myofascial trigger point therapy.

Benefits From The Solution To The Problem:-

If the proposed treatment method proves to be effective it would greatly enhance the chiropractic profession`s management of myofasciitis, decreasing the costs of the treatment and the number of repeat visits and therefore decreasing the patient`s discomfort and the number of work-days lost, resulting in increased production.

Feasibility Of The Solution:-

The proposed treatment protocol does not require the use of any modalities or modern technology. Its application is not time consuming and it can be performed in the doctor`s consulting rooms or at the patient`s home.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this review of related literature is to summarise the facts and theories about myofascial pain syndrome and its treatment. Although this condition is common it is still poorly understood and the response to the treatment is often poor and unpredictable (Sola, 1955). At the present time no information is available about placebo treatment of myofascial pain syndromes, this study will contribute further information to this subject.

2.2 AETIOLOGY.

According to Magora (Travell and Simons, 1983) prolonged periods of sitting, occasional heavy lifting and weekend activity in sedentary persons, precipitates this condition. Incidence is closely related to whether there are psychological problems at the work place or at home. Westrin (Travell and Simons, 1983) published an article in 1973, relating an increased incidence of low back pain in those not happy with their job situation or divorced or having an alcohol problem. Psychology is therefore important in trigger point activation.

Goldenberg (1986) also found depression to be associated with fibrositis. In a study conducted by this author, 71% of the patients presenting with fibrositis also suffered from depression (Goldenberg, 1986). Goldenberg (1987) states that this condition is not simply a psychologically linked disorder. He also states that patients with this condition do not generally improve with psychotherapy. Payne et al.(1982) found similar results. Turk and Flor (Travell and Simons,

1983) related chronic back pain as being increasingly viewed as a psycho-physiological and psychosocial problem stemming from the interaction of physical, psychological and social factors. Therapeutic procedures must therefore be directed towards both the mind and the body. Trigger points, according to the above authors, are a psychosomatic manifestation of mental " turmoil". Gelb (1980) also recognises a psychological component in the development of this condition, but states that there are physical and thus treatable causes apart from the above aspects. According to Berkow (1987), Gelb (1980), Sola (1981) and Melnick (1954) physical and mental stress, poor sleep, trauma, exposure to dampness or cold and sometimes a systemic disorder are likely causes of myofascial trigger points. But according to Sola the power of these stimuli to produce pain is moderated by that persons genetics, personality and conditioning. This condition occurs more often in young women who tend to be tense, depressed and anxious. Men are more likely to develop the condition in association with occupational or recreational strain. In a minority of cases the condition may be associated with psychogenic or psychophysiological manifestations. Symptoms may be worsened by stress and more importantly by a physician who dismisses the matter as of no concern. According to Yunus et al. (1981) 16% of their sample group of 50 were told that they had a psychological syndrome and this lack of a definite diagnosis increased the patient`s anxiety and contributed to the progression of the condition. He states that the condition is poorly recognised and that only 6% of their sample group were referred with a diagnosis. According to Gelb (1980) muscles under stress will respond in the following manner; they will develop spasms, will lose their tone and become weak, they will tense up and trigger

points will develop inside them. In response to all of the above there will be pain. Emotional tension that is not allowed release accumulates in the body until it is released as a physical symptom. (Gelb, 1980)

Good (1950) recognises the effect that emotional strain, worries and other psychological stresses may have, but states that less importance should be placed on these aspects of the condition. He also states that doctors are themselves responsible for increasing the patient`s mental worries by being unable to properly diagnose the condition (Good, 1950). More commonly, tp. activation is as a result of acute strain due to sudden overload or chronic repetitive strain. (Travell and Simons, 1983; Simons 1988; Melzack, 1977)
Murphy (1989) states that trigger points are formed as a result of `prolonged muscle spasm, direct or indirect injuries or orthopaedic abnormalities that place the muscle in an abnormal function.`

Good (1951) summarises the aetiology of the condition as follows; septic foci (infections), allergic reactions, climatic conditions (many patients report feeling worse with sudden weather changes or temperature changes), endocrine dysfunction, psychological factors, trauma and an autonomic imbalance. This includes an imbalance of electrolytes (especially the sodium, potassium and calcium ratio) and a vasomotor imbalance. Yunus et al. (1981) concur with the above findings.

2.2.1 **PREVALENCE:**

According to Travell and Simons (1983) this condition is common. Latent trigger points are more common than active trigger points (tp`s). Sola (Travell and Simons, 1983) found focal points representing latent trigger points in the shoulder girdle of 54% of females and 45% of males in a group of 200. The largest group were between the ages of 31 and 50 years.

In a study performed by Sola et al (1954) he found that of a group of 200, 49.5% had trigger points. He also observed that 62.5% of the people with trigger points had more than one. The muscles that were found to be most affected were the trapezius, levator scapulae and infraspinatus with the most being found in the trapezius muscle (34.7 %). He also states that trigger points tend to occur bilaterally in a specific muscle (Sola, 1954). The above information is substantiated by Travell and Simons (1983) and Yunus et al. (1981). In recent estimates the prevalence of this condition, in the USA range from 3 to 6 million (Goldenberg, 1987).

In a study performed by Gelb, it was found that 71 percent of a healthy general population of dental patients suffered from chronic pain, of these 43% had headaches, 17% had neck aches and 11% had both. Chronic pain referred to by Gelb included myofascial trigger points (Gelb, 1980). No information is currently available on the prevalence of mftp`s in the RSA.

2.2.2 **PERPETUATING FACTORS:**

According to most authors the following are the most common:

Mechanical stress; this is as a result of skeletal asymmetry and disproportion eg. a short leg, a small hemipelvis, a long second metatarsal bone or short upper arms. Other sources of mechanical/muscular stress are : misfitting furniture, poor posture, abuse of muscles, constricting pressure on muscles and prolonged immobility (Travell and Simons, 1983, Gelb, 1980). According to Sola, (1955) the most common predisposing factor is acute or chronic mechanical stress. Sola (1981) also implicates poor work habits, abnormal posture and gait. This is in accordance with Bennet`s findings that patients presenting with the condition are physically unfit and that improvement of their fitness results in a decrease of their symptoms. Bennet also relates the following perpetuating factors: repetitive motion, postural stress, excessive noise, adverse weather, psychic stress, compensation and secondary gain (Bennet 1986). Nutritional inadequacies : vitamin deficiencies especially vitamins C, B and inadequate calcium, potassium, iron and other elements that are needed for normal muscle function. Metabolic and endocrine inadequacies: that perpetuate tp's are hypometabolism due to hypothyroidism, hyperuricaemia and hypoglycaemia. Anything that impairs muscle metabolism including anaemia or hypoxia is likely to perpetuate tp,s (Travell and Simons, 1983; Goldenberg, 1987). Psychological factors that prevent a rapid recovery include depression, anxiety, secondary gain and sick behavior. According to

Travell and Simons (1983), ineffective coping skills before pain, foster disability and respond best to counselling that is function orientated. The patient may also show a psychological need for the disability. But these psychological factors must not be assumed to be the one and only cause of the condition (Travell et al. 1983; Rubin 1981). Patients may, therefore, respond to treatment just by being assured that their condition is of muscular origin and is treatable. Patients who assume that their pain is untreatable often assume an air of hopelessness, this perpetuates their condition. It also indicates how a placebo (which would involve a diagnosis) treatment could be effective. Depression goes hand in hand with pain, the more pain there is the more depressed the patient is likely to be and visa versa. Engaging in exercises and other treatment will help cure their depression and this will have a reversing effect on their pain. Anxiety is expressed in the form of muscle tension and this perpetuates tp,s. These patients respond to techniques of relaxation and turning off excess stress eg. lifestyle or occupational changes (Bennet ,1986).

Chronic infections due to viral or bacterial diseases and some parasitic infestations can prevent recovery from myofascial pain syndromes. Other factors perpetuating the condition are allergies, impaired sleep and "organic" disease (Travell and Simons, 1983; Sola, 1955; Graff-Radford et al. ,1987; Rubin, 1981). The above perpetuating factors serve to indicate how diverse the treatment of the condition must be to achieve the best results. It also indicates how a placebo treatment could work, especially when the importance of the patients mental health and attitude is concerned. In this study

the treatments will make use of educating the patients to avoid pain perpetuating situations. This also indicates how perfectly this treatment regime would fit into the scope of chiropratic practice. Both are holistic in their health approach and both are concerned with pain, primarily, of a musculoskeletal origin.

Various authors list the perpetuating factors as: nutritional inadequacies, mechanical stresses, metabolic inadequacies, inactivity, chronic infection, unresolved anger and psychological stresses. Precipitating factors as: trauma, postural strain and repetitive use. Predisposing factors as: insufficient fitness, joint laxity, allergies, job frustrations, unsolvable domestic situations, abuse (physical, sexual and psychological), metabolic abnormalities, alcohol and cold (Gatterman, 1990; Simons, 1974; Bennet et al, 1986).

According to Simons (1988), the tp may spontaneously subside once the perpetuating factors have been removed.

2.2.3 THE DEVELOPMENT OF MYOFASCIAL TRIGGER POINTS:

Trigger points develop in muscles that are acutely or chronically strained. There is some degree of tissue damage. Disruption of the sarcoplasmic reticulum results in calcium release and this results in sustained contraction of the muscle fibre and this produces the taut bands associated with trigger points. The initial tissue damage results in disruption of small blood vessels and the release of platelets resulting in sensitising of the surrounding nerves.

Contracture develops as a result of the sustained contraction, which also results in vasoconstriction and ischaemia which, ultimately, also causes pain (Travell and Simons, 1983).

Sola (1981) states that trigger points may be thought of as weak points within the muscle or fascia that are more sensitive to stress induced change, they thus remain dormant until a period of stress when they then become active.

2.2.4 PATHOLOGY:

According to French's index of differential diagnosis (Hart 1985); pains apparently arising in the muscles are often referred from inflammatory or degenerative disease in a nearby joint. Disease or injury of ligaments refer pain to muscles and this could be the cause of "fibrositic" pains although these are poorly explained. It is thought that pain may also be referred from the adjacent spinal joints and ligaments.

Travell and Simons (1983) quote Gowers, Stockman, Llewellyn and Jones as giving connective tissue hyperplasia and inflammatory pathology of connective tissue as the "cause". But this was not substantiated in most subsequent biopsy studies. Schade later postulated an increase in the viscosity of the muscle colloid (Travell and Simons, 1983). German biopsy studies showed characteristic non-specific changes by light microscopy (Travell and Simons, 1983). Kellgren (Travell and Simons, 1983) first reported the associated refered pain and attributed it to tp`s. Awad , Fasbender and Wegener reported ultramicroscopic findings

in biopsies of muscles that showed evidence of myofascial tp's (i.e. abnormality of the contractile elements in the muscle) (Travell and Simons, 1983).

Simons quotes Brendstrup as finding that the`fibrositic` muscle showed an increased concentration of acid mucopolysaccharides, an increased water content and chloride content and that the firmer feel to that area of the muscle was due to edema (Simons, 1974).

Good (1950) theorises that the condition is as a result of disturbed circulation (decreased blood flow). This would tend to support the above findings by Brendstrup. According to Cyriax, the pain felt in a specific area is not as a result of a muscle pathology, but rather due to a disc herniation and the resulting nerve irritation (Cyriax, 1984). According to Sola (1955) the histopathology of the tp, when investigated showed little findings that could explain the pain.

2.3 CLINICAL PRESENTATION:

According to Travell and Simons (1983):

The irritable point may be found in a taut band of muscle. This point is painful to compression and this may evoke referred pain and autonomic phenomena (this a sign of an active trigger point). Active trigger points are more likely to occur in sedentary people who engage in irregular or infrequent bouts of exercise.

According to Melnick (1954) myofascial trigger points have the following characteristics;

1. They are small, hypersensitive areas within the muscle tissue, about 0.5 cm in diameter.

2. Symptoms are set off whenever the trigger point is irritated. Signs of autonomic nervous system irritation may also be present in the area in which the symptoms are felt.

3. The refered pain does not follow any peripheral nerve and is constant for a specific trigger point.

4. Trigger points may form at a distance from the original source.

5. Trigger points persist long after the causative factor has disappeared.

6. Treatment of the trigger point will not be effective unless the cause has been removed.

Sola (1954) lists the presentation of the condition as follows; pain of a deep - burning - aching sensation, stiffness, limitation of motion, tremors, weakness, altered sweat patterns and local changes in skin temperature.

2.3.1 **SYMPTOMS:**

The pain is refered from the tp in specific patterns that are characteristic of each muscle. The pain is described as being dull, deep and aching. The pain intensity ranges from discomfort to "incapacitating torture". Pressure increases this pain. The patient will present with pain due to the most recently activated tp. The mechanisms that underlie the refered sensations are still uncertain (Travell and Simons, 1983; Sola, 1955; Hockaday et al., 1967).

The pain does not precisely follow dermatomes, myotomes or sclerotomes and it may involve many segments. The patient may present with a history of sudden overload, overwork, fatigue, direct trauma and/or chilling. Tp's are also activated by other tp's, visceral disease, arthritic joints and by emotional stress. (It is this influence of the mind that could result in `successful` placebo treatment). Active tp's vary in irritability from hour to hour and day to day. This irritability may be increased by cold, cramped positions and viral infections, but the symptoms and signs of the tp's often outlast the cause (Travell and Simons 1983; Yunus et al. 1981).

Besides pain, other phenomena caused by trigger points are sweating, tears, goose-bumps, imbalance, dizziness, tinnitis and disrupted sleep. Tp's also cause stiffness and weakness of the involved muscles, limitation of motion and reactive hyperaemia (Travell and

Simons, 1983; Sola, 1955; Graff-Radford et al ,1987; Goldenberg, 1987). According to Berkow (1987) and Goldenberg (1987); the stiffness and pain are of an aching character and the pain is worsened by overuse and straining. A local muscle spasm is also present. Gatterman (1990) observed that the pain was also aggravated by psychological stress. He also mentions that Freud treated muscle pain physiologically and psychologically by using massage and electrotherapy in addition to psychotherapy, but that psychological causes could not be considered to be the main cause of the condition. According to this author, there is likely to be a history of muscle strain, whip-lash, overuse, overload and fatigue. Myofascial pain syndromes (mfps), are common among "typists, computer operators and assembly line workers, (he also lists the other clinical findings mentioned by the above authors). Stiffness is noted after periods of inactivity and muscle weakness may be reported, but no true weakness can generally be found (Gatterman, 1990).

Although this condition is definitely affected by psychological aspects the consistency of the pain patterns indicates that the condition is not solely of a psychological nature (Sola, 1955).

2.3.2 SIGNS:

The trigger point is palpable, the surrounding muscles are tense, the area surrounding the trigger point feels "swollen" and warm, there will also be a "jump sign", a local twitch response and restricted range of motion (rom) (Travell et al, 1983).

The reduced range of motion is as a result of the muscle shortening associated with the condition. This, when taken in conjunction with the muscles to be studied, can be seen as decreased cervical, scapular and shoulder range of motion (Rubin, 1981).

2.4 FINDINGS ON EXAMINATION AND DIAGNOSIS:

2.4.1 Findings On Examination:

According to Travell and Simons (1983):

Active and passive stretching of the affected muscle increases the pain, the rom is restricted and pain is increased when the muscle is contracted against fixed resistance. Her other findings have been listed above. She describes the trigger point found in the palpable band as a "sharply circumscribed spot of tenderness". Pressure applied to the trigger point can cause the patient to jump away from the pressure and/or cry out. This is the jump sign. These findings are corroborated by Wolfe (1986), Graff-Radford et al. (1987), Murphy (1989) and Yunus et al. (1988).

According to Gatterman (1990); skin rolling tenderness and hyperaemia are also found. This is not corroborated by Yunus et al. (1988) who say that skin signs are not common.

2.4.2 Diagnosis:

There is a history of sudden onset, during or shortly following an overload stress. Each muscle has specific/characteristic pain patterns refered from the tp. There will be weakness and restriction of the stretch rom. of the affected muscle and a taut band is palpable in this muscle. There will be tenderness to pressure on the trigger point and a local twitch response is elicited through snapping palpation or piercing the point exactly with a needle. Pressure on the tp will tend to reproduce the patient`s pain (Travell and Simons, 1983).

According to Berkow (1987) the diagnosis is based on the recognition of the typical pattern of the condition and by excluding other diseases.

In 1972 Smythe developed his own criteria for diagnosis, this included local tenderness, stiffness, fatigue and normal results from laboratory tests (Wolfe, 1986). But Yunus et al. (1988) say that laboratory tests are usually normal and do not contribute to a diagnosis because differences in muscle pathology are not clear.

Goldenberg (1987) uses the following diagnostic criteria:

chronic aches and pains in 3 or more sites for 3 or more months, absence of systemic conditions to account for these symptoms, multiple tender points at characteristic sites, sleep disturbances, fatigue, pain in the neck and\shoulders and chronic headaches.

2.5 TREATMENT:

Travell says that the response to specific trigger point therapy is often immediate and complete. She advocates the use of hot packs following other therapy to relieve muscle soreness and increase the rom. The treatment is more effective when it is followed by rom. exercises (Travell and Simons, 1983).

According to Lewit, when the most painful area was needled or touched by the needle, immediate pain relief occurred in 86.8% of cases in his study while the effectiveness of the treatment was dependent on the intensity of pain at the trigger point and the preciseness with which the maximum area of pain was found with the needle. Pain relief was found to be effective in the long term (Lewit, 1979).

When the localised therapy failed it was usually due to some unresolved perpetuating factor and successful long-term management of this condition is dependent on controlling these factors (Travell et al.,1983; Graff-Radford et al, 1987). But according to Bennet et al. (1986) treatment of the symptoms with heat, nonsteroidal

anti-inflammatory drugs, massage and anaesthetic injections are of little long term use. The effectiveness of dry needling in treating this condition may be due to mechanical disruption of the sensory nerve endings involved in the trigger point activity. Massage and pressure therapies are used to "wash out" irritating substances that facilitate tp formation and perpetuation. The effectiveness of dry needling does not match that of procaine injections. This is substantiated by Murphy (1989) but refuted by Garvey et al. (1989) who found that dry needling or vapocoolant spray plus acupressure appeared to be more effective than injection with steroids and/or lidocaine in reducing the discomfort of trigger points of the lower back. Dry needling produces no drug reactions, but the needle mechanically disrupts the abnormally functioning nerve endings or contractile elements of the muscle which are thought to be responsible for sustaining the tp activity. When the above occurs the patient`s symptoms are relieved. Local release of potasium (intracellular) due to damage to the muscle fibers by the needle could also cause a "depolarisation block" of the nerve fibres and this would result in pain decrease. It has been suggested though, that this type of needling technique`s effectiveness is strongly influenced by the placebo effect. It was found that high anxiety and depression test scores as well as good doctor-patient rapport were significant predictors of analgesia derived from needling (Levine et al. 1976). Other treatments listed include; ice rubs, heat, passive stretching, ischaemic compression, deep stroking massage, ultrasound, intermittent cervical or lumbar traction and relaxation techniques. Acupuncture is also successful as there is a 71% correlation between the associated pain pattern and its distribution of acupuncture points and trigger

points. High voltage stimulation, transcutaneous nerve stimulation and other electrical treatment forms may be used (Travell and Simons, 1983; Melzack, 1981; Sola,1981; Melzack, 1977; Murphy, 1989; Dontigny, 1974; Yunus et al., 1981).

According to Berkow the condition may disappear spontaneously with a decrease in stress (this is contrary to what Travell believes). But it may become chronic or recur. Relief is obtained from reassurance, relaxation hypnosis, cognitive therapy postural training, improved sleep, local applications of heat, massage, anti-depressant drugs, aspirin and/or anesthetic injection (Berkow 1987; Rubin, 1981; Hord, 1987). Gatterman advocates the use of chiropractic therapy as being of the most effective treatments for muscle pain syndromes along with life-style changes, stretching, light aerobic exercise, adequate rest, attitude changes, nutritional support and other measures suggested by Travell (Gatterman 1990, Travell and Simons,1983; Rubin ,1981). Generally, treatment is directed towards the disruption of the "neurological circuits" responsible for the "perpetuation of the pain-spasm-pain cycle".

The stretching techniques generally used are:-

the passive stretch, isometric contraction stretch, active resistance exercises and low impact aerobic exercise. Lewit and Simons developed the technique of placing the muscle in a stretched position, isometric contraction is exerted against minimal resistance,

relaxation and gentle stretch follow as the muscle relaxes. A group of 244 was tested , using this technique, 94% experienced immediate relief (lasting relief in 63%), (Lewit and Simons, 1984).

This technique should be used in conjunction with the above methods. Murphy (1989) states that the stretching and exercises or the affected muscle, along with patient cooperation, greatly enhances the long term effectiveness of the trigger point therapy.

The treatment recommended by the "Hand book of Physical Medicine and Rehabilitation" involves muscle re-education and exercise to maintain muscle tone and to correct postural deformity, deep-breathing exercises and exercises to strengthen the abdominal and gluteal muscles. Proper diet and calorie intake are also recommended along with the other therapies described by the previous authors (Lewit and Simons 1984, Travell and Simons 1983, Gatterman 1990).

Pomp studied a group of 23 patients who did not respond to conventional treatment methods. They each then completed brief psychotherapy and it was then found that symptoms decreased in 15 patients in therapy, 2 after therapy and there was no change in 6 of the patients. It was found that the decrease in symptoms coincided with relief from a strong negative emotion, recognition of an unrealistic self-concept, development of a feeling of competence or a specific change in the patient's environment (Pomp 1974). But this is

contrary to what Goldenberg writes, i.e. that patients with this condition do not generally improve with standard psychotherapy (Goldenberg, 1987).

Although this dissertation does not deal with actual psychological analysis or therapy the above article serves to indicate the role that the mind plays in the treatment of the condition and thus how a placebo treatment could show substantial improvement in the patient's condition.

In a pilot study conducted by Frampton it was found that electro-acupuncture was effective in the treatment of tp pain (Frampton, 1985).

Bennet (1986) stresses the active involvement of the patient in their own treatment. They are thus encouraged to help themselves and in so doing alleviate the perpetuating factors of their condition eg. increasing their level of physical fitness and avoiding stresses that worsen the symptoms. The physicians role, besides that of active treatment, is to be a good listener, to be optimistic toward improvement, to encourage increased physical fitness and to identify postural faults that may perpetuate the patient`s condition (Bennet 1986). Beecher defined satisfactory pain relief as a 50 percent or greater reduction of pain severity , but more recently a 33 percent reduction in pain severity has been accepted as significant (Mendelson et al, 1983).

Hord (1987) states that few physicians are equipped to incorporate all the above techniques into a structured treatment program and they must thus rely on referral to people who specialise in a modality. This is in accordance with Goldenberg`s view of a multidisciplinary evaluation and treatment of the condition. Chiropractors are able to supply such evaluation and treatment. Chiropractic treatment would thus be beneficial in treating the condition as well as saving the patient money.

2.6 MUSCLE OVERVIEW:

2.6.1 The Trapezius Muscle:

According to Travell and Simons (1983), Rubin (1981) and Good (1951): this muscle is most often affected by tp's, according to Travell, there are 6 tp`s with distinctive pain patterns in the upper, middle and lower portions of the muscle.

Tp1 refers pain upward along the back and side of the neck to the mastoid process and is a major source of tension neck ache . The pain extends to the side of the head, temple and behind the eye. This tp may also be associated with symptoms of dizziness or vertigo.

Tp2's referred pain zone lies behind that of tp1, but it is limited to the neck.

Tp3 refers pain severely to the higher cervical regions, mastoid area and to the shoulder. It is responsible for an annoying, deep ache between the shoulder blades. The neck rom could be restricted to the opposite side.

Tp4 produces a steady burning pain that is referred down and along the vertebral border of the shoulder blade.

Tp5 produces a superficial burning pain between the tp and the upper spine (C7-T1 area).

Tp6 is found near the acromion and refers pain (aching) to the top of the shoulder.

Tp7 this tp is superficial and sends a shivery sensation down one arm on the same side of the body.

SYMPTOMS:

Tp1 = severe neck pain and temporal headache.
Tp2 = neck pain and intolerance to the weight of heavy clothing.
Tp3 and 4 = suprascapular, interscapular and acromial or neck pain.
Tp5 = burning interscapular pain.
Tp6 = tenderness over the shoulder.
Tp7 = a shivery feeling and gooseflesh.

These tp's are activated by:

a short leg , a small hemipelvis or short upper arms as well as sustained elevation of the shoulders, whiplash and compression of the muscle.

On examination active rotation to the opposite side is painful and side-bending is slightly restricted.

Management:

Needling, stretching and ice, along with the following corrective actions; Correcting body asymmetry, altering misfitting furniture, repositioning office furniture, altering poor sleeping posture and relieving constriction.

Exercises:

Swimming , skipping, stretching. Stretching exercises are as follows; the side bending neck exercise - in which the patient pulls the head over to one side by looping one arm over his head and pulling his head in that direction. This is performed in the seated position. The middle trapezius stretch exercise - the patient is asked to lie on his back, on the floor, place his elbows, forearms and palms together in front of his abdomen and in this position raise his arms over his face. He should then drop his arms past his ears to the floor and

then, keeping his arms in contact with the floor, swing his arms down against the sides of his body. The above process should be repeated about 15 times.

2.6.2 The Levator Scapulae Muscle:

According to Travell and Simons (1983) and Sola (1955): pain from this muscle is referred to the angle of the neck, along the vertebral border of the scapulae and to the shoulder. This tp results in a stiff neck.

Symptoms:

There is pain at the angle of the neck and the patient can't turn his head to the same side but must turn the whole of his body.

Activation of this tp occurs by:

Occupational stresses, typing, sleeping with the neck in a tilted position, psychological stress, high arm rests on a chair or a cane that is too long, over exercise, tennis, swimming, infections, and tortcollis.

On examination there is decreased rotation and flexion of the head but there is little restriction in shoulder movement.

Management:

Needling, stretching, education, lumbar support, application of ice or a hot/moist pack, correct cane length and pillow position change to avoid shortening and cramping of muscles.

Stretch exercises are as follows:

In a seated position the patient pulls the head across and down using his one hand while the other hooks under the stool acting as a stabilizer. The muscle is then stretched in the direction in which it feels tight.

2.6.3 **Supraspinatus Muscle**:

According to Travell and Simons (1983):

Pain resulting from trigger points in this muscle is felt in the middle region of the shoulder i.e. the mid-deltoid region and this pain may also be felt down the arm up to the wrist.

Symptoms:

The pain is worsened by forcefully abducting the arm at the shoulder and stretching when reaching the arm behind the back. Patients with this trigger point report difficulty in reaching up above the shoulder and may also complain of pain disturbed sleep.

Activation of the trigger points is likely to occur when heavy objects are carried with the arm hanging or if the object is lifted above the shoulder.

On examination the patient shows a reduced range of motion of the affected shoulder (this will be detected, and measured with the use of the goniometer.) On examination of the trigger points tenderness will be felt over the area of the tp.

Management of this tp includes needling the tp, stretching exercises, education, avoiding overuse of the muscle eg. the patient should avoid activities like hanging up curtains. Stretch exercises are as follows; the patient stretches the muscle by pulling the arm up behind the back, this is best done in the shower with the hot water running over the muscle or the stretch may be done by pulling the elbow of the affected side across the chest and holding it there.

2.6.4 Infraspinatus Muscle:

According to Travell and Simons (1983) and Sola (1955):

Pain resulting from this muscle is felt deep in the front of the shoulder, within the shoulder joint and also travels down the side of the arm, forearm and hand.

Symptoms:

The patient may not be able to do up her bra, take out a wallet from a back pants pocket, zip a dress, or put the affected arm into a coat. Sola and Williams , included the following symptoms - shoulder girdle fatigue, a weak grip and decreased mobility of the shoulder (Travell and Simons, 1983). The pain prevents the person from lying on that side at night.

Activation of the trigger points; this usually occurs from overload stress while reaching up and back. Patient examination shows limited movement at the shoulder (external and internal rotation). The tp is usually located just below the spine of the scapula.

Management of the patient includes; needling, stretching and education (avoiding overload and repetitive motions and self stretch exercises). Stretches are as follows; the arm is pulled across the body and then the arm is pulled up behind the body (similar to the stretch of the supraspinatus muscle).

2.6.5 Rhomboid (Major) Muscle:

According to Travell and Simons (1983):

Pain from this muscle is felt over the vertebral border of the scapula and the paraspinal muscles, the pattern of pain is similar to that of the levator scapulae muscle but it does not affect the neck. The patient complains of shallow, aching pain while the muscle is not in use.

The trigger points in this muscle are activated by prolonged leaning forward and working in the round shouldered position ie. poor posture. Patient examination shows little change in the range of motion of the shoulder.

Management of the patient`s condition includes the use of needling the tp, stretch exercises (the middle trapezius stretch) and patient education eg. the use of a lumbar pillow, correct seating posture and frequent breaks from sitting.

2.7 SUMMARY:

Trigger points or tp's are numerous in the body and in the population, but for the purpose of this research only those in the trapezius, levator scapulae, rhomboid, supraspinatus and infraspinatus muscles will be considered. Tp's have a number of causes and theories as to

their pathology, perpetuating factors and countless treatments but, unfortunately, there is no information on the placebo treatment of myofascial trigger points.

CHAPTER THREE

MATERIALS AND METHODS

3.1 INTRODUCTION

This is a synopsis of how this dissertation has been performed with respect to the following aspects:-

- the methods, techniques and measurements
- the type and nature of the data
- the location of the sample and data
- how the data was be captured
- and the statistics that were used .

3.2 METHODS, TECHNIQUES AND MEASUREMENTS

During the year 1993 40 patients applied to take part in the research of which 20 patients fulfilled the requirements and were selected. These patients had fulfilled the entrance requirements of the dissertation, i.e. they had have active myofascial trigger points of the upper back and shoulder girdle musculature diagnosed according to the accepted diagnostic criteria as set out by Travel and Simons (1983).

Only patients between the ages of 18 and 55 were selected. The patient group consisted of those having active trigger points in the trapezius, levator scapulae, supraspinatus, infraspinatus and rhomboid muscles. (For diagnosis and symptoms and signs - please refer to the literature review.)

This group of 20 was then be divided into two further groups of 10 each - this occurred on a random basis.

Process Of Randomisation:

Six groups of 4 were formed, these were numbered from 1 - 6, a die was then thrown to get a number from 1-6 which was representative of a particular order of placebo or experimental patients eg. 1: PEEP 2: PEPE 3: EPPE 4: PPEE 5: EPEP 6: EEPP `P` was representative of placebo and `E` was representative of an experimental patient. The die was thrown 5 times to get the order of placebo and experimental patients. These two groups of 10 were known as the "placebo group" and the "experimental group".

The patients were informed, beforehand, that they would be taking part in the study and that they may or may not be receiving the "authentic" treatment for their condition - they then had the choice of withdrawing before the study began. Each patient also received a typed introductory letter and a `letter of consent` which they had to sign, before they started on the research program (appendices J and I).

The experimental group received authentic treatment in the form of dry needling (using sterilised acupuncture needles which were 25mm long and had a 0.3mm gauge), stretching of the affected muscles as well as education concerning perpetuating factors.

The placebo group received a sham treatment in the form of detuned ultrasound (the u/s machine used was a Sonoplus 436 supplied by Mediotronics and made by Enraf Nonius). The "timer" of the ultrasound machine was set but the unit was turned off before treatment began. This was be done only to make the group believe they were being treated. Each patient was treated five times.

No studies had mentioned the maximum treatment time, Travell and Simons, 1983, suggested that the response was often immediate, but anecdotal evidence suggested that these patients should be treated five times. If the patient was completely symptom free before the end of his allotted five treatments he was still monitored. After the five treatments both groups were re-evaluated one month after the last consultation to establish the long term effectiveness of the respective treatments. During their treatment time the patient filled out a visual analogue scale (VAS.), a general disability index and a pain questionaire. (The questionaire was completed twice only - on the initial treatment and on the follow-up evaluation.)

The physician at this time also performed a range of motion test with the aid of a goniometer (The goniometer used was an `Autogon 2` from Smith and Nephew Rolyan Inc.) and performed tests to detect the patients pain/pressure tolerance with the aid of an algometer. The algometer used was the model `fdk 20 force dial` made by Wagner instruments and supplied by Activator Methods Inc. (refer to appendix C2).

The patients were treated five times in a three week period. At the end of the allotted five treatments the patients were discharged for a month after which they were reevaluated.

Detailed Patient Procedure:

On the initial consultation a thorough case history was taken from the patient (Appendix F). After which the patient underwent a physical examination (Appendix G). This was followed by a regional examination of the neck and upper back. (Appendix H).
These procedures were completed in order to insure an accurate diagnoses of the condition. Once the diagnosis had been made the patient was asked to complete the questionaire (Appendix B2).

The patient was then instructed to return to the clinic where he was then allotted to either the control (placebo) or the experimental group. At the second consultation the patient completed the vas (Appendix A) and the disability index (Appendix B1). If the patient had not completed the questionaire it was completed at this time. The practitioner then recorded the " physical measurements" using the algometer and goniometer (Appendix C1 and D1 respectively). At that stage the patient was then treated.

After the treatment the two physical measurements were retaken as was the vas. The above procedure was repeated at every consultation over the three week period. On the one month follow-up i.e. one month after

the last treatment, the patient completed a vas., disability index and a questionaire. The practitioner repeated the goniometer (rom.) and algometer measurements.

3.3 TYPE AND NATURE OF THE DATA

Primary data was collected by clinical observation and communication with the patient. The primary data for this research was specifically taken from the "visual analogue scale", "the general disability index", the "pain questionnaire" and the appropriate tests performed by the researcher using the algometer and goniometer.

The secondary data was gathered from a search of related literature.

3.4 LOCATION OF THE DATA/SAMPLE

The secondary data was available through the library at the Technikon Natal and through other library facilities. The primary data was available once the patients had been selected and once they have actually begun to "participate" in the research.

The location of the sample was in the greater Durban area and the "group presenting themselves" at the chiropractic day clinic at the Technikon Natal. This "group" was attracted to the clinic by the media i.e. advertisements and also referrals from practitioners in the Durban area.

3.5 CRITERIA FOR ADMISSIBILITY OF THE DATA

Only the data from the above mentioned questionaire, disability index and visual analogue scale that were completed correctly and under supervision were used.

Data was only "taken" from those people eventually selected for the research. ie. from the sample group.

Both the placebo and experimental groups underwent the same tests, the same procedures, but differing only in the eventual treatment, to be admissible to the study.

3.6 DISCUSSION - CAPTURING AND SECURING THE DATA.

The data was captured in the following way:-

On arriving at the clinic - once the initial diagnostic work-up had been completed the patient was asked to complete the vas, the general disability index and the pain questionaire. These were "checked" in the patient`s presence to make sure there were no faults and that the patient understood each question. (For an example of the above please refer to Appendices A, B1 and B2). These measurements enabled the solving of the first subproblem.

The researcher then measured the range of motion with the goniometer and the result was then recorded. Here the American impairment scale was used (Appendix D2.) Further data was recorded from readings derived from the use of the algometer. (This instrument is a force dial which reads in pounds or kilograms - and is used to determine the pain threshold by the amount of force/cm^2 required for a person to first perceive pain - the instructions for the use of this instrument are to be found in Appendix C2.) The above two readings allowed the second sub-problem to be solved.

The data was thus captured by the five above methods and was secured in the form of the questionaire, tables and recorded readings. The above information was then used to determine the patients "progress" or the lack thereof. The patients subjective perception of pain was recorded by the visual analogue scale and the pain questionaire. His perception of how disabling the condition was, was recorded via the "disability index". (For more detail please refer to the information below and Appendix B1). The rom. and algometer readings gave the physician an objective assessment of the patients progress and/or response to the treatment.

The visual analogue scale:-

By getting the patient to complete this at every consultation a change in the level of pain experienced by the patient according to his (subjective) opinion was noted. By using this data the rate of change as well as the degree of change in both groups was evaluated.

Range of motion:-

Referring to the literature review it will be noted that trigger points in certain of the muscles present with a decrease in the range of motion. This was detected by the goniometer. By using this instrument an objective assessment of the patients rom. was acquired. The rom. was then be correlated with the American Medical Association`s Impairment Rating Scale, the percentage impairment was noted. The results of adding the number of notable results was then placed into a frequency table.

The pain questionaire: (Appendix B2)

Before using the questionaire it was pre-tested on a sample of 6 people. Once the questionaire was judged to acceptable it was the submitted for use.

This questionaire has 16 sections.

Questions 1-3 were used for general patient information.

Age - noted because the age group of greatest incidence is between 21-50.

Q4 - onset of pain - tells how long the condition was present how long the treatment / or involved the treatment might have to be.

Q5 - the precipitating event is self evidently important.

Q6 - gives an indication of how severe the pain is and if it fits into the characteristics of the pain caused by myofascial pain syndrome.

Q7,8,9,10 - location of the pain is important for the same reasons as above.

Q11 - gives a clue as to which muscle is involved and also how involved it is. it could also help decide how severe the patients condition is. (Refer to the literature review)

Q12 - this information is used to see if the pain fits into the MFPS stereotype. (Refer to the literature review)

Q13,14,15 - gives an indication on what is effective in the treatment of the patients pain and what kind of treatment has been tried before. (If all the alternative treatments had been tried and had failed the patient was not allowed to take part in this study - as they could have had more serious and "pressing" complaints.)

Q16 - this also gives clues into the origin of the problem and if the problem is immediately resolvable.

The responses from the above questions were placed into a frequency table.

Algometer:

The measurements from this instrument (readings were recorded at the beginning and end of every consultation) furnished information on the patients pain threshold. The patient with mfps will have a lower pain threshold than a person without. During treatment, as various symptoms and signs of the condition abate, the patients pain threshold will increase. Readings taken at the time of consultation were then analyzed - the rate of increase and degree of increase was noted. Data for the two groups were then analyzed and compared.

The disability index:

The disability index gave the physician some idea on how "much" the patients pain was influencing their general life-style. By recording these readings at every consultation the patients recovery (noted by resumption of normal daily activities or a decrease in the influence the pain had on their normal daily routines) was noted.

The data from all five measurements was then `combined` and examined to determine the overall influence of the respective treatments on the patients. By doing this the third sub-problem was solved.

3.7 STATISTICS

The type of statistics that were used were the:-

- Mann Whitney U-test
- Wilcoxon sign rank test
- chi square test ("McNemar" test)
- "time scale". (refer to appendices E 1,2,3,4)

Of the five consecutive consultations, it was decided to analyse the changes between the first and the fifth consultations, before the treatment. The change between the 5th and 6th consultation, also before the treatment and then between the 1st and the 6th consultations before the treatment. The above steps were carried out for both the placebo and the experimental group. The Wilcoxon sign rank test was used to statistically analyse the above changes. The Wilcoxon sign rank test was thus performed on the changes between consultations 1-5, 5-6, and 1-6 for both groups. This statistical test

was chosen because of its less restrictive assumptions and its likeness in sensitivity to the T-test. The significance level was set at 5%.

By using the Mann Whitney U-test the difference between the first consultation of both groups, the fifth consultation of both groups and the sixth consultation of both groups was analysed. The Mann Whitney U-test was thus performed on the differences between the following consultations; 1-1, 5-5 and 6-6. The readings obtained before the actual treatment for that consultation were used.

The Mann Whitney U-test was also chosen because of its less restrictive assumptions and requirements. Its significance level was set at 5%.

Chi square test - please refer to the discussion.

The time scales mentioned were taken in the form of graphs relating the medians of the measurements taken. All statistical analysis performed made use of the Statgraphics Plus Version 6` as supplied by Manugistics Inc. All statistical analysis was performed at the Technikon Natal Berea campus.

3.8 SUMMARY:

Preceding this paragraph the methodology of the study was outlined. It dealt with the selection and randomisation of the sample group, as well as the methods and equipment used in the treatment and data gathering of both the placebo and the control groups. The methods of data processing and statistics used were also outlined.

CHAPTER FOUR

RESULTS

RESULTS:

The results were dealt with as follows:

Each measurement method ie. the vas., the goniometer, the disability index, the algometer and the pain questionaire were handled separately as was each statistical test that was performed. (Please note that all measurements used were those that were taken before each treatment in that consultation.)

The McNemmar or chi square test, when performed revealed no statistically usable results and it was, for this reason, ignored. This was thought to be as a result of the nature of the data collected and the small sample size.

The Wilcoxon Sign Rank Test:

The Visual Analogue Scale (Vas):

For the placebo group:

Consultation 1 and 6: the large sample statistic z = 2.014
Two tailed probability of equaling or exceeding z = 0.044
Consultation 1 and 5: the large sample statistic z = 2.488
Two tailed probability of equaling or exceeding z = 0.013
Consultation 5 and 6: the large sample statistic z = 1.268
Two tailed probability of equaling or exceeding z = 0.205

For the experimental group:

Consultation 1 and 6: the large sample statistic z = 2.242
Two tailed probability of equaling or exceeding z = 0.025
Consultation 1 and 5: the large sample statistic z = 2.344
Two tailed probability of equaling or exceeding z = 0.019
Consultation 5 and 6: the large sample statistic z = 0.105
Two tailed probability of equaling or exceeding z = 0.917

Median Scores For Vas.

	1	2	3	4	5	6
exp	6.5	2	2.5	4	1	1.5
pla	6	6	5.5	4.5	3	4

Median vas. scores: figure - 4.1

Range Of Motion (Rom):

For the placebo group:

Consultation 1 and 6: the large sample statistic z = 1.268
Two tailed probability of equaling or exceeding z = 0.205
Consultation 1 and 5: the large sample statistic z = 0.809
Two tailed probability of equaling or exceeding z = 0.418
Consultation 5 and 6: the large sample statistic z = 1.095
Two tailed probability of equaling or exceeding z = 0.273

For the experimental group:

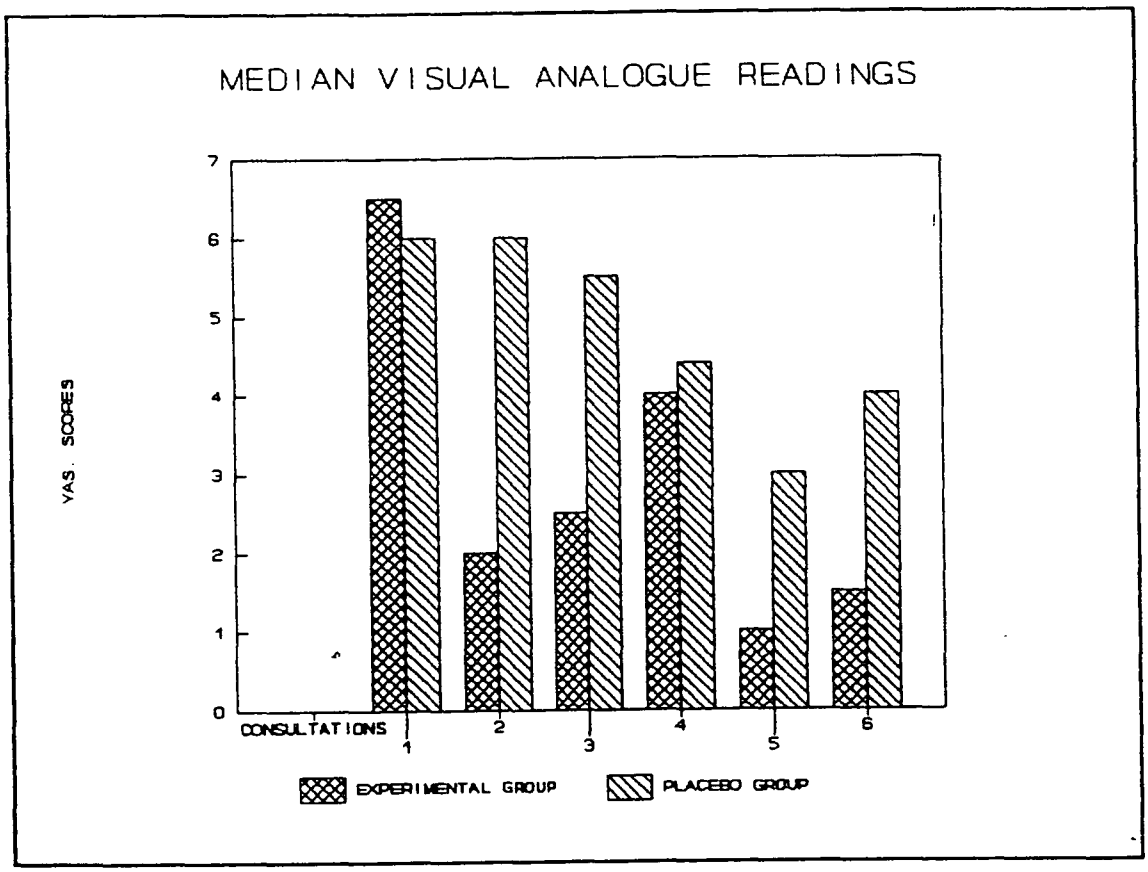
Consultation 1 and 6: the large sample statistic z = 0.663
Two tailed probability of equaling or exceeding z = 0.508
Consultation 1 and 5: the large sample statistic z = 0.829
Two tailed probability of equaling or exceeding z = 0.407
Consultation 5 and 6: the large sample statistic z = 0.770
Two tailed probability of equaling or exceeding z = 0.441

Median Scores For Rom

	1	2	3	4	5	6
exp	4	3.5	3	4.5	3.5	4
pla	5	5	5	2.5	4	2.5

Median rom. scores: figure 4.2

FIGURE 4.1 MEDIAN VAS. SCORES



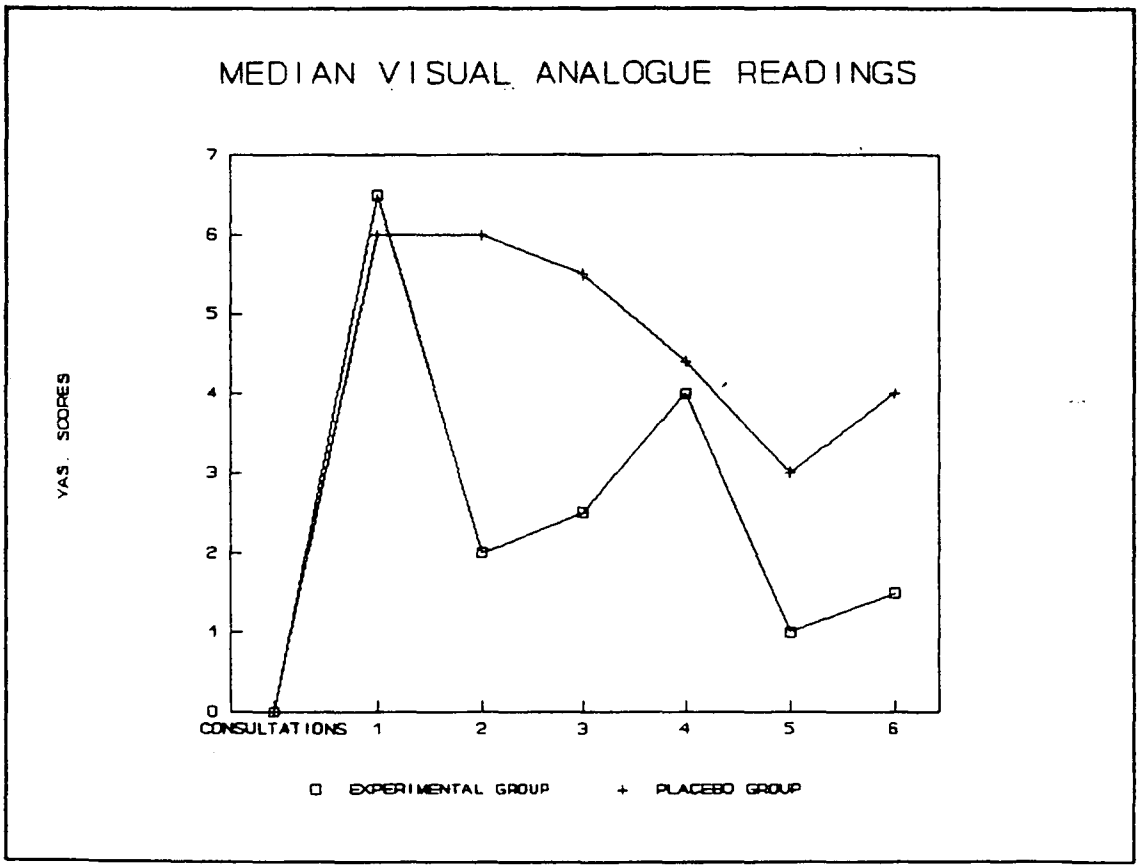
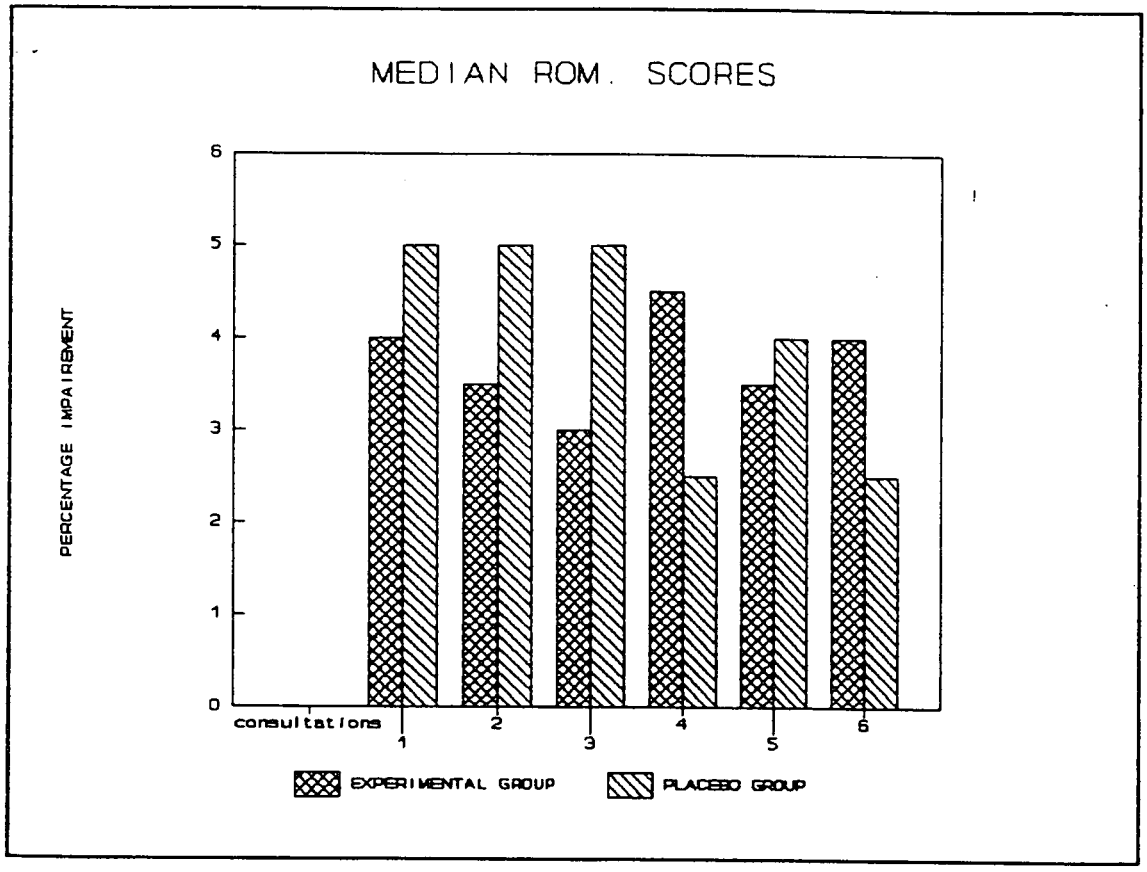
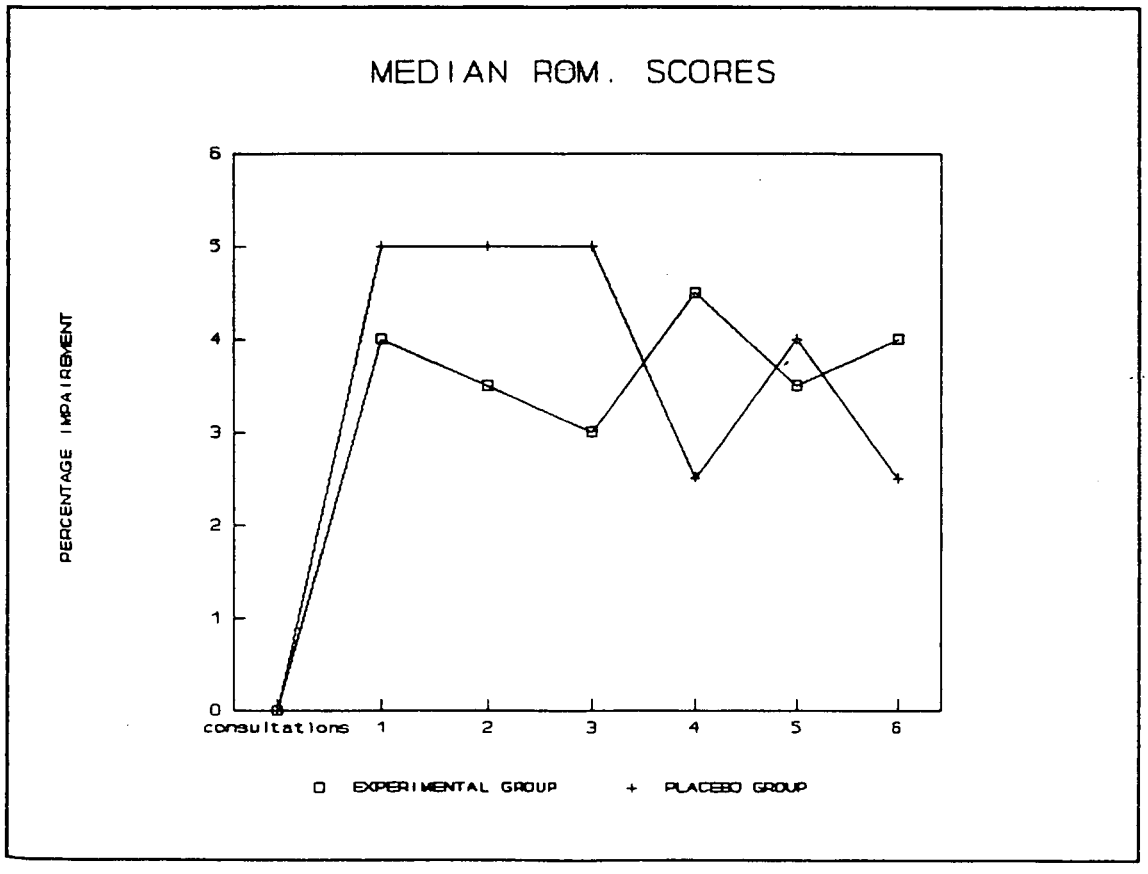


FIGURE 4.2 MEDIAN ROM. SCORES





Rom. Frequency Table:

The following is a table in which the rom`s are depicted ie. in ascending order of involvement. (The figures are derived from counting the number of notable readings, as determined by the American Medical Association guide to impairment, and summing these figures.)

Range Of Motion Frequency Table:

	Placebo	Experimental
neck: flexion	4	6
extension	18	25
lateral flexion	41 (l)	45 (r)
" "	54 (r)	47 (l)
rotation (R)	55	58
rotation (L)	87	74
shoulder:		
adduction	0	o
extension	0	0
medial rotation	3	0
flexion	27	6
abduction	30	14
lateral rotation	54	79

Disability Index:

For the placebo group:

Consultation 1 and 6: the large sample statistic z = 1.421
Two tailed probability of equaling or exceeding z = 0.155
Consultation 1 and 5: the large sample statistic z = 1.421
Two tailed probability of equaling or exceeding z = 0.155
Consultation 5 and 6: the large sample statistic z = 0.355
Two tailed probability of equaling or exceeding z = 0.722

For the experimental group:

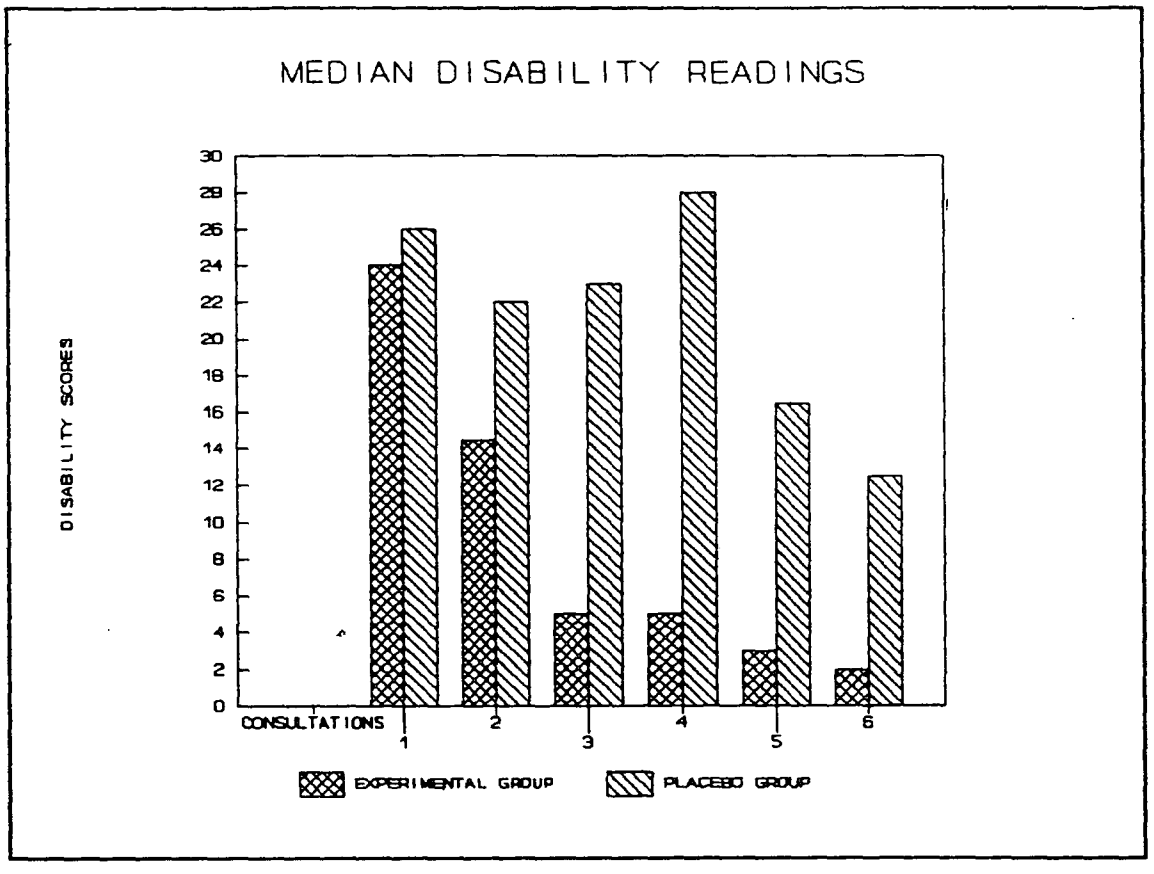
Consultation 1 and 6: the large sample statistic z = 2.854
Two tailed probability of equaling or exceeding z = 0.004
Consultation 1 and 5: the large sample statistic z = 2.650
Two tailed probability of equaling or exceeding z = 0.008
Consultation 5 and 6: the large sample statistic z = 0.711
Two tailed probability of equaling or exceeding z = 0.477

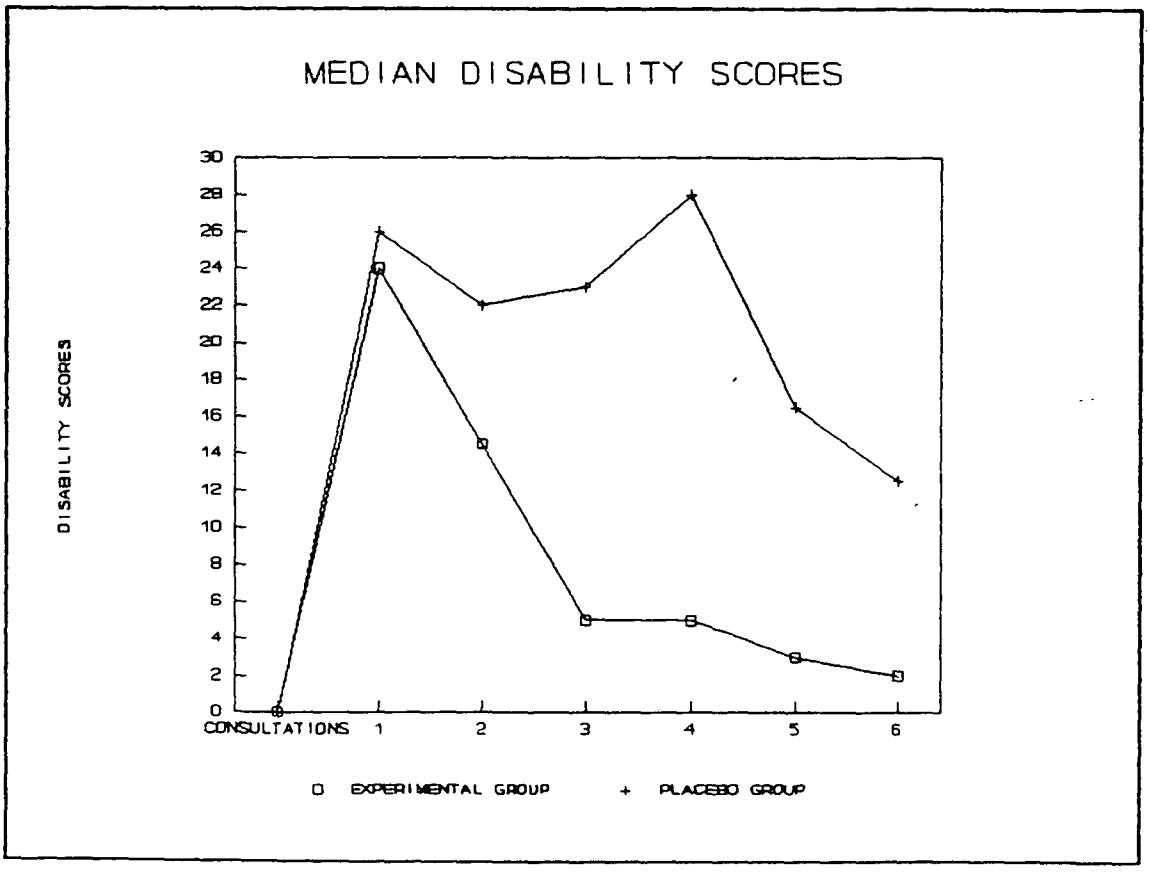
Median Scores For The Disability Index:

: 1	2	3	4	5	6
exp:24	14.5	5	5	3	2
pla:26	22	23	28	16.5	12.5

Median disability scores: figure 4.3

FIGURE 4.3 MEDIAN DISABILITY SCORES





Algometer Readings:

For the placebo group:

Consultation 1 and 6: the large sample statistic z = 0.968
Two tailed probability of equaling or exceeding z = 0.333
Consultation 1 and 5: the large sample statistic z = 1.121
Two tailed probability of equaling or exceeding z = 0.262
Consultation 5 and 6: the large sample statistic z = 0.408
Two tailed probability of equaling or exceeding z = 0.683

For the experimental group:

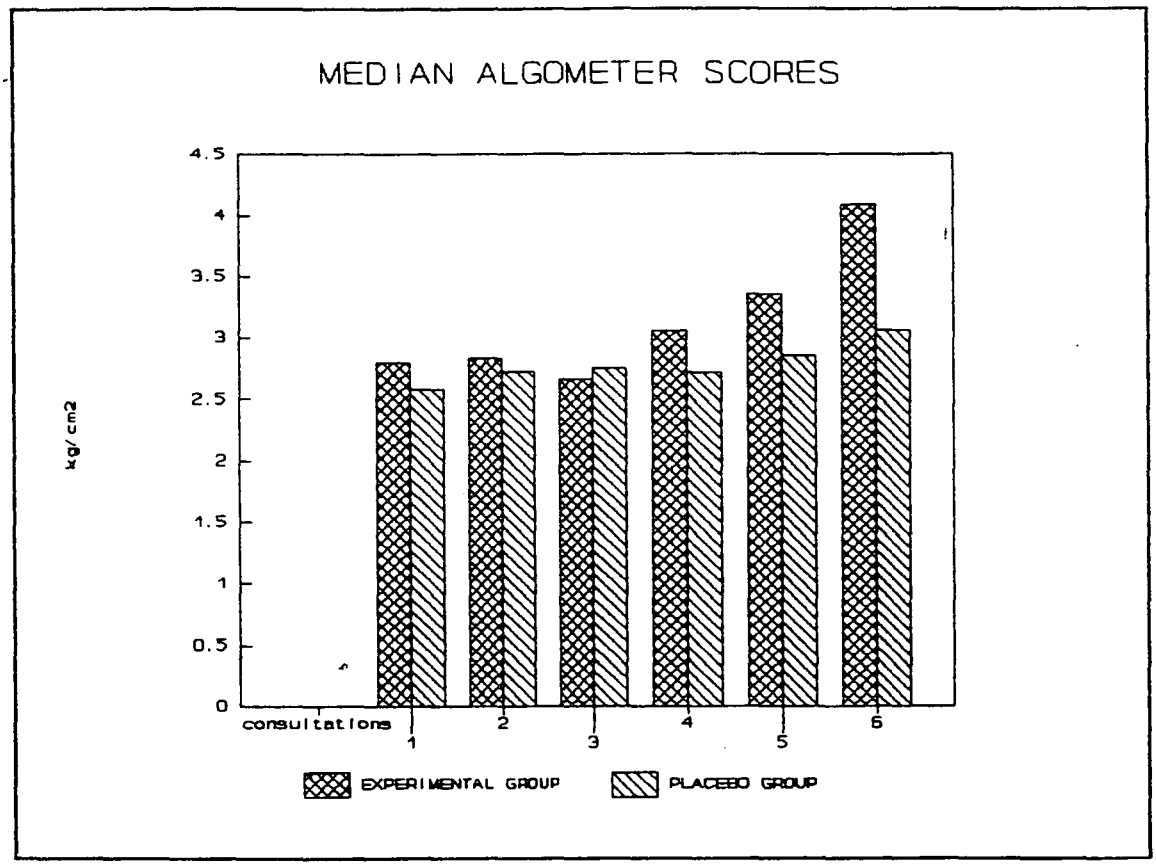
Consultation 1 and 6: the large sample statistic z = 2.752
Two tailed probability of equaling or exceeding z = 0.006
Consultation 1 and 5: the large sample statistic z = 2.344
Two tailed probability of equaling or exceeding z = 0.019
Consultation 5 and 6: the large sample statistic z = 1.896
Two tailed probability of equaling or exceeding z = 0.058

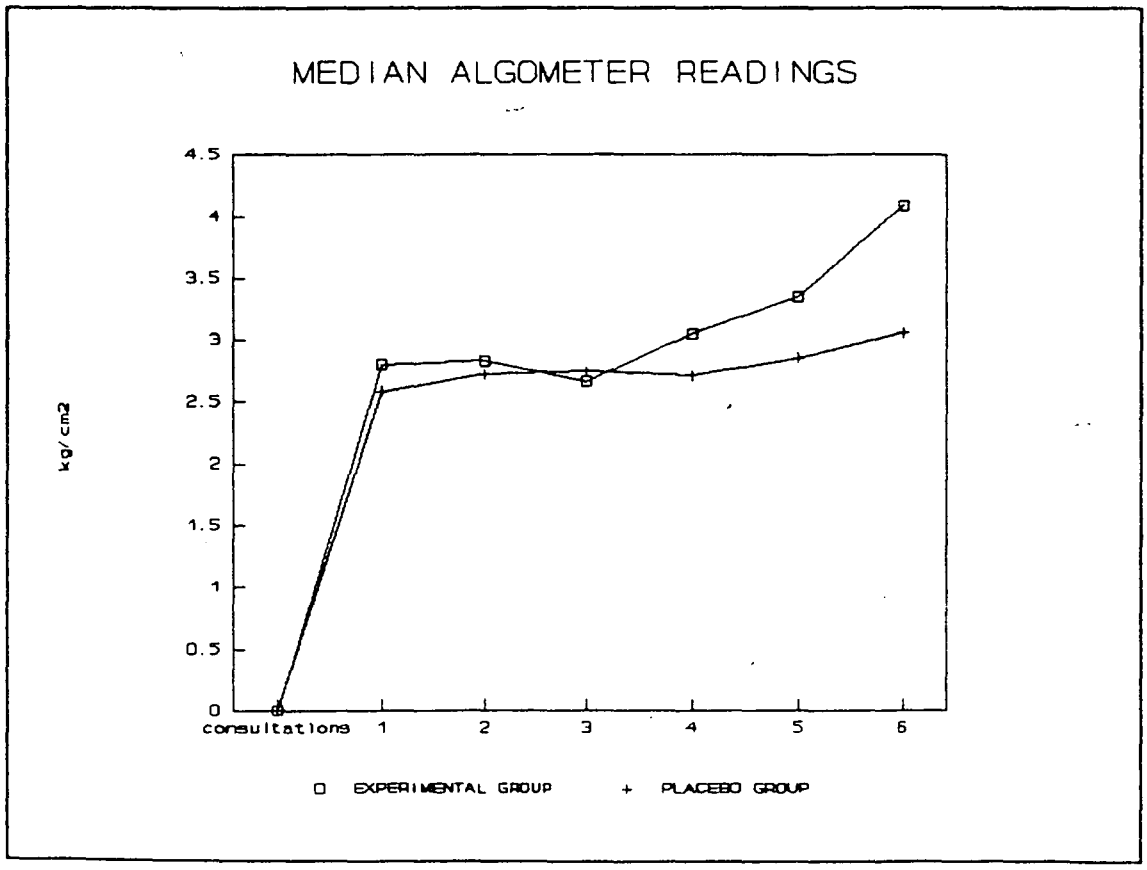
Median Algometer Scores:

: 1	2	3	4	5	6
exp:2.805	2.835	2.665	3.05	3.35	4.09
pla:2.585	2.72	2.745	2.715	2.855	3.06

Median algometer scores: figure 4.4

FIGURE 4.4 MEDIAN ALGOMETER SCORES





The Mann Whitney U-Test:

Vas. Readings:
Consultation 1 (experimental and placebo)
Large sample test statistic z = 0.305
Two tailed probability of equaling or exceeding z = 0.760

Consultation 5 (experimental and placebo)
Large sample test statistic z = 1.456
Two tailed probability of equaling or exceeding z = 0.145

Consultation 6 (experimental and placebo)
Large sample test statistic z = 2.026
Two tailed probability of equaling or exceeding z = 0.043

Rom. Readings:
Consultation 1 (experimental and placebo)
Large sample test statistic z = 0.343
Two tailed probability of equaling or exceeding z = 0.732

Consultation 5 (experimental and placebo)
Large sample test statistic z = 0.076
Two tailed probability of equaling or exceeding z = 0.939

Consultation 6 (experimental and placebo)
Large sample test statistic z = 0.766
Two tailed probability of equaling or exceeding z = 0.444

Disability Index Readings:
Consultation 1 (experimental and placebo)
Large sample test statistic z = 0.578
Two tailed probability of equaling or exceeding z= 0.570

Consultation 5 (experimental and placebo)
Large sample test statistic z = 1.747
Two tailed probability of equaling or exceeding z = 0.081

Consultation 6 (experimental and placebo)
Large sample test statistic z = 2.022
Two tailed probability of equaling or exceeding z = 0.043

Algometer Readings:
Consultation 1 (experimental and placebo)
Large sample test statistic z = 2.022
Two tailed probability of equaling or exceeding z = 0.043

Consultation 5 (experimental and placebo)
Large sample test statistic z = 1.247
Two tailed probability of equaling or exceeding z = 0.212

Consultation 6 (experimental and placebo)
Large sample test statistic z = 2.722
Two tailed probability of equaling or exceeding z = 0.006

Pain Questionaire:

Only positive responses to the questions were counted. These are represented in one table, placebo group at consultations 1 and 6 and the experimental group at consultation 1 and 6. Apart from the demographic data obtained from the questionaire all other scores have been converted to percentages.

Pain Questionaire Results:

Demographic data

Questions:	Consultation 1	Consultation 6
1) Age: placebo	23 - 55	
experimental	21 - 50	
2) Sex: placebo	females 8	
	males 2	
experimental	females 6	
	males 4	
3) Occupation: placebo	3 house wives	
	2 unemployed	
	1 missionary	
	4` office bound`	
experimental	1 manual laborer	
	9 `office bound`	

4)	Consultation 1	Consultation 6
Placebo		
Pain onset:	1-10 years	1-10 years
Duration	3 months-3 years	3 months -3 years
Experimental		
Pain onset:	1-20 years	1-20 years
Duration	2 weeks - 18 months	2 weeks - 18 months

	Placebo		Experimental	
	cons. 1	cons. 6	cons. 1	cons.6
5) Precipitating event:				
Trauma	40%	40%	20%	20%
Illness	0	10%	0	0
Work stress	80%	100%	70%	90%
Sport activity	10%	10%	50%	30%

	Placebo		Experimental	
	cons. 1	cons 6	cons 1	cons 6
6) Typical pain:				
Frequency				
daily	80%	60%	30%	20%
weekly	10%	30%	20%	20%
monthly	0	0	40%	30%
Duration				
hours	20%	10%	40%	30%
days	40%	30%	30%	20%
weeks	0	30%	10%	0
7) Location of pain:				
Back of head	100%	80%	70%	20%
Face	30%	10%	0	0
Neck	100%	80%	100%	80%
Between shoulders	80%	70%	70%	60%
Side of head	0	0	30%	10%
Shoulder	100%	90%	90%	80%
8) Is the pain unilateral				
Left (L)	20%	30%	20%	40%
Right (R)	20%	30%	30%	20%
Bilateral	60%	30%	60%	30%
9) Pain:				
Focal	0	10%	10%	30%
Diffuse	60%	70%	60%	20%
Radiating	30%	0	70%	50%
10) Character of pain:				
Pressing	20%	20%	10%	70%
Heaving	20%	0	10%	0
Aching	70%	60%	40%	20%
Burning	30%	20%	40%	60%
Throbbing	40%	60%	50%	70%
Punishing- cruel	0	0	0	0
Tiring- exhausting	40%	20%	0	20%

	Placebo		Experimental	
11) Associated symptoms:				
Goose flesh	0	0	0	0
Fainting	10%	10%	10%	0
Nausea	10%	0	10%	0
Difficulty moving	40%	80%	40%	60%
Sweating	30%	10%	0	0

	Placebo		Experimental	
	cons. 1	cons. 6	cons. 1	cons.6
12) Aggravation:				
Coughing	10%	0	20%	0
Exertion	30%	40%	60%	40%
Sustained movements	20%	30%	50%	30%
Cold	30%	40%	0	10%
Cramped positions	40%	40%	50%	40%
Heavy clothing	0	0	0	0
Reading in bed	50%	60%	0	10%
Infections (chest colds)	30%	10%	10%	20%
Occupational stress	80%	60%	80%	80%
Emotional stress	60%	50%	70%	40%
13) Medication:				
Pain killers	60%	40%	60%	20%
14) Self help:				
Lying down	30%	30%	40%	30%
Massage	90%	90%	60%	90%
Heat	60%	60%	30%	50%
Cold	0	0	10%	0
Changing positions	40%	30%	30%	40%
Rest	20%	30%	40%	40%
Stretching	50%	30%	50%	90%
Light exercise	20%	10%	40%	30%
15) Past treatment:				
Gp	30%	10%	0	10%
Chiropractor	30%	100%	60%	100%
Optometrist	0	0	0	0
Dentist	0	0	0	0
16) Job stress rating:				
Low	10%	0	10%	20%
Medium	30%	40%	30%	50%
High	70%	30%	60%	30%

CHAPTER FIVE

DISCUSSION

Discussion Of The Results:

It is recognised that the selected sample of 20 patients is too small from which to draw accurate and statistically significant conclusions.

Of the 40 patients that applied for the research only 27 qualified to take part, of these only 20 completed the full course of treatments. The` drop-out` was presumed to have been as a result of several factors, as follows;` drop-outs` from the placebo group were due to the patients perceived lack of response (improvement). In both groups the remainder of the patient `drop-outs` were as a result of non-compliance.

The reasons for the non-compliance were as follows:

Transport problems, work/time constraints and discouragement/ misinformation from friends etc. The patients that did complete the treatment course cited transport problems and prior commitments as being the major problematic factors in scheduling consultation times. The results will be discussed under the specific categories of the measurements used in the study.

Answers To Subproblem One:

The visual analogue scale:

These results were analysed with the use of the Wilcoxon sign rank test. There was a significant difference between the first and the fifth consultations as well as the first and sixth consultations for both the placebo and the experimental group. There was no significant difference between the fifth and the sixth consultations within either group. The above results were not expected as the placebo treatment was not supposed to be effective. This can be explained when the nature of the condition i.e. it`s psychological `overtones` and that 30% of placebo treatments will be effective, are taken into account. The experimental group improved as a result of the applied treatment. It was theorised that the unexpected improvement in the vas. scores of the placebo group was a subjective response and that the objective results would not support the above findings. This theory was substantiated when the median algometer scores were examined and they showed a less marked and, therefore, expected change in the scores of the placebo group. The median scores of the disability index also support the above theory (refer to the appendices E1,2,3,4). When the first, fifth and sixth consultations were analysed using the Mann Whitney U-test (MWUT.), for analysing the differences between the two groups, a significant difference was noted at the sixth consultation only. This was explained as, the nature of the treatment for the experimental group included patient education and specific stretch exercises which would continue to influence the patient`s improvement even after the active treatment

had stopped. The placebo group which lacked the above aspects of their treatment would not have continued to improve (refer to appendices E 1,2,3,4).

The disability index:

When using the Wilcoxon sign rank test, significant differences were noted between consultations 1 and 6, and consultations 1 and 5 of the experimental group only. Consultations 5 and 6 for this group did not produce statistically significant results. No significant changes were noted in the placebo groups` readings, as far as the disability index readings were concerned.

When the 1st, 5th and 6th consultation readings from both groups were analysed using the MWUT. the 6th consultation comparison was the only statistically significant finding. This finding supported the above theory that the difference between the two groups was due to the patient education and exercises that the experimental group received and that the placebo group did not receive. The reason for the placebo groups improvement can be attributed to the aforementioned facts but it is still uncertain. It was this improvement in the placebo group that resulted in the differences between the two groups, at the fifth consultation, being statistically insignificant.

The pain questionaire:

On examining the results obtained from the questionnaire it would, in retrospect, have been better to design two separate questionaires, one for the initial treatment and one at the follow-up consultation. The patient tended to refer to the pain that they had before and during the treatment rather than the pain they had experienced after the last treatment. The result was that there were few changes in the responses to the questions on the repeating of the questionnaire at the 6th consultation.

The demographic data supported the literature survey. 80% of the placebo and 60% of the experimental groups, were women. The age spread also corresponded to the literature survey`s findings.

It was interesting to note that of the patients that completed the study, 65% were `office bound` i.e. they had desk or office orientated occupations. This was presumed to be related to poor office-design and although the patients were educated as to how they could change this environment (in the experimental group) few were able to do so.

Most of the patients related the onset of their condition to `work stress` rather than `trauma`. Trauma was listed as the second most common cause of the condition. This does not concur with Travell and Simons (1983) who list trauma as the primary cause. The `pain distribution` exhibited by the patients as determined by the pain questionaire was expected as this related to the trigger points that

were chosen for the study. These results supported what was found in the literature review as do most of the other results obtained from the questionaire. Of interest was the number of patients who related the aggravation of their condition to occupational and emotional stress and how the two groups responded. The placebo group showed a decrease in the number of patients relating aggravation to occupational stress, this was not true of the experimental group. But the experimental group showed a greater decrease in the number of patients relating the aggravation to emotional stress. The reasons for this are uncertain.

As expected, the experimental group noted that they received benefit particularly from the stretching exercises. The placebo group could not express the same benefit as they were not exposed to these exercises or education.

The number of patients relying on medication for pain relief decreased more in the experimental group than in the placebo group. It was thus concluded that the experimental group derived greater benefit from their treatment than the placebo group.

The questionaire did not prove to be as informative as it was hoped, due to its poor design and application.

Answers To Subproblem Two:

Range of motion (goniometer readings):

Neither the Wilcoxon sign rank test nor the Mann Whitney U-test produced statistically significant results.

This lack of statistically significant results was probably due to problems associated with the use of the `American impairment rating scale` and the equipment used. The impairment rating scale used was not sensitive enough to note the slight changes or deficiencies in rom. that were recorded. Problems with the equipment were more related to the patient and the actual operation of the unit rather than equipment fault. It was found that when the patient was in pain he /she was loath to move in the direction in which this pain would be increased and he/she thus stopped short of his/her maximum range of motion. This measurement varied according to how they were feeling on that particular consultation i.e. the patients `feared` performing the movement that was associated with pain. This resulted in a lack of consistency of the rom. measurements.

When the frequencies of the affected movements were examined it was noted that in the neck, lateral flexion and rotation were the most affected, while in the shoulder lateral rotation was the most affected. This was affected by the muscle that was primarily involved and what the normal action of that muscle would be. In this study the

trapezius muscle was the most commonly and severely muscle affected followed by the levator scapulae, rhomboid, supraspinatus and infraspinatus muscles respectively.

Algometer readings:

When the changes between consultations 1 and 6, 1 and 5, and 5 and 6 were analysed using the Wilcoxon sign rank test the placebo group revealed no statistically significant changes. This supported the hypothesis that the placebo group would not respond to the placebo treatment but it did not correspond with the results obtained from the analysis of the vas. The experimental group, however, showed statistically significant changes on analysis of consultations 1 and 5, and 1 and 6 but not between the 5th and 6th consultations. This supported the hypothesis that the experimental group would respond to the traditional myofascial trigger point therapy. The greater significance of the change between the 1-5 and the 1-6 consultations was thought to be due to the patient education and stretching exercises that the patient continued with after active treatment had stopped. This theory was supported by the statistical analysis performed on the data of consultations 5 and 6, which, although being statistically insignificant at $z = 0.058$, are only marginally so i.e. there was improvement in the patient during this stage too.

When the differences between the two groups at consultations 1, 5 and 6 were examined, statistical differences were noted at the first consultation and the sixth consultation but not at the fifth consultation. The reason why there was a difference at the first

consultation was not clear - as, in all the other measurements taken, no such difference was noted. The difference noted on the sixth consultation can be attributed to the patient education and stretch exercises.

The lack of statistical difference noted on the fifth consultation is thought to be caused by the unexpected improvement of the placebo group thus nullifying the improvement of the experimental group i.e. if the placebo group had not responded there would possibly have been a statistically significant result.

Answers To Subproblem Three:

When the two above sets of information i.e. the solutions to subproblem one and two, were combined to establish the viability of the myofascial treatment i.e. of the experimental group, the following was found: according to the patient`s subjective responses i.e.. the vas. and the disability index, the experimental group improved significantly more than the placebo group. This was especially noted on the disability scores (refer to appendices E 1 and 2).

When the objective measures of improvement were analysed i.e. the algometer and goniometer readings, it was found that the pressure to pain tolerance of the experimental group did increase more than that of the placebo group (refer to appendix E3).

The range of motion measurements did not produce the results expected and little information was derived from this measurement.

The experimental group improved more than the placebo group in both the subjective and objective measurements. Thus proving the hypothesis that myofascial trigger point therapy of myofasciitis is an effective adjunct to chiropractic therapy, correct.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSION:

When the results for both groups were combined it was found that the group receiving the authentic myofascial trigger point therapy improved more than the placebo group in both the subjective and objective measurements (Refer to appendices E 1,2,3,4) and in so doing proved all the stated hypotheses correct. It can thus be stated that myofascial trigger point therapy including stretching exercises and patient education, is an effective form of treatment for shoulder pain, neck pain, head aches of myofascial trigger point origin. It is also an effective treatment for the other signs and symptoms that are associated with this condition.

Because chiropractic treatment often entails the management of such cases, i.e. where patients present with signs and symptoms of myofasciitis, myofascial trigger point therapy would be an effective adjunct to chiropractic treatment.

RECOMMENDATIONS:

This study should be repeated using a larger sample size, so that more accurate conclusions can be drawn from the derived information. If this study were to be repeated it is recommended that allowances should be made for the patient, i.e. the patient should be able to schedule his/her appointments when it is convenient for him/her to do so, otherwise he/she will be lost due to `non compliance`. It is thus advised that a set number of treatments per week is not applied, instead, letting the patient make a set number of consultations,

within a set period that is suitable to him or her is suggested. This period should be long enough to allow for this to occur. It would be of interest to conduct a follow-up study at 6 months, a year and 2 years following the last treatment to establish how effective the treatment is over a longer period and how many of the patients have maintained their exercise routine.

It would also be of interest to note the effectiveness of chiropractic treatment when combined with myofascial trigger point therapy. Another study that should be recommended is to analyse how effective the patient education is and how many patients manage to incorporate the advice they were given into their daily lives /occupations particularly in an office environment where, according to this study, 65% of the patients were `occupied`.

When the range of motion measurements are recorded it is recommended that they be measured with a `fixed`, non-mobile, goniometer i.e. one that would eliminate operator-movement- error. When these results are analysed, a scale other than the american impairment rating scale, that was used in this study, should be used. The scale should enable the researcher to calculate the total percentage disability, as the above scale did, but it should allow smaller increments i.e.. instead of having increments of 10 or 20 degrees as with this scale, a scale with increments of 3 to 5 degrees should be used. This would enable the researcher to more accurately detect any change in the rom.

When using a pain questionaire it is advised that an existing questionaire be obtained. It would enhance the validity of the results that were obtained from it. If a questionaire was designed it is also suggested that a score be assigned to each question so that the results could be statistically analysed question by question and as a total at the end of the questionnaire. It is felt that more reliable information is obtainable via the above method. This score could then be compared to the totals obtained at the initial treatment, for every question and at the end of the allotted number of treatments.

A further study of interest would be to evaluate the effect of electro-therapy eg. ultra-sound, on myofascial pain syndrome.

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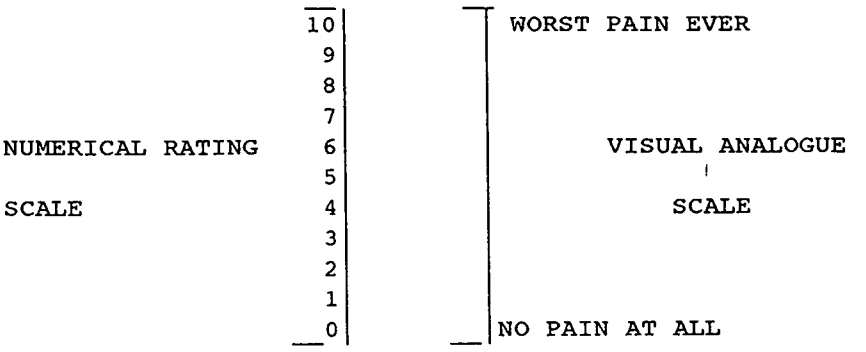
APPENDICES

APPENDIX A

VISUAL ANALOGUE SCALE:



APPENDIX B1

DISABILITY INDEX

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PAIN QUESTIONAIRE (APPENDIX B2)

PATIENT CODE:..... DATE:.....

1 - AGE:.....

2 - SEX (M: F:)

3 - OCCUPATION:.....

4- WHEN DID THIS PAIN FIRST TROUBLE YOU ?.....
.....

-HOW LONG HAS THIS PRESENT PAIN TROUBLED YOU ?.....
.....

5 - PRECIPITATING EVENT:	NO:	YES:
eg.:-ACCIDENT:	_____	_____
ILLNESS:	_____	_____
WORK STRESS:	_____	_____
SPORT ACTIVITY:	_____	_____

OTHER: .....

6 - TYPICAL PAIN:-

HOW OFTEN DO YOU HAVE ATTACKS OF THIS PAIN?

DAILY:.....WEEKLY.....MONTHLY.....

DURATION: HOURS:.....DAYS:.....WEEKS:.....

7 - LOCATION OF PAIN:	NO:	YES:
BACK OF HEAD:	_____	_____
FACE:	_____	_____
SIDE OF HEAD:	_____	_____
NECK:	_____	_____
SHOULDER:	_____	_____
BETWEEN THE SHOULDERS	_____	_____

8 - IS THE PAIN ON ONE SIDE	NO:	YES:
RIGHT:	_____	_____
LEFT:	_____	_____
OR ON BOTH SIDES:	_____	_____

9 -IS THE PAIN	NO:	YES:
FOCAL (CENTRALISED)	_____	_____
DIFFUSE (`SPREAD OUT`)	_____	_____
RADIATING:	_____	_____

10 - IS THE PAIN:	NO	YES
PRESSING	_____	_____
HEAVING	_____	_____
ACHING	_____	_____
BURNING	_____	_____
THROBBING	_____	_____
PUNISHING - CRUEL	_____	_____
TIRING - EXHAUSTING	_____	_____

11- ACCOMPANYING SYMPTOMS

GOOSEFLESH:	_____	_____
FAINTING:	_____	_____
SWEATING:	_____	_____
DIFFICULTY MOVING:	_____	_____

OTHER:.....

12 - AGGRAVATION: NO: YES:

COUGHING: _____ _____

EXERTION (WORK OR SPORTS): _____ _____

SUSTAINED MOVEMENTS: _____ _____

COLD: _____ _____

CRAMPED POSITIONS: _____ _____

TIGHT CLOTHING : _____ _____

HEAVY CLOTHING (COATS): _____ _____

READING IN BED: _____ _____

INFECTIONS (CHEST COLDS): _____ _____

OCCUPATIONAL STRESSES : _____ _____

EMOTIONAL STRESS: _____ _____

13 - MEDICATION NO:_____ YES:_____

(MEDICATION`S NAME?.....)

(HOW MUCH AND HOW OFTEN?.....)

14 - WHAT IMPROVES THE PAIN? NO: YES:

LYING DOWN: _____ _____

MASSAGE: _____ _____

HEAT: _____ _____

COLD: _____ _____

CHANGING POSITIONS: _____ _____

REST: _____ _____

STRETCHING: _____ _____

LIGHT EXERCISE: _____ _____

OTHER:.....

15 - PAST TREATMENT: NO: YES: HELPFUL NO: YES:

GP: ....

CHIROPRACTOR: ....

OPTOMETRIST: ....

DENTIST: ....

16 - HOW WOULD YOU RATE YOUR JOB STRESS? NO: YES:

1 (LOW): .....

2 (MEDIUM): .....

3 (HIGH): .....

APPENDIX C1

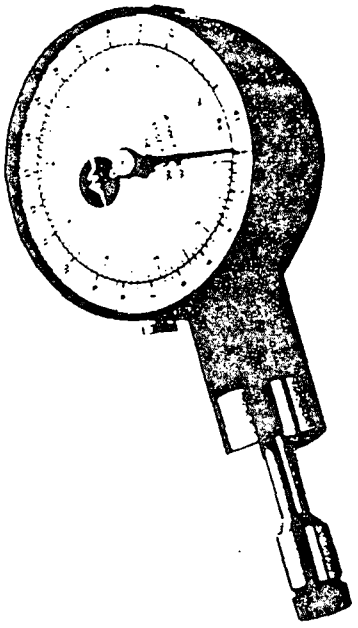
ALGOMETER READINGS

NO.	BEFORE TREATMENT	AFTER TREATMENT (kg/cm)
1		
2		
3		
4		
5		
6		
7		

APPENDIX C2

ALGOMETER SPECIFICATIONS AND DIRECTIONS

ALGOMETER INSTRUCTIONS



Activator Methods, INC.
3714 E. INDIAN SCHOOL RD., PHOENIX, AZ 85018
(602) 224-0220

GENERAL INFORMATION

The algometer is most accurate in the range which is 75% from full scale. In the range below 25% of full scale, the gauge will give consistent readings, however, with less accurate results. This inaccuracy is inherent to the design of mechanical gauges. (Note: several studies have demonstrated reliability in a clinical setting.)

The algometer requires no lubrication or other form of service.

The face of the meter has no zero setting because the zero has no significance in the calibration or accuracy of the gauge.

CALIBRATION

Activator Methods certifies that all algometers have been properly calibrated and are accurate to ± 1% of full scale. The calibration of the algometer may be checked by attaching the pull hook and suspending test weights at ¼, ½, ¾, and full capacity in the vertical position. The weight of the plunger, flat tip, and pull hook (15 g.) should be subtracted from the test results. If it is determined that calibration is required, the instrument should be returned to the factory.

ALGOMETER INSTRUCTIONS

Background:

Pressure pain threshold (PPT) has been used by many authors to quantify palpatory pain findings for myofascial trigger points and pain over bone using an algometer (1-7).

Description:

The pressure algometer consists of a force dial which reads in pounds or kilograms and a 1 cm diameter rubber tipped stylus. Pain threshold is determined by the amount of force/cm² required for a person to first perceive pain.

Procedure:

Prior to recording the pain threshold, discuss the procedure with the patient. Before taking a measurement, you may wish to demonstrate the process to the patient by pressing the algometer into the palm of their hand.

1. Localize any sensitive areas you wish to measure by gentle but firm palpation.
2. Hold the meter in the palm of your hand between your thumb and index finger.
3. Place the rubber tipped stylus over the pre-determined trigger point or area of palpable tenderness you wish to measure. Make sure the force dial is perpendicular to the skin surface. Stabilize any nodular muscular regions between the middle and index finger of your indifferent hand.
4. Apply steady, gentle pressure at a rate of 1kg/cm²/sec. until the patient first feels pain and responds by saying "now."
5. Remove the stylus and record the value and locations of the tender areas in your notes or on a diagram for follow-up examination.
6. Reset the meter prior to making another reading.

References:

1. Fischer AA. Pressure algometry over normal muscles: Standard values, validity, reproducibility of pressure threshold. Pain 1986; 30:115-126.
2. Hsieh J, Hong CZ. Effect of chiropractic manipulation on the pain threshold of myofascial trigger point: a pilot study. Presented at the FCER's 2nd Annual International Conference on Spinal Manipulation, May 11-12, 1990, Washington, D.C.
3. Maloney P, Tepe R, Buerger D, et al. Evaluating the algometer as a diagnostic instrument. Presented at the FCER's 1st Annual International Conference on Spinal Manipulation, March 31-April 1, 1989, Washington, D.C.
4. Osterbauer PJ, Fuhr AW, DeBoer KF, et al. Preliminary clinical and biomechanical assessment patients with chronic sacroiliac syndrome. Presented at the FCER's 2nd Annual International Conference on Spinal Manipulation, May 11-12, 1990, Washington, D.C.
5. Reeves JL, Jaeger B, Graff-Radford SB. Reliability of the pressure algometer as a measure of myofascial trigger point sensitivity. Pain 1986; 24:313-21.
6. Vernon HT. Pressure pain threshold evaluation of the effect of spinal manipulation on chronic neck pain: a single case study. J Can Chiropr Assoc 1988; 32(4):191-4.
7. Vernon HT, Acker P, Burns S., et al. Pressure pain threshold evaluation of the effect of spinal manipulation in the treatment of chronic neck pain: a pilot study. J. Manipulative & Physiol Ther 1990; 13(1):13-16.

THIS INSTRUMENT CARRIES A ONE YEAR WARRANTY FROM DATE OF PURCHASE.

Version: 12-93

APPENDIX D1

GONIOMETER READING

	BEFORE		AFTER	
NECK: EXTENSION				
FLEXION				
ROTATION				
LAT. FLEXION				
SHOULDER:				
ABDUCTION				
ADDUCTION				
EXTENSION				
FLEXION				
INT. ROTATION				
EXT. ROTATION				

APPENDIX D2

THE AMERICAN IMPAIRMENT RATING SCALES

(THE AMERICAN MEDICAL ASSOCIATION`S: GUIDES TO THE EVALUATION OF PERMANENT IMPAIRMENT.)

Guides to the

Evaluation of Permanent Impairment

2nd Edition

Shoulder Joint – Forward Elevation

Abnormal Motion

1. Place the patient in the neutral position (Figure 26). Note pronation of the forearm.

2. Center the goniometer next to the shoulder joint (Figure 27). Record the goniometer reading with the goniometer arm along axis of the upper arm.

3. With the patient elevating both arms as far as possible (Figure 26), follow the range of motion with the goniometer arm. Record the angle that subtends the arc of motion in the tested arm.

4. Consult the abnormal motion section of Table 16 to determine the impairment of the upper extremity.

Example: 30° active forward elevation from neutral position (0°) or any 30° arc of retained active forward elevation is equivalent to 13% impairment of the upper extremity.

5. ADD the impairment values contributed by forward elevation and backward elevation. The sum of these values is the impairment of the upper extremity that is contributed by abnormalities of forward and backward elevation of the shoulder.

Ankylosis

1. Place the goniometer base as if measuring the neutral position (Figure 27). Measure the deviation from neutral position with the goniometer arm and record the reading.

2. Consult the ankylosis section of Table 16 to determine the impairment of the upper extremity.

Example: A shoulder joint with ankylosis at 30° forward elevation is equivalent to 40% impairment of the upper extremity.

Shoulder Joint – Backward Elevation

Abnormal Motion

1. Place the patient in the neutral position (Figure 28). Note supination of the forearm.

2. Center the goniometer next to the shoulder joint (Figure 29). Record the goniometer reading with the goniometer arm along the axis of the upper arm.

3. With the patient elevating both arms as far as possible (Figure 28), follow the range of motion

TABLE 16
IMPAIRMENT DUE TO AMPUTATION, ABNORMAL MOTION AND ANKYLOSIS OF THE SHOULDER JOINT–FORWARD ELEVATION

	Impairment of Upper Extremity
Amputation–At Joint	100%

Abnormal Motion

Average range of FORWARD-BACKWARD ELEVATION is 190 degrees
Value to total range of joint motion is 33%

Forward elevation from neutral position (0°) to:	Degrees of Joint Motion LOST	RETAINED	Impairment of Upper Extremity
0°	150	0	16%
10°	140	10	15
20°	130	20	14
30°	120	30	13
40°	110	40	12
50°	100	50	11
60°	90	60	9
70°	80	70	8
80°	70	80	7
90°	60	90	6
100°	50	100	5
110°	40	110	4
120°	30	120	3
130°	20	130	2
140°	10	140	1
150°	0	150	0

Ankylosis – Joint ankylosed at:	Impairment of Upper Extremity
0° (neutral position)	60%
10°	53
20°	47
*30°	40
40°	45
50°	50
60°	55
70°	60
80°	65
90°	70
100°	75
110°	80
120°	85
130°	90
140°	95
150° (full forward elevation)	100

*position of function

with the goniometer arm. Record the angle that subtends the arc of motion in the tested arm.

4. Consult the abnormal motion section of Table 17 to determine the impairment of the upper extremity.

Example: 30° active backward elevation from neutral position (0°) or any 30° arc of retained active backward elevation is equivalent to 1% impairment of the upper extremity.

5. ADD the impairment values contributed by forward elevation and backward elevation of the shoulder. The sum represents the impairment of the upper extremity that is contributed by abnormal forward and backward elevation of the shoulder.

Ankylosis

1. Place the goniometer base as if measuring the neutral position (Figure 29). Measure the deviation from the neutral position with the goniometer arm and record the reading.

2. Consult the ankylosis section of Table 17 to determine the impairment of the upper extremity.

Example: A shoulder joint with ankylosis at 10° backward elevation is equivalent to 70% impairment of the upper extremity.

Figure 26

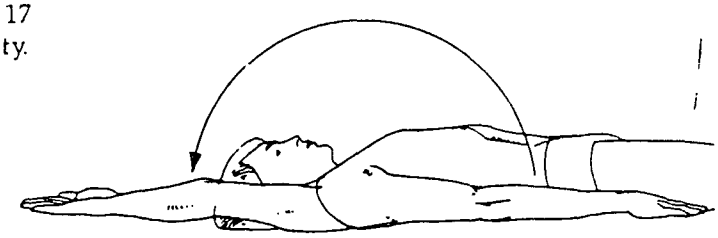


Figure 27

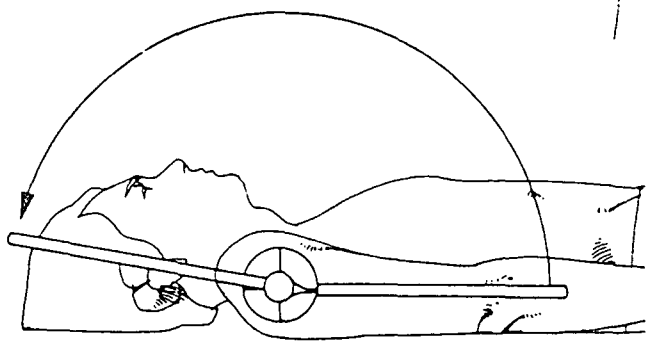


Figure 28

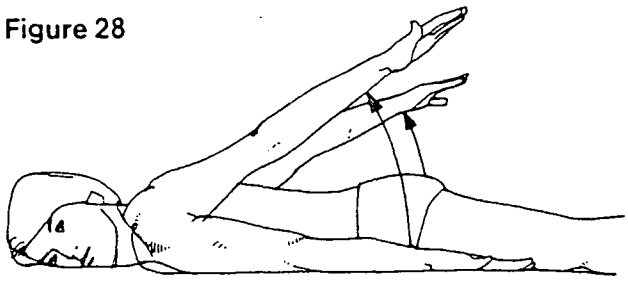


Figure 29

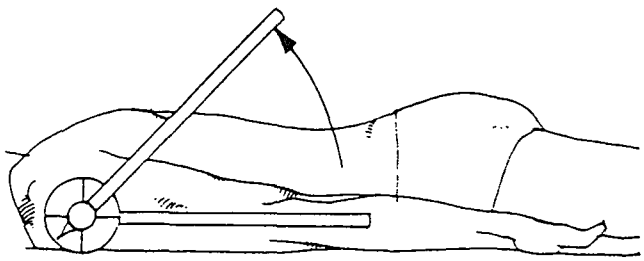


TABLE 17
IMPAIRMENT DUE TO AMPUTATION, ABNORMAL MOTION AND ANKYLOSIS OF THE SHOULDER JOINT—BACKWARD ELEVATION

	Impairment of Upper Extremity
mputation—At Joint	100%

Abnormal Motion

Average range of FORWARD-BACKWARD ELEVATION is 190 degrees
Value to total range of joint motion is 33%

Backward elevation from neutral position (0°) to:	Degrees of Joint Motion LOST	RETAINED	Impairment of Upper Extremity
0°	40	0	4%
10°	30	10	3
20°	20	20	2
30°	10	30	1
40°	0	40	0

Ankylosis

Joint ankylosed at:	
0° (neutral position)	60%
10°	70
20°	80
30°	90
40° (full backward elevation)	100

TABLE 18
IMPAIRMENT DUE TO AMPUTATION, ABNORMAL MOTION AND ANKYLOSIS OF THE SHOULDER JOINT–ABDUCTION-ADDUCTION

	Impairment of Upper Extremity
Amputation+At Joint	100%

Abnormal Motion

Average range of ABDUCTION-ADDUCTION is 180 degrees
Value to total range of joint motion is 33%

Abduction from neutral position (0°) to:	Degrees of Joint Motion LOST	RETAINED	Impairment of Upper Extremity
0°	150	0	17%
10°	140	10	16
20°	130	20	14
30°	120	30	13
40°	110	40	12
50°	100	50	11
60°	90	60	10
70°	80	70	9
80°	70	80	8
90°	60	90	7
100°	50	100	6
110°	40	110	4
120°	30	120	3
130°	20	130	2
140°	10	140	1
150°	0	150	0
Adduction from neutral position (0°) to:			
0°	30	0	3%
10°	20	10	2
20°	10	20	1
30°	0	30	0

Ankylosis

Joint ankylosed at:	
0° (neutral position)	60%
10°	56
20°	51
30°	47
40°	42
*45°	40
50°	43
60°	49
70°	54
80°	60
90°	66
100°	71
110°	77
120°	83
130°	89
140°	94
150° (full abduction)	100

Joint ankylosed at:	
0° (neutral position)	60%
10°	73
20°	87
30° (full adduction)	100

*position of function

Shoulder Joint – Abduction and Adduction

Abnormal Motion

1. Place the patient in the neutral position (Figure 30). Note the position of the forearm.

2. Center the goniometer over the shoulder joint (Figure 30). Record the reading with the goniometer arm along the axis of the patient's arm.

3. Abduction: With the patient abducting both ar as far as possible (Figure 31), follow the range of motion with the goniometer arm. Record the ang that subtends the arc of motion in the tested arm

4. Adduction: Rotate the goniometer to the position indicated in Figure 32. Starting from the neutral position, with the patient moving the arr to be tested across the abdomen (Figure 33), follc the range of motion with the goniometer arm. Record the angle that subtends the arc of motior

5. Consult the abnormal motion section of Table to determine the impairment of the upper extrem

Example: 20° active abduction from neutral pos tion (0°) or any 20° arc of retained active abduction is equivalent to 14% impairment of upper extremity.

6. ADD the impairment values contributed by abduction and adduction. Their sum is the impa ment of the upper extremity due to abnormal abduction and adduction of the shoulder.

Ankylosis

1. Place the goniometer base as if measuring the neutral position (Figure 30). Measure the deviat from the neutral position with the goniometer a and record the reading.

2. Consult the ankylosis section of Table 18 to determine the impairment of the upper extremit

Example: A shoulder joint with ankylosis at 45 abduction is equivalent to 40% impairment or t upper extremity.

Figure 30

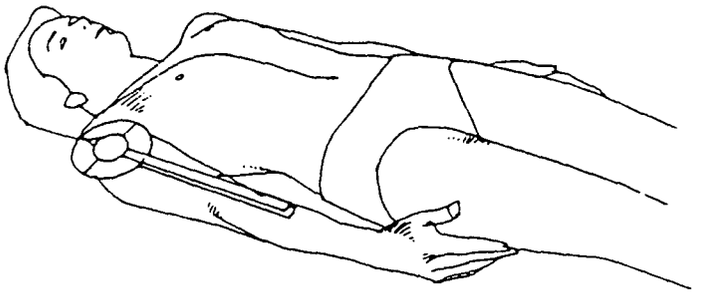


Figure 31

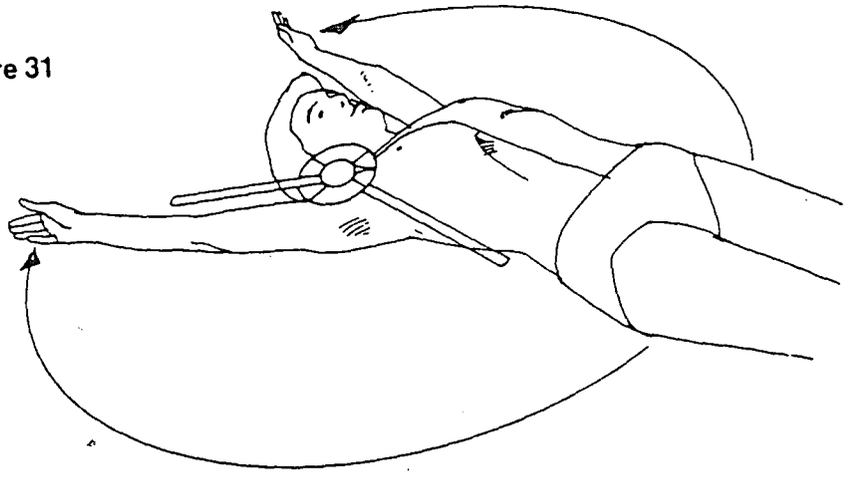


Figure 32

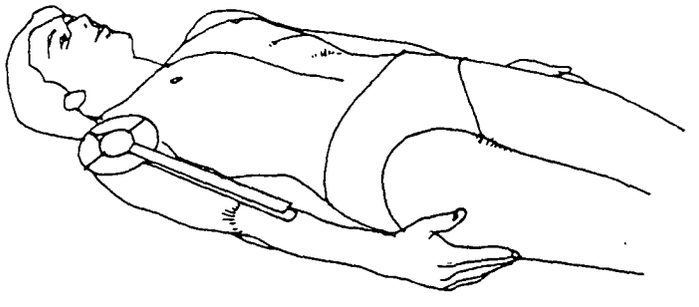


Figure 33

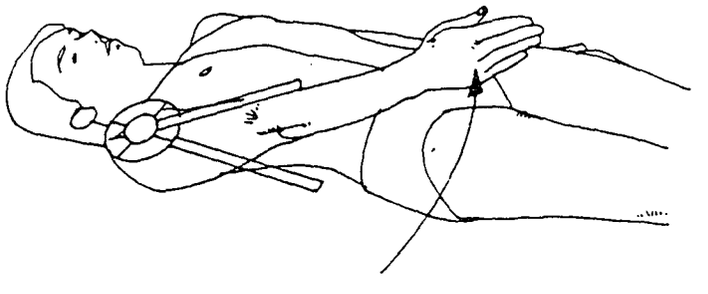


Figure 34

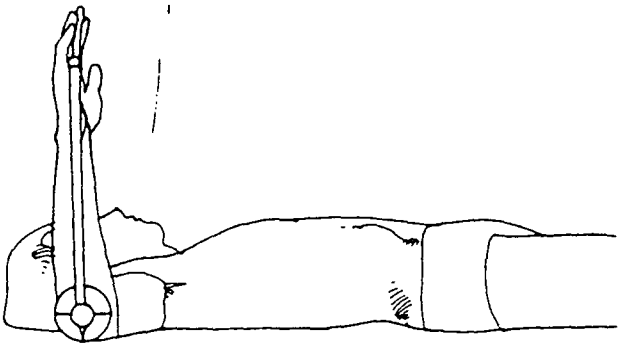


Figure 35

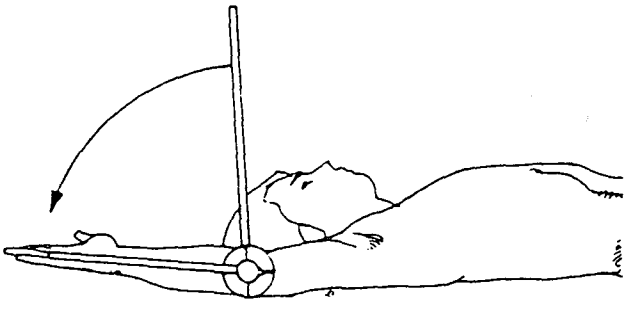


Figure 36

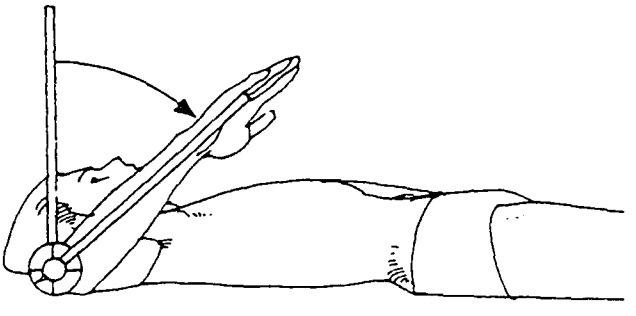
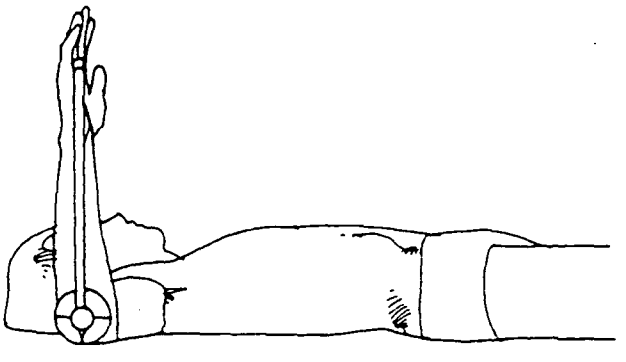


Figure 37



Shoulder Joint – Rotation

Abnormal Motion

1. Place the patient in the neutral position (Figure 34). Note the position of the forearm.

2. Center the goniometer next to the elbow joint (Figure 34). Record the reading with the goniometer arm parallel to the axis of the forearm. Consider 90° or a vertical position of the goniometer arm as the neutral point (0°).

3. External rotation: With the patient attempting to touch the dorsal surface of the forearm to the table top (Figure 35), follow the range of motion with the goniometer arm. Record the angle that subtends the arc of motion.

4. Internal rotation: Starting from the neutral position, with patient attempting to touch the volar surface of the forearm to the table top (Figure 36), follow the range of motion with the goniometer arm. Record the angle that subtends the arc of motion.

5. Consult the abnormal motion section of Table 19 to determine the impairment of the upper extremity.

Example: 20° active external rotation from neutral position (0°) or any 20° arc of retained active external rotation is equivalent to 11% impairment of the upper extremity.

6. ADD the impairment values due to abnormal external and internal rotation. Their sum represents impairment of the upper extremity due to abnormal rotation of the shoulder.

Ankylosis

1. Place the goniometer base as if measuring the neutral position (Figure 37). Measure the deviation from the neutral position with the goniometer arm and record the reading.

2. Consult the ankylosis section of Table 19 to determine the impairment of the upper extremity.

Example: A shoulder joint with ankylosis at 20° external rotation is equivalent to 40% impairment of the upper extremity.

TABLE 19
IMPAIRMENT DUE TO AMPUTATION, ABNORMAL MOTION AND ANKYLOSIS OF THE SHOULDER JOINT—ROTATION

	Impairment of Upper Extremity
Amputation—At Joint	100%

Abnormal Motion

Average range of ROTATION is 130 degrees
Value to total joint motion is 33%

Internal rotation from neutral postition (0°) to:	Degrees of Joint Motion LOST	RETAINED	Impairment of Upper Extremity
0°	40	0	6%
10°	30	10	5
20°	20	20	3
30°	10	30	2
40°	0	40	0
External rotation from neutral position (0°) to:			
0°	90	0	14%
10°	80	10	12
20°	70	20	11
30°	60	30	9
40°	50	40	8
50°	40	50	6
60°	30	60	5
70°	20	70	3
80°	10	80	2
90°	0	90	0

Ankylosis

Joint ankylosed at:	
0° (neutral position)	60%
10°	70
20°	80
30°	90
40° (full int. rotation)	100
Joint ankylosed at:	
0° (neutral position)	60%
10°	50
*20°	40
30°	49
40°	57
50°	66
60	74
70	83
80°	91
90° (full ext.rotation)	100

*position of function

TABLE 20
RELATIONSHIP OF IMPAIRMENT OF THE UPPER EXTREMITY TO IMPAIRMENT OF THE WHOLE PERSON

% Impairment of Upper Extremity	Whole Person	% Impairment of Upper Extremity	Whole Person	% Impairment of Upper Extremity	Whole Person
0	0	35	21	70	42
1	1	36	22	71	43
2	1	37	22	72	43
3	2	38	23	73	44
4	2	39	23	74	44
5	3	40	24	75	45
6	4	41	25	76	46
7	4	42	25	77	46
8	5	43	26	78	47
9	5	44	26	79	47
10	6	45	27	80	48
11	7	46	28	81	49
12	7	47	28	82	49
13	8	48	29	83	50
14	8	49	29	84	50
15	9	50	30	85	51
16	10	51	31	86	52
17	10	52	31	87	52
18	11	53	32	88	53
19	11	54	32	89	53
20	12	55	33	90	54
21	13	56	34	91	55
22	13	57	34	92	55
23	14	58	35	93	56
24	14	59	35	94	56
25	15	60	36	95	57
26	16	61	37	96	58
27	16	62	37	97	58
28	17	63	38	98	59
29	17	64	38	99	59
30	18	65	39	100	60
31	19	66	40		
32	19	67	40		
33	20	68	41		
34	20	69	41		

NOTE: Impairment of the whole person contributed by the upper extremity may be rounded to the nearest 5 percent only when it is the *sole* impairment involved.

Vertebrae — Fractures

The following table applies to compression of the body of a vertebrae:

Amount of Compression	% Impairment of Whole Person
25%	3
50%	6
>50%	10

Fracture of posterior elements is rated at 3% impairment.

Impairments contributed by the compression of a body of a vertebra and the fracture of the posterior elements are combined, not added.

NOTE: Non-union of a fractured posterior element would cause a 3% impairment of the whole person. The pedicles, laminae, articular process, and transverse process are included in the above impairment rating involving fracture of posterior elements.

Two or More Vertebrae

Measure separately and record the impairment of the whole person that is contributed by each vertebra. Then, combine the impairment values, using the Combined Values Chart. Neurological involvement also should be evaluated, and the results should be combined with the impairment rating related to the vertebrae (see Chapter 2).

Example:

Description	% Impairment of Whole Person
First vertebrae with 50% compression of body	0
First vertebrae with fracture of posterior elements	3
Second vertebrae with 75% compression of body	10
Third vertebrae with 50% compression of body	0
Third vertebrae with fracture of pedicle	3
(6 combined with 3 = 9; 9 combined with 10 = 18; 18 combined with 6 = 23; 23 combined with 3 = 25)	25

Vertebrae — Dislocations or Subluxations

A reduced dislocation or subluxation of one vertebrae is rated at 5% impairment of the whole person. If two or more vertebrae are dislocated and reduced, their impairments are combined. For example, if three vertebrae are dislocated, the impairment rating would be 15 (5 combined with 5 = 10; 10 combined with 5 = 15).

An unreduced dislocation or subluxation causes temporary impairment until it is reduced; then the physician should evaluate permanent impairment on the basis of the patient's condition with the reduced dislocation or subluxation. If no reduction is possible, then the physician should evaluate impairment on the basis of restricted motion and concomitant neurological findings in the spinal region involved, according to the criteria shown below and in Chapter 2.

Ankylosis of Cervical, Thoracic and Lumbar Regions

The examiner may choose to determine impairment of the spine due to ankylosis of the cervical, thoracic or lumbar regions by one of two methods: (1) using the goniometer and referring to the appropriate table involving the region of the spine being tested (see below), or (2) using appropriate radiographs to determine the number and position of the vertebrae with ankylosis and referring to Table 46.

Cervical Region — Flexion and Extension

Abnormal Motion

1. Place the patient in the neutral position (Figure 67).

2. Center the goniometer (Figure 67), with its base in line with the superior border of the larynx (C5) and its arm extended vertically along the mastoid process. Record the goniometer reading.

3. Flexion: With the patient bending the head as far forward as possible (Figure 68), follow the range of motion with the goniometer arm. Keep the goniometer arm along the mastoid process. Record the angle that subtends the arc of motion.

4. Extension: Starting from the neutral position with the patient bending the head as far backward as possible (Figure 69), follow the range of motion with the goniometer arm. Keep the goniometer arm vertical along the mastoid process. Record the angle that subtends the arc of motion.

5. Consult the abnormal motion section of Table 47 to determine the impairment of the whole person.

Example: 30° active flexion from neutral position (0°) or any 30° arc of retained active flexion is equivalent to 1% impairment of the whole person.

6. ADD the impairment values contributed by flexion and extension. Their sum is the impairment of the whole person that is contributed by flexion and extension abnormalities of the cervical region.

Ankylosis

1. Place the goniometer base as if measuring the neutral position (Figure 67). Measure the deviation from the neutral position with the goniometer arm and record the reading.

2. Consult the ankylosis section of Table 47 to determine the impairment of the whole person.

Example: A cervical region with ankylosis at 30° flexion is equivalent to 23% impairment of the whole person.

Consult Table 46 if radiographic methods are chosen to determine impairment due to ankylosis.

TABLE 46
IMPAIRMENT OF CERVICAL, THORACIC AND LUMBAR REGIONS DUE TO ANKYLOSIS, DETERMINED BY RADIOGRAPHIC METHODS

Favorable (neutral) Position	% Impairment of Whole Person	Unfavorable Position	% Impairment of Whole Person
Any 2 cervical	2	Any 2 cervical	4
Any 3 cervical	5	Any 3 cervical	10
Any 4 cervical	7	Any 4 cervical	14
Any 5 cervical	9	Any 5 cervical	18
Any 6 cervical	12	Any 6 cervical	24
Any 7 cervical	14	Any 7 cervical	28
C7 and T1	2	C7 and T1	4
Any 2 thoracic	1	Any 2 thoracic	2
Any 3 thoracic	2	Any 3 thoracic	4
Any 4 thoracic	3	Any 4 thoracic	5
Any 5 thoracic	4	Any 5 thoracic	7
Any 6 thoracic	5	Any 6 thoracic	9
Any 7 thoracic	5	Any 7 thoracic	11
Any 8 thoracic	6	Any 8 thoracic	13
Any 9 thoracic	7	Any 9 thoracic	15
Any 10 thoracic	8	Any 10 thoracic	16
Any 11 thoracic	9	Any 11 thoracic	18
Any 12 thoracic	12	Any 12 thoracic	20
T12 and L1	3	T12 and L1	6
Any 2 lumbar	3	Any 2 lumbar	6
Any 3 lumbar	6	Any 3 lumbar	12
Any 4 lumbar	9	Any 4 lumbar	18
Any 5 lumbar	12	Any 5 lumbar	24
C1–C7	14	C1–C7	28
T1–T12	10	T1–T12	20
L1–L5	12	L1–L5	24
C1–T12	23	C1–T12	28
T1–L5	21	T1–L5	39
C1–L5	32	C1–L5	56

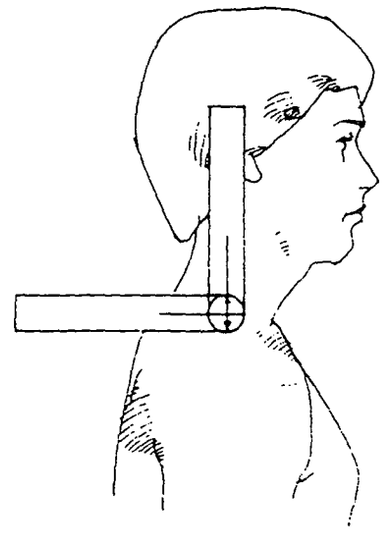


Figure 67

TABLE 47
IMPAIRMENT DUE TO ABNORMAL MOTION AND ANKYLOSIS OF THE CERVICAL REGION— FLEXION-EXTENSION

Abnormal Motion

Average range of FLEXION-EXTENSION is 90 degrees
Value to total range of cervical motion is 40%

	Degrees of Cervical Motion		Impairment of Whole Person
Flexion from neutral position (0°) to:	**LOST**	**RETAINED**	
0°	45	0	4%
15°	30	15	3
30°	15	30	1
45°	0	45	0
Extension from neutral position (0°) to:			
0°	45	0	4%
15°	30	15	3
30°	15	30	1
45°	0	45	0

Ankylosis

Region ankylosed at:	
*0° (neutral position)	14%
15°	19
30°	23
45° (full flexion)	35
Region ankylosed at:	
*0° (neutral position)	14%
15°	19
30°	30
45° (full extension)	60

*position of function

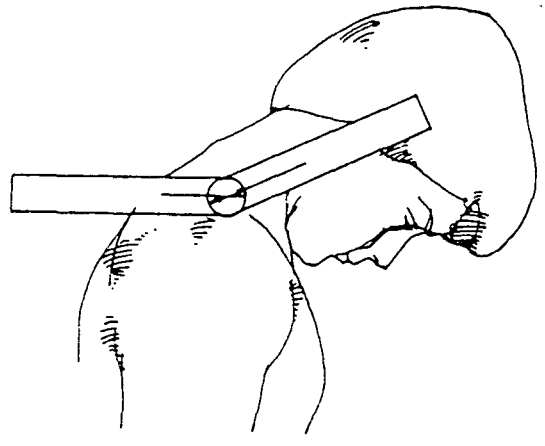


Figure 68

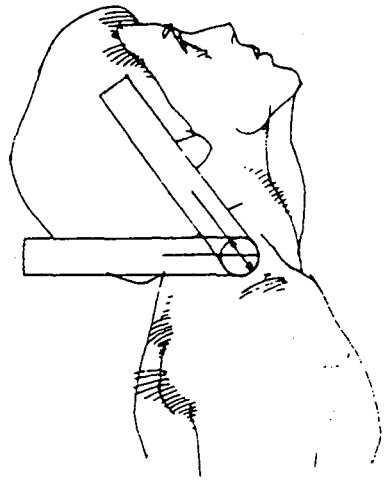


Figure 69

Cervical Region – Lateral Flexion and Bending

Abnormal Motion

1. Place the patient in the neutral position (Figure 70). Note the lateral extension or abduction of the arms to steady the shoulders.

2. Center the goniometer over the back of the neck (Figure 70), with the base on the vertebra prominans and the goniometer arm along midline of the neck. Record the goniometer reading.

3. Left lateral flexion: Starting from the neutral position with the patient bending the neck to the left as far as possible (Figure 71), follow the range of motion with the goniometer arm. Record the angle that subtends the arc of motion.

4. Right lateral flexion: Starting from the neutral position with the patient bending the neck to the right as far as possible (Figure 71), follow the range of motion with the goniometer arm. Record the angle that subtends the arc of motion.

TABLE 48
IMPAIRMENT DUE TO ABNORMAL MOTION AND ANKYLOSIS OF THE CERVICAL REGION– LATERAL FLEXION

Abnormal Motion

Average range of LATERAL FLEXION (lateral bending) is 90 degrees
Value to total range of cervical motion is 25%

	Degrees of Cervical Motion		Impairment of Whole Person
Right lateral flexion from neutral position (0°) to:	**LOST**	**RETAINED**	
0°	45	0	3%
15°	30	15	2
30°	15	30	1
45°	0	45	0
Left lateral flexion from neutral position (0°) to:			
0°	45	0	3%
15	30	15	2
30°	15	30	1
45°	0	45	0

Ankylosis

Region ankylosed at:	
*0° (neutral position)	15%
15°	20
30°	25
45° (full right lat. flexion)	30
Region ankylosed at:	
*0° (neutral position)	15%
15°	20
30°	25
45° (full left lat. flexion)	30

*position of function

5. Consult the abnormal motion section of Table 48 to determine the impairment of the whole person.

Example: 30° active left lateral flexion from neutral position (0°) or any 30° arc of retained active left lateral flexion is equivalent to 1% impairment of the whole person.

6. ADD the impairment values contributed by left lateral flexion and right lateral flexion. Their sum represents the impairment of the whole person that is contributed by abnormal lateral flexion of the cervical region.

Figure 70

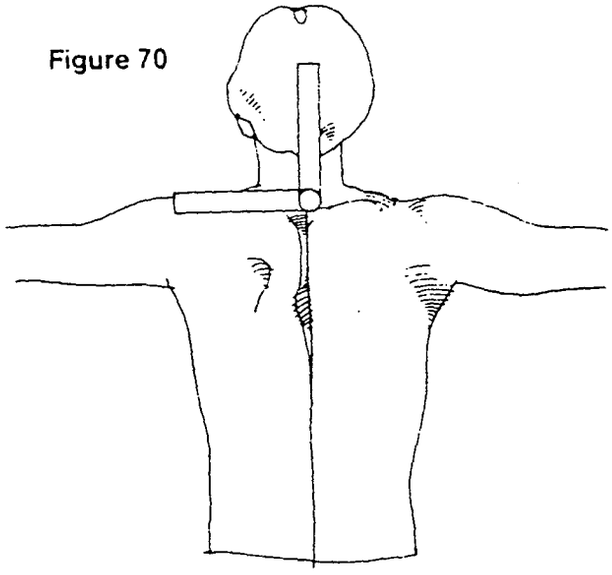
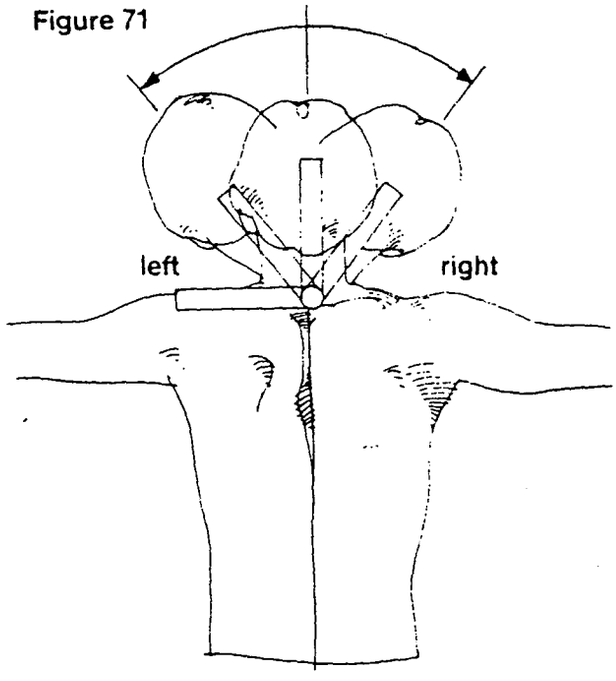


Figure 71



Ankylosis

1. Place the goniometer base as if measuring the neutral position (Figure 70). Measure the deviation from the neutral position with the goniometer arm and record the reading.

2. Consult the ankylosis section of Table 48 for the cervical region to determine the impairment of the whole person.

Example: A cervical region with ankylosis at 30° right lateral flexion is equivalent to 25% impairment of the whole person.

Consult Table 46 if radiographic methods are chosen to determine impairment due to ankylosis.

Cervical Region – Rotation

Abnormal Motion

1. Place the patient in the neutral position (Figure 72); the examiner should prevent motion of the shoulders by placing the hands on the patient's shoulders. The goniometer is not used.

2. With patient rotating the head to the right and left as far as possible (Figure 73), record the range of motion in each direction, estimating the arc described by the chin as it turns from the neutral position.

3. Consult the abnormal motion section of Table 49 to determine the impairment of the whole person.

Example: 20° active left rotation from neutral position (0°) or any 20° arc of retained active left rotation is equivalent to 3% impairment of the whole person.

4. ADD the impairment values contributed by left rotation and right rotation. Their sum is the impairment of the whole person that is contributed by abnormal rotation of the cervical region.

Ankylosis

1. Estimate by the position of the chin the angle at which the cervical region is ankylosed.

2. Consult the ankylosis section of Table 49 to determine the impairment of the whole person.

Example: A cervical region with ankylosis at 20° right rotation is equivalent to 17% impairment of the whole person.

Consult Table 46 if radiographic methods are chosen to determine impairment due to ankylosis.

Figure 72

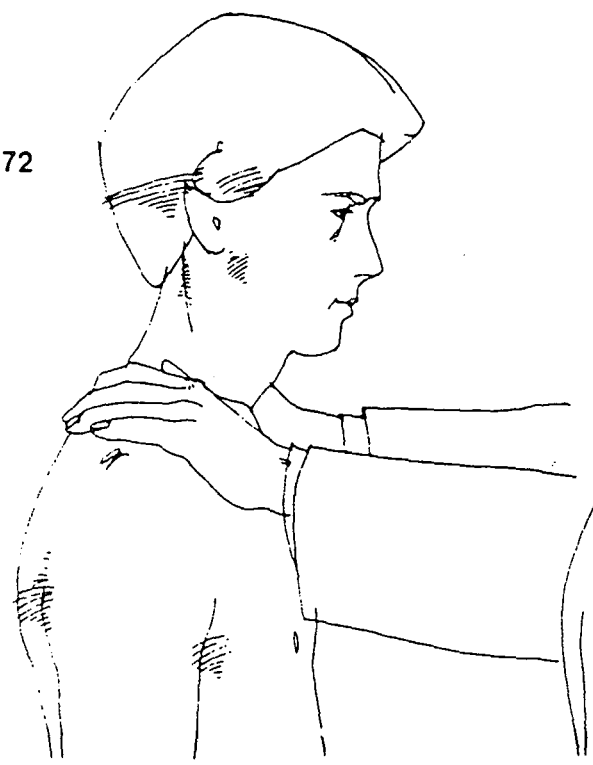


Figure 73

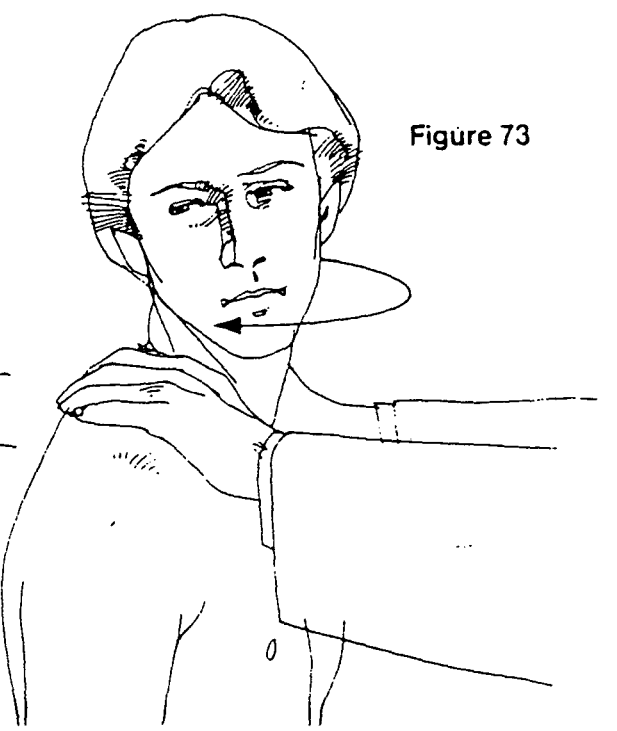


TABLE 49
IMPAIRMENT DUE TO ABNORMAL MOTION AND ANKYLOSIS OF THE CERVICAL REGION—ROTATION

Abnormal Motion

Average range of ROTATION is 160 degrees
Value to total range of cervical motion is 35%

	Degrees of Cervical Motion		Impairment of Whole Person
Right rotation from neutral position (0°) to:	LOST	RETAINED	
0°	80	0	4%
20°	60	20	3
40°	40	40	2
60°	20	60	1
80°	0	80	0
Left rotation from neutral position (0°) to:			
0°	80	0	4%
20°	60	20	3
40°	40	40	2
60°	20	60	1
80°	0	80	0

Ankylosis

Region ankylosed at:	
*0° (neutral position)	14%
20°	17
40°	21
60°	25
80° (full right rotation)	28
Region ankylosed at:	
*0° (neutral position)	14%
20°	17
40°	21
60°	25
80° (full left rotation)	28

*position of function

TABLE 50
IMPAIRMENT DUE TO ABNORMAL MOTION AND ANKYLOSIS OF THE THORACOLUMBAR REGION—FLEXION-EXTENSION

Abnormal Motion

Average range of FLEXION-EXTENSION is 120 degrees
Value to total range of thoracolumbar motion is 40%

	Degrees of Thoracolumbar Motion		Impairment of Whole Person
Flexion from neutral position (0°) to:	LOST	RETAINED	
0°	90	0	9%
10°	80	10	8
20°	70	20	7
30°	60	30	6
40°	50	40	5
50°	40	50	4
60°	30	60	3
70°	20	70	2
80°	10	80	1
90°	0	90	0
Extension from neutral position (0°) to:			
0	30	0	3
10°	20	10	2
20°	10	20	1
30°	0	30	0

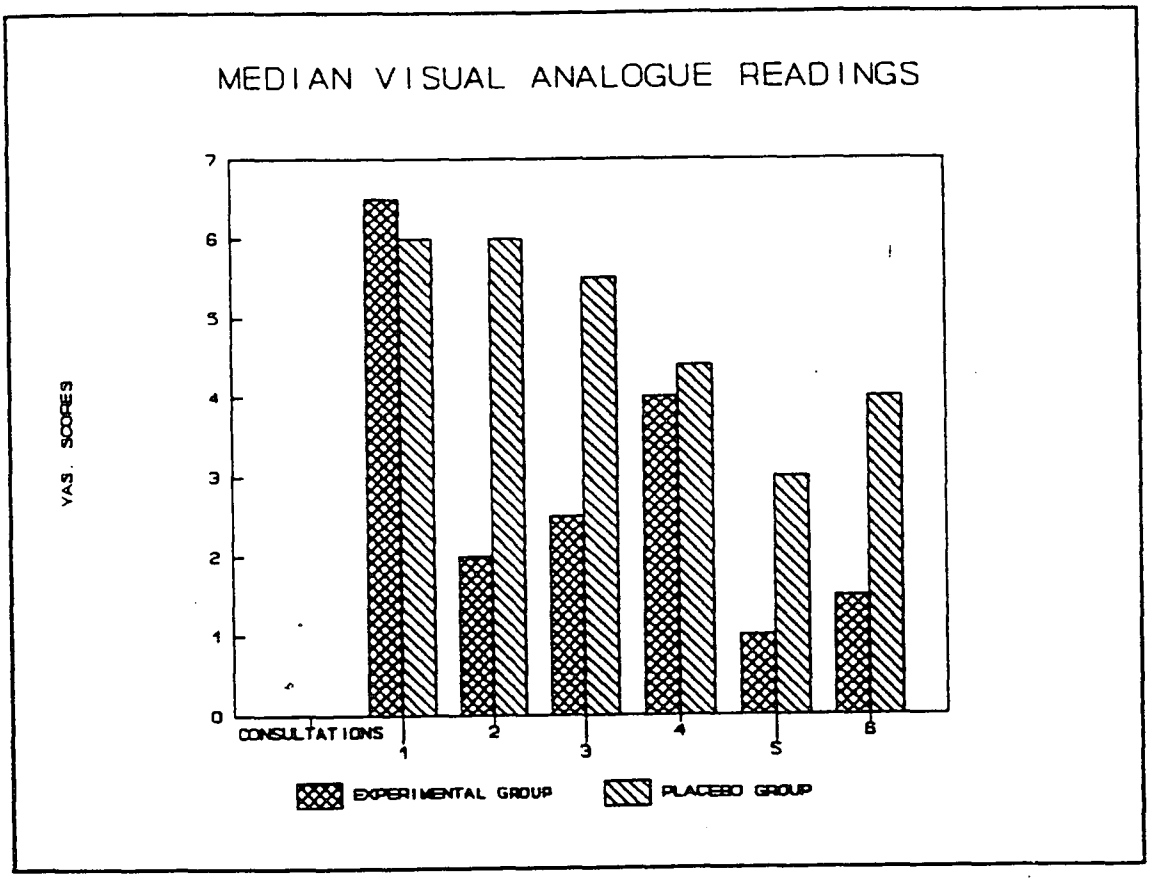
Ankylosis

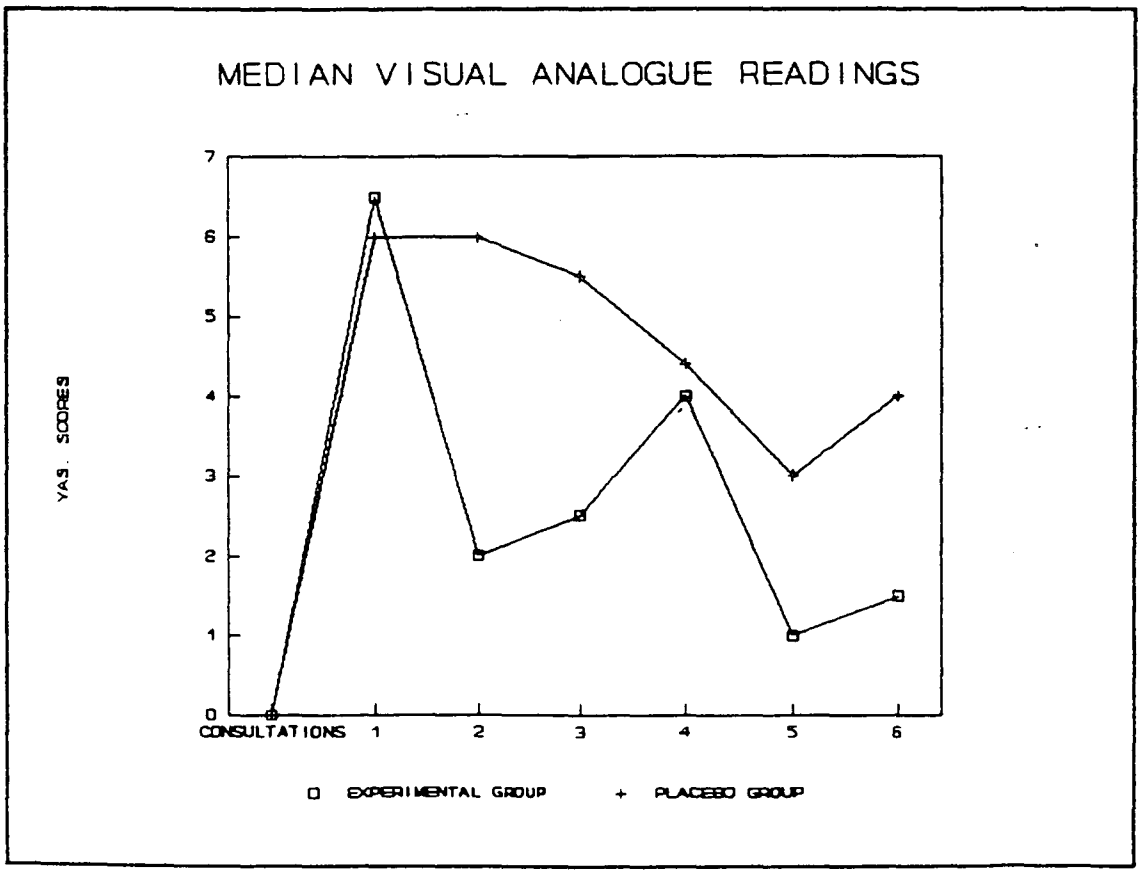
Region ankylosed at:	
*0° (neutral position)	20
10°	22
20°	24
30	27
40°	29
50°	31
60°	34
70°	36
80°	38
90° (full flexion)	40
Region ankylosed at:	
*0° (neutral position)	20
10°	27
20°	34
30 (full extension)	40

*position of function

APPENDIX E1

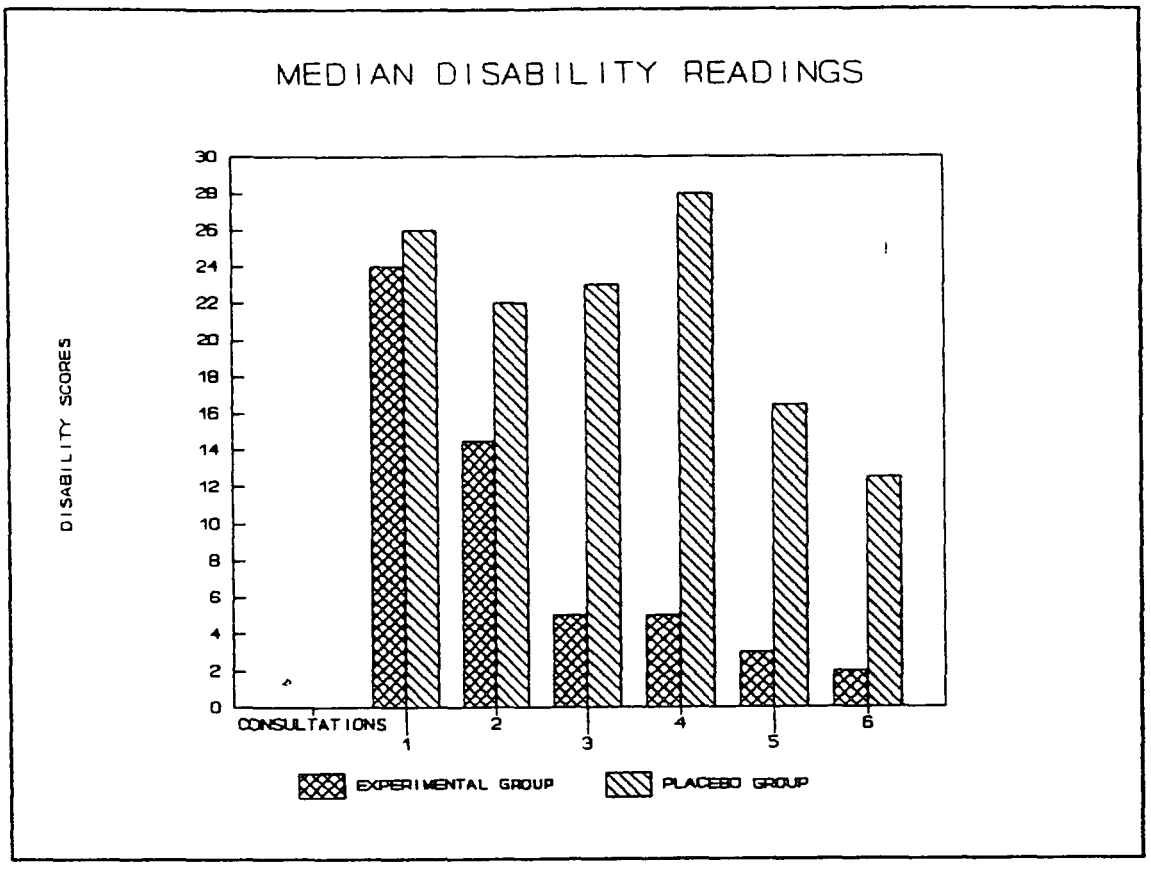
MEDIAN VAS. SCORES

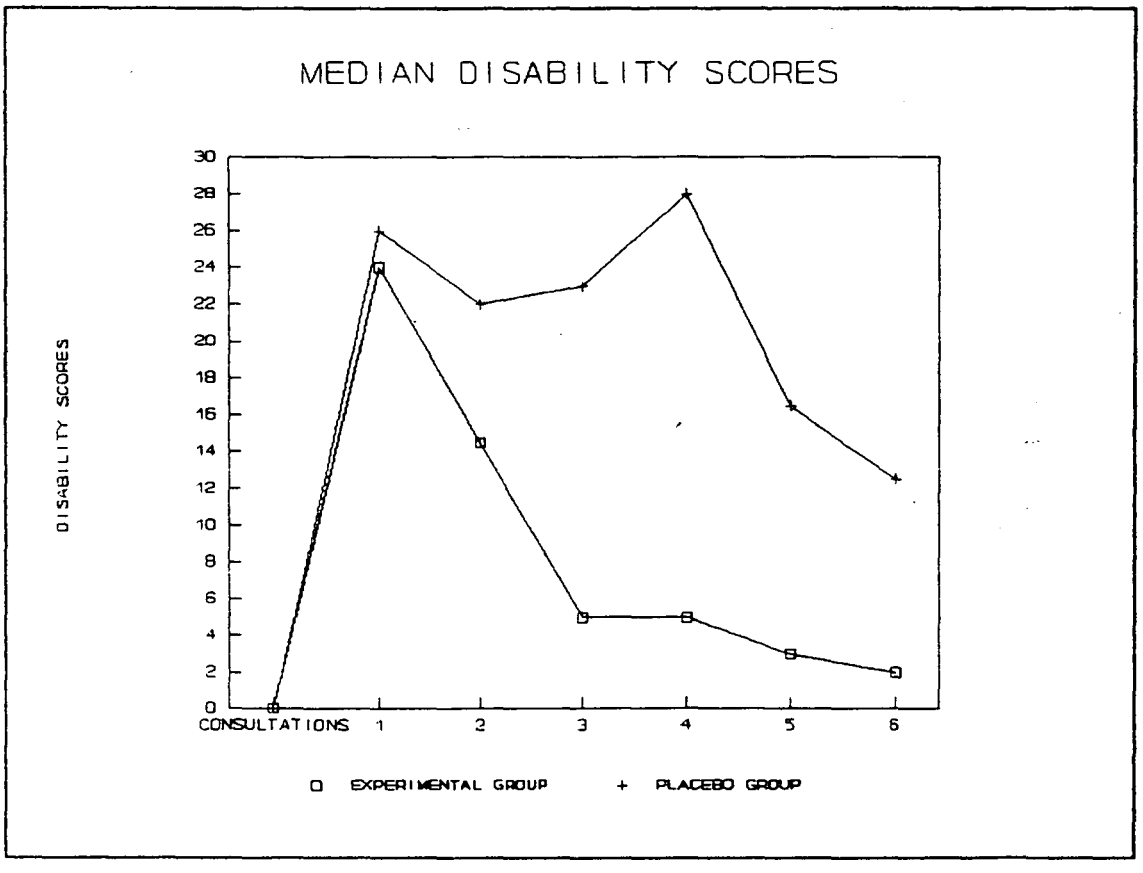




APPENDIX E2

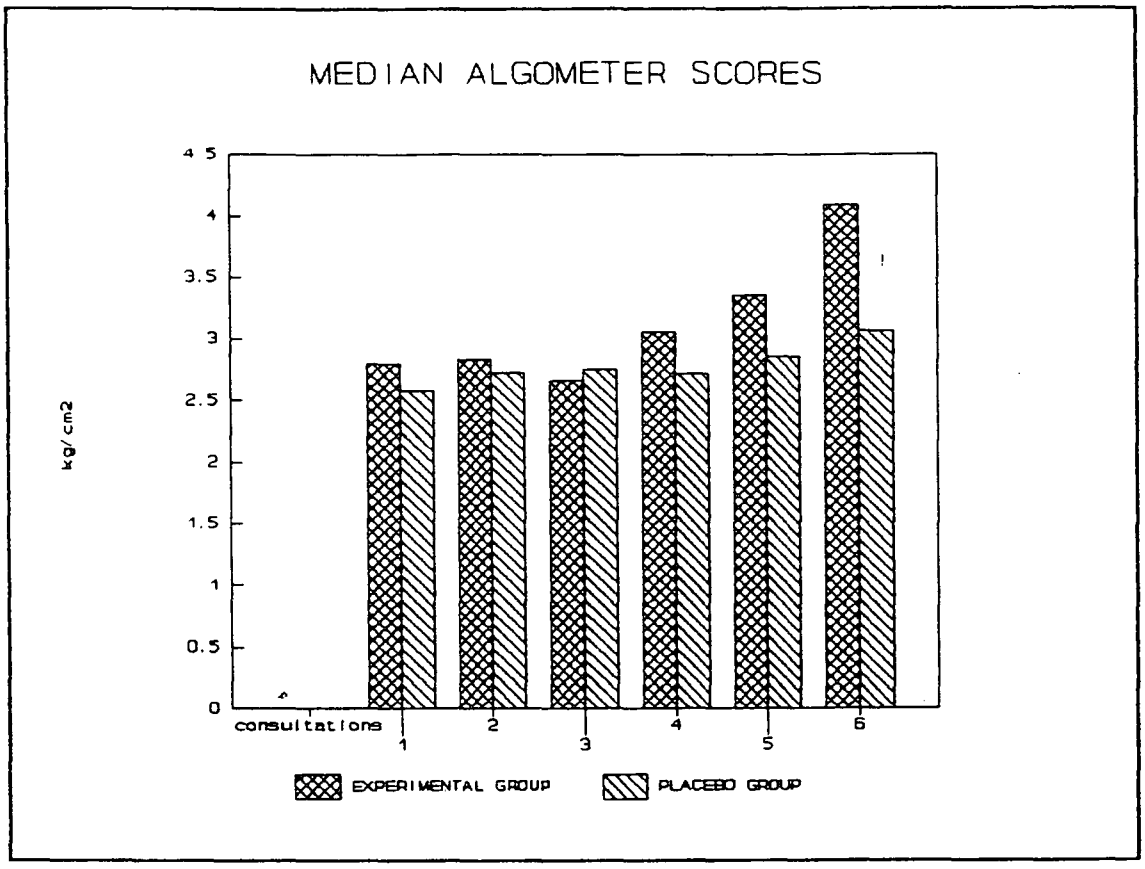
MEDIAN DISABILITY SCORES

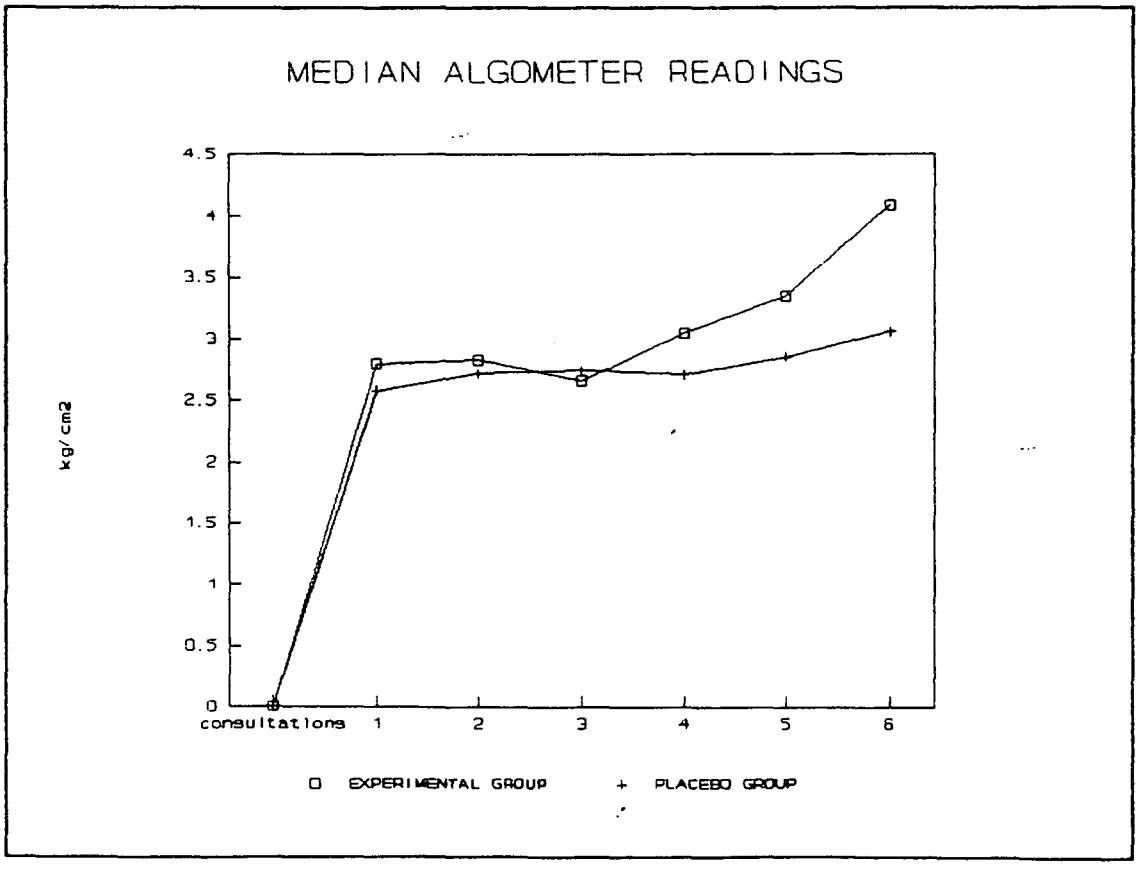




APPENDIX E3

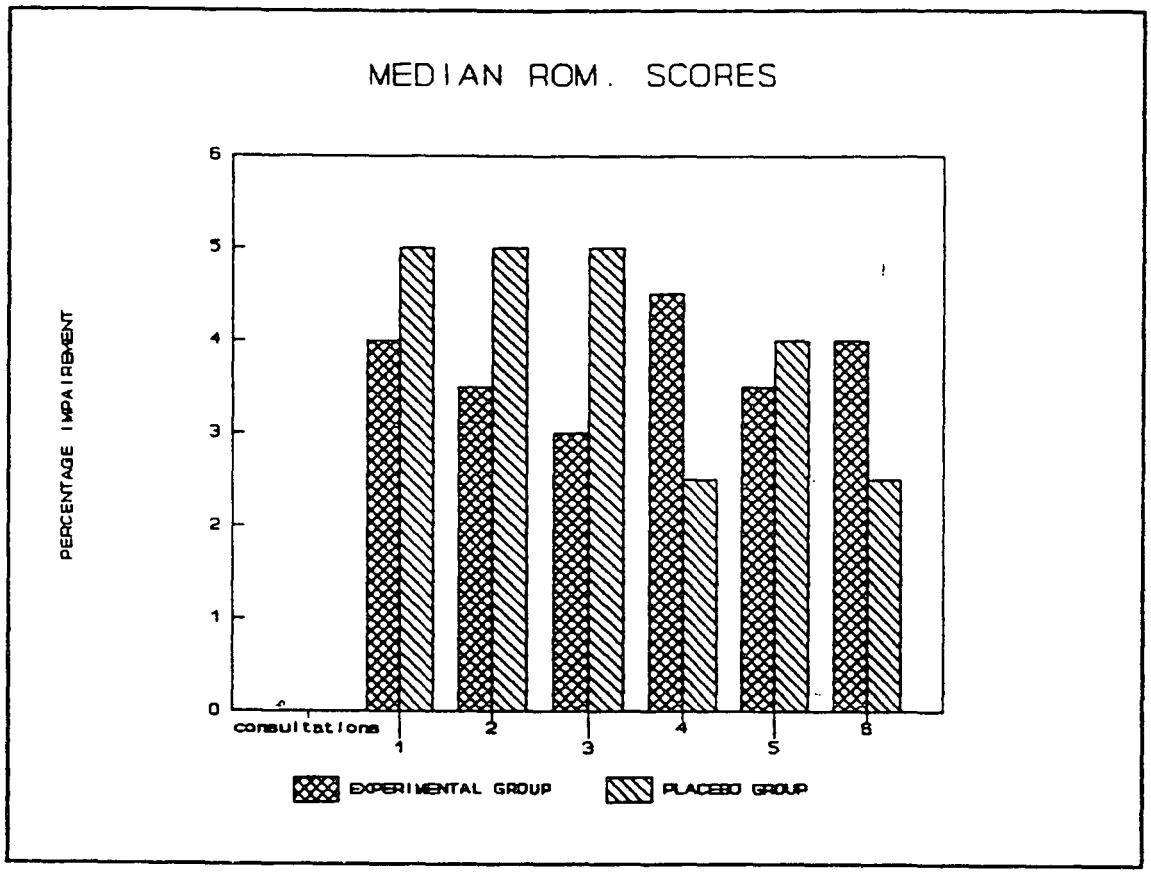
MEDIAN ALGOMETER SCORES

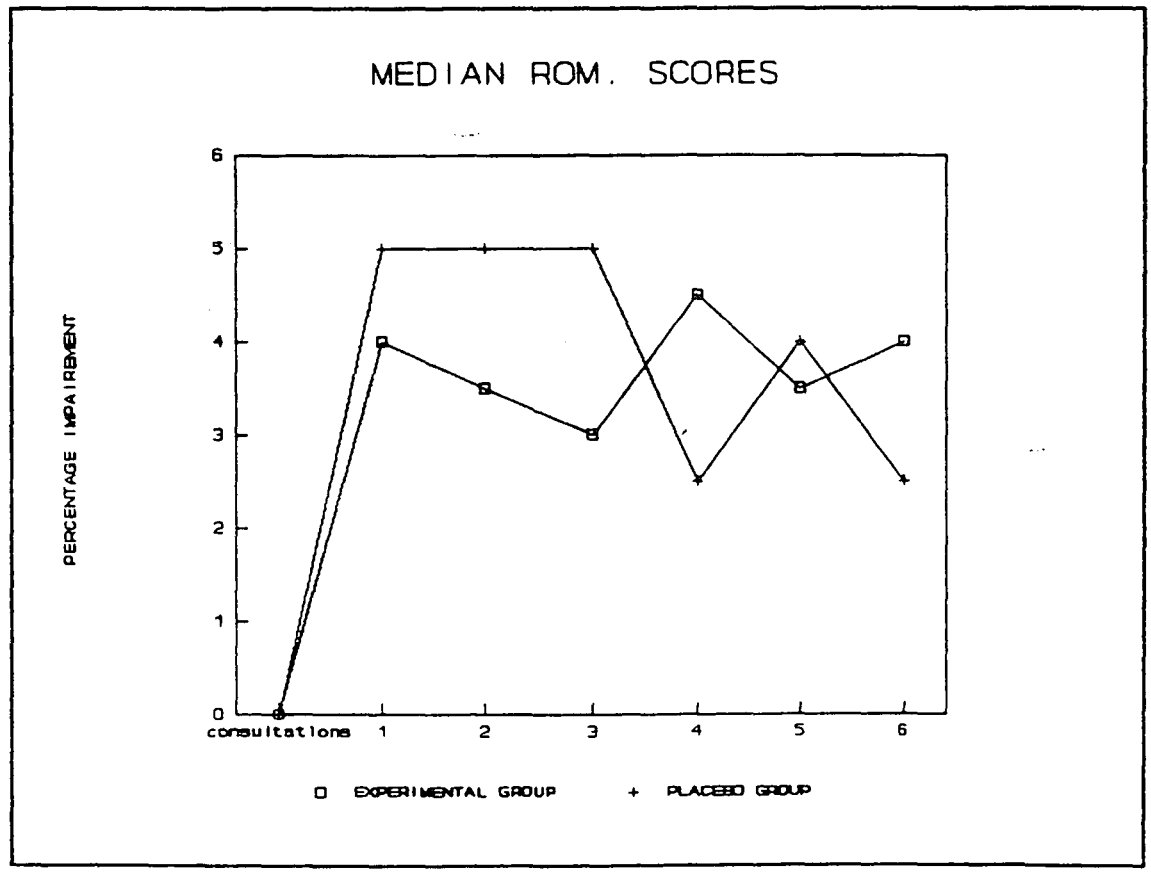




APPENDIX E4

MEDIAN ROM. SCORES





APPENDIX F

CASE HISTORY FORMS

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

CASE HISTORY

Patient: _____ Date # _____

File #: _____

X-ray #: _____

Age: _____ Sex: _____ Occupation: _____

Intern: _____ Signature: _____

FOR CLINICIAN'S USE ONLY

Initial visit clinician: Signature:

Case History:

Examination:
Previous: TN Current: TN
Other Other

X-ray Studies:
Previous: TN Current: TN
Other Other

Clinical path. lab.:
Previous: TN Current: TN
Other Other

Case status:
PTT: Conditional: Signed off: Final sign out:

Recommendations:

Intern's case history

1. Source of history:

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

3. Present illness:

Location

Onset

Duration

Frequency

Pain (character)

Progression

Aggravating factors

Relieving factors

Associated S & S

Previous occurrences

Past treatment and outcome

8. Psychosocial history:

Home situation

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 G

PHYSICAL EXAMINATION FORMS

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

PHYSICAL EXAMINATION

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

Patient:_____ File #_____

Last name First name

Clinician:_____ Signature:_____

Intern:_____ Signature:_____

Date:_____

Height:_____ Weight:_____ Temp:_____

Rates: Heart:_____ Pulse:_____ Respiration:_____

Blood pressure: Arms: L / R /

Legs: L / R /

General appearance:

STANDING EXAMINATION.

Minor's sign
Skin changes
Posture
  erect
  Adam's
Ranges of motion:

T/L spine:	Flexion:	90	Fingers to floor
	Extension:	50	
	R.lat.flex.:	30	Fingers down leg
	L.lat.flex.:	30	Fingers down leg
	Rot.to R.:	35	
	Rot.to L.:	35	

Flex.

L.Rot. R.Rot.

L.lat flex. R.lat. flex.

Ext.

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

Romberg's sign.
Pronator drift.
Trendelenburg's sign.
Gait.
  rhythm
  balance
  pendulousness
  on toes
  on heels
  tandem
Half squat.
Scapular winging.
Muscle tone.
Spasticity/Rigidity.

Shoulder:
- skin
- symmetry
- ROM - glenohumeral
  - scapulo-thoracic
  - acromioclavicular
  - elbow
  - wrist

Chest measurement
- inspiration
- expiration

Visual acuity

Breast examination:
- Inspection:
  - skin
  - size
  - contour
  - nipples
  - arms overhead
  - hands against hips
  - leaning forward.
- Palpation:
  - axillary lymph nodes.

SEATED EXAMINATION.

- Spinal posture
- Head
  - scalp
  - skull
  - face
  - skin
- Eyes
  - conjunctiva
  - sclera
  - eyebrows
  - eyelids
  - lacrimal gland
  - nasolacrimal duct
  - alignment
  - corneal reflex
  - ocular movement

	L			R		
	III	IV	VI	III	IV	VI

  - visual fields
  - accomodation
  - iris
  - pupils
  - red reflex
  - optic disc

vessels
general background
macula
vitreous
lens

Ears:
auricle
ear canal
drum
auditory acuity
Weber test
Rinne test

Nose:
external
internal
septum
turbinates
olfaction

Sinuses (frontal & maxillary):
tenderness
transillumination

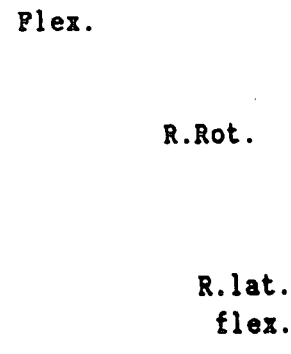
Mouth and pharynx:
lips
buccal mucosa
gums and teeth
roof
tongue
inspection
movement
taste
palpation
pharynx
inspection
CN X

Neck:
posture
size
swelling
scars
discoloration
hair line

- Neurological:
  - Dermatomes
    - C5
    - C6
    - C7
    - C8
    - T1
  - Tendon reflexes
    - biceps
    - triceps
    - brachioradialis
  - Muscle strength
    - C5
    - C6
    - C7
    - C8
    - T1
  - Coordination:
    - point-to-point
    - dysdiadochokinesia
- Thorax:
  - Chest:
    - Inspection:
      - skin
      - shape
      - respiratory distress
      - rhythm (respiratory)
      - depth "
      - effort "
      - intercostal/supraclavicular retraction
    - Palpation:
      - tenderness
      - masses
      - respiratory expansion
      - tactile fremitus
    - Percussion:
      - lungs (posterior)
      - diaphragmatic excursion
      - kidney punch
    - Auscultation:
      - breath sounds
        - vesicular
        - bronchial
      - adventitious sounds
        - crackles (rales)
        - wheezes (rhonchi)
      - voice sounds
        - broncophony
        - whispered pectoriloquy
        - egophony

ROM:

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



lymph nodes
trachea
thyroid
carotid arteries (thrills, bruit)

CN V
CN VII
CN VIII (nystagmus)
CN IX
CN XI

TMJ
- Inspection
  - ROM
  - deviation
- Palpation
  - crepitus
  - tenderness

Cardiovascular:
auscultation (aortic murmurs)
Allen's test

SUPINE EXAMINATION

JVP
PMI
auscultation heart (L.lat.recumbent)
respiratory excursion
percussion chest (anterior)
breast palpation
The abdomen:
Inspection:
skin
umbilicus
contour
peristalsis
pulsations
hernias (umbilical/incisional)
Auscultation:
bowel sounds
bruit
Percussion:
general
liver
spleen
Palpation:
superficial reflexes
cough
light
rebound tenderness
deep
liver
spleen
kidneys
aorta
intra-/retro-abdominal wall mass
shifting dullness
fluid wave
Acute abdomen:
where pain began and now
cough
tenderness
guarding/rigidity
rebound tenderness
Rovsing's sign
psoas sign
obturator sign
cutaneous hyperaesthaesia
rectal exam
Murphy's sign.

Male genitals and hernias.
Inspection:
skin
prepuce
glans
meatus
nits/lice
scrotum
inguinal/femoral bulges
Palpation:
penis (tenderness/induration)
testes
epididymis
inguinal canal
femoral canal
cremasteric reflex
Auscultation:
scrotal mass.
Peripheral vasculature:
Inspection:
skin
nail beds
pigmentation
hair loss
Palpation:
pulses - radial, brachial, femoral, popliteal, post.tibial, dorsalis pedis
lymph nodes - epitrochlear, femoral (horizontal & vertical)
temperature (feet & legs)
Manual compression test
Retrograde filling (Trendelenburg) test
Arterial insufficiency test

Musculoskeletal:
ROM
hip
flex. 90/120
ext. 15
abd. 45
add. 30
int rot 40
ext rot 45
knee
flex. 130
ext. 0/15
ankle
plantar flex 45
dorsiflex 20
inversion 30
eversion 20
leg length

Neurological:
- dermatomes
  - L1
  - L2
  - L3
  - L4
  - L5
  - S1
- muscle strength
  - hip flexion
  - knee extension
  - ankle dorsiflexion
  - plantar flexion
- tendon relexes
  - patellar
  - Achilles
- plantar reflex

Rectal examination:
- Inspection
  - sacrococcygeal & perianal areas
- Palpation
  - sphincter tone
  - tenderness
  - induration
  - nodules
  - prostate
  - seminal vesicles

Mental status
- Appearance and behaviour:
  - level of consciousness
  - posture and motor behaviour
  - dress, grooming, personal hygiene
  - facial expression
  - affect
- Speech and language:
  - quantity
  - rate
  - volume
  - fluency
  - aphasia (prn)
- Mood
- Thought processes (logical, relevant, organized)
- Memory and attention:
  - orientation (time, place, person)
  - remote memory
  - recent memory
  - new learning ability
- Higher cognitive functions:
  - information and vocabulary (general & specialised knowledge)
  - abstract thinking.

APPENDIX H

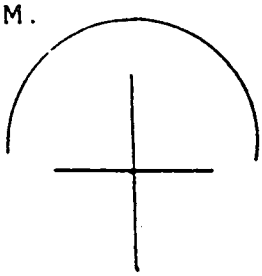
REGIONAL EXAMINATION FORM

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

REGIONAL EXAMINATION - CERVICAL SPINE

Observation:

posture
size
swellings
scars
discoloration
hair line
R.O.M.



Flexion 45° chin to larynx
chin to chest
Extension 70° Forehead parallel to ground

L. Rotation 70°
R. Rotation 70°
L. lat. flex 45°
R. lat. flex 45°

/ painless limitation
// painful limitation

Palpation: lymph nodes
trachea
thyroid gland

Orthopaedic:

tenderness:
trigger points:
SCM
trapezius
scaleni
levator scapulae
posterior musculature
doorbell sign
cervical compression
Kemp's test
lateral compression
cervical distraction
Adson's test
Halstead's test
costoclavicular test
hyperabduction (Wright's) test
Eden's (traction) test
shoulder abduction test
shoulder depression test
dizziness rotation test
Lhermitte's sign
Brachial plexus tension
O'Donoghue manoeuvre

Neurological:

Dermatomes: L. R.

C2
C3
C4
C5
C6
C7
C8
T1

Myotomes: C1
C2
C3
C4
C5
C6
C7
C8
T1

Reflexes:
C5
C6
C7

Vascular:

BP L / R /
Carotids
Subclavian arteries
Wallenberg's test

Motion palpation:

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

APPENDIX I

PATIENT CONSENT FORM.

THIS IS TO CONFIRM THAT I .....

AM WILLING TO PARTICIPATE IN THE RESEARCH DISSERTATION OF ANDREW JONES.

I UNDERTAKE TO THE BEST OF MY ABILITY TO ADHERE TO THE DESIGNATED PROGRAM AND TO COMPLY WITH THE REQUESTS OF THE RESEARCHER.

I ALSO UNDERSTAND THAT ALL PERSONAL INFORMATION IS STRICTLY CONFIDENTIAL.

.....	.....
	(WITNESS)
.....	.....
(DATE)	(WITNESS)

APPENDIX J

INTRODUCTORY LETTER:

DEAR PATIENT, WELCOME TO THE CHIROPRACTIC DAY CLINIC AND MY RESEARCH PROJECT, I AM INVESTIGATING `MYOFASCIAL TRIGGER POINT THERAPY` AND YOUR ASSISTANCE WILL BE GREATLY APPRECIATED. PLEASE BE ASSURED THAT ALL INFORMATION IS STRICTLY CONFIDENTIAL AND WILL NOT BE INCORPORATED INTO THE RESULTS. PLEASE BE AS ACCURATE AS POSSIBLE WHEN COMPLETING THE QUESTIONAIRE THAT WILL BE GIVEN TO YOU .

YOUR CO-OPERATION IN THIS RESPECT IS GREATLY APPRECIATED

ANDREW JONES (INTERN)