THE EFFECTIVENESS OF MANIPULATION COMBINED WITH A CERVICAL PILLOW COMPARED TO MANIPULATION ALONE IN THE MANAGEMENT OF MECHANICAL NECK PAIN

By

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I, Tracey Allwood, do declare that the dissertation is representative of my own work.

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DEDICATION

Firstly to Jesus Christ, Lord of my life. Thank-you for your amazing grace and great love.

To Dad, Mom and Wendy , thank-you for your unconditional love. It has been a privillege to be in our family.

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TABLE OF CONTENTS

TABLES AND FIGURES

ADDENDA

DEFINITION OF TERMS

Adhesion

A fibrous band or structure by which parts adhere abnormally (Bergmann 1993:754).

Adjustment

The chiropractic adjustment is a specific form of direct articular manipulation using either long or short lever techniques with specific contacts and is charaterised by a dynamic thrust of controlled velocity, amplitude and direction (Haldeman 1992:621).

Biomechanics

The study of the structure, function and mechanical aspects of human motion. It is concerned mainly with external forces either of a static or dynamic nature dealing with human movements (Bergmann 1993:755).

Joint dysfunction

Joint mechanics showing area disturbances of function without structural change. Subtle joint dysfunction affecting quality and range of joint motion. They are diagnosed with the aid of motion palpation and stress and motion radiography investigation (Bergmann 1993: 759).

Lordosis

The anterior concavity in the curvature of the lumbar and cervical spine (Bergmann 1993: 760).

Manipulation

A manual procedure involving a directed thrust which moves a joint past the physiological range of motion without exceeding its anatomic limit (Gatterman 1995:12).

ABSTRACT

Neck pain is a common condition that has become a serious health concern. Since there is controversy regarding the most effective management of this condition, further research needs to be executed. The purpose of this investigation was to compare manipulation combined with a cervical pillow to manipulation alone in the management of mechanical neck pain.

The rationale behind this, was that manipulation is one of the most common treatments for spinal conditions and has shown significant results in alleviating mechanical neck pain. Cervical pillows have been investigated by various researchers. They have concluded that cervical pillows are effective in treating mechanical neck pain. Thus, using the pillow as an adjunct to manipulation should attain superior results to manipulation alone.

This study consisted of 40 patients who were randomly divided into 2 equal groups. The average age of the patients was 34 years old and the average duration of neck pain was pain of greater than 6 months.

The patients received 6 treatments over a 4 week period. Group1 were manipulated and given a cervical pillow to sleep on, while group 2 received manipulation alone.

Assessment included the use of the CMCC Neck Disability Index, McGill Pain Questionnaire and the NRS 101 Pain Scale questionnaires for subjective results. The objective data was attained by using an algometer.

Subjective and objective statistical analysis was completed using the non-parametric Wilcoxon's Signed Rank Test and Mann-Whitney's U –Test comparing the intra-group and inter-group respectively. This was conducted at a 95% confidence interval. Data was recorded in the form of tables and graphs for visual interpretation.

Both groups showed statistically significant improvement in terms of pain reduction and disability. Furthermore; in both groups the algometer readings revealed a decrease in joint tenderness over the dysfunctional area.

Groups 1 and 2 demonstrated equal efficacy in the management of mechanical neck pain, with the exception of the algometer readings in group 1 that showed a greater short term improvement. However, the differences were not significant enough to show statistical improvement. General trends in results suggested that group 1 showed greater benefits.

In conclusion, sufficient clinical evidence exists to demonstrate a significant improvement in response to both treatment protocols. Therefore there is no statistical evidence in this study to suggest that one treatment approach is superior to the other.

CHAPTER ONE

INTRODUCTION

1.1 THE PROBLEM AND ITS SETTING

Mechanical neck pain is common and has been identified as a serious health concern. According to Cassidy et al. (1992) 40-50% of the population experience neck pain at some time during their lives.

Howe et al. (1983) state that there are many theories as to the cause of mechanical neck pain. Gatterman (1990:205) reports that the most common cause is joint sprain with joint locking and associated muscle spasm. Similarly, Bergmann et al. (1993:58) regard joint dysfunction as a frequent and significant cause of spinal pain.

Despite there being a wide variety of treatment protocols for mechanical neck pain, the most effective management remains an area of debate. This is because the value of most current protocols for these conditions remains unverified (McMorland and Suter 2000). Due to the inability of conventional medicine to effectively manage spinal conditions, an opportunity for developing new approaches to mechanical spinal treatment has arisen (Skargren et al. 1997 and Giles and Muller 1999).

Current treatment protocols that have recently been investigated include manipulation, physiotherapy, intensive training of the cervical muscles (Jordan 1998), acupuncture (Giles and Muller 1999), manual therapy, treatment by a general practitioner (Koes et al. 1991) and the use of a cervical pillow (Hagino et al. 1998).

One of the most common treatments for a spinal condition is manipulation (Skargren et al. 1997). Numerous studies have shown manipulation to be particularly beneficial in the management of neck pain (Van Schalkwyk 1998:125, Kavonic 1999:109 and Skargren et al. 1997) and, in some instances, superior to any other form of treatment (Haldeman 1992 and Brunarski 1984). However, research needs to be undertaken to determine the best approach when using manipulation for patients suffering from mechanical neck pain (Pikula 1999).

Cervical pillows have also shown clinically significant results in the management of mechanical neck pain. Hagino et al. (1998) found that a cervical pillow had clinically beneficial results in the treatment of headache and neck pain. Lavin et al. (1997) had similar results, showing that the pillow reduced pain and improved quality of sleep. They added that more research is needed to evaluate the effects of cervical pillows in terms of pain reduction and sleep parameters.

The purpose of this study was to investigate the effectiveness of manipulation combined with a cervical pillow to manipulation alone in the management of mechanical neck pain, with reference to subjective and objective findings. Group one, in this study, received manipulation to the cervical spine and were given a cervical pillow to take home to sleep on. Group two was treated with manipulation alone.

The patients' perception of their pain was measured using the Short-form McGill Pain Questionnaire (Melzack 1987) and the Numerical Pain Rating Scale (Jensen et al. 1986),

while the patient's perception of their disability was measured using the CMCC Neck Disability Index (Vernon and Mior 1991). Objective findings were collected using the pressure algometer (Fischer 1986). The patients received six treatments over a maximum of four weeks and data was obtained at the first, third and after the sixth treatments.

A greater understanding of the effectiveness of manipulation and the use of a cervical pillow should benefit chronic neck pain sufferers and potentially decrease the use of medication and other medical intervention (Lavin et al. 1997). This trial should also provide a basis for further research into ergonomic support in the field of chiropractic, sleeping posture, as well as into manipulative care of spinal conditions.

This study shall attempt to assess whether manipulation combined with a cervical pillow is a more effective treatment than manipulation alone. It should provide important information concerning the future structures, protocols, and management of patients with mechanical neck pain, consequently providing valuable information to aid clinical decision making by providers of primary care. Comprehensive research of new treatment strategies is important to clinicians, patients, social insurers and financiers before new protocols are implemented (Skagren et al. 1997).

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Mechanical neck pain and other spinal pain syndromes constitute an enormous cost for health care budgets worldwide. The financial and resource implications of spinal pain are extensive (Giles and Muller 1999), including huge medical consumption, disability and absenteeism from work (Borghouts et al. 1999).

In North America, neck and low back-related conditions are associated with high health care costs (Cote et al. 1998). The total cost of neck pain in The Netherlands in 1996 was approximately 686 billion US$ (Borghouts et al. 1999).

In Grieves' opinion (1994:39) the cervical spine is a neglected area in terms of research. There have been few well planned prospective studies performed to date and much debate surrounds the management of this health concern (Giles and Muller 1999).

At a time when the medical community is applying evidence-based management of patients, it is essential that the field of spinal pain adopt this approach. This field should no longer be characterised by inadequate research and controversy (Giles and Muller 1999). Chiropractors should be responsible for consistently examining the effectiveness of the care they provide as they are clinicians who are increasingly being sought out by the general population (McMorland and Suter 2000).

The following review outlines the various aspects of mechanical neck pain in terms of the incidence, basic anatomy and biomechanics involved. In addition current thinking in terms of the origin of mechanical neck pain, signs and symptoms as well as general trends in treatment protocols will be discussed.

2.2 INCIDENCE, PREVALENCE AND CHARACTERISTICS

Neck pain is a common complaint. However, reliable epidemiological studies on the prevalence of neck pain are difficult to find (Dvorak 1998).

The prevalence of neck pain ranges from 10-15% of the population (Borghouts et al. 1999). In the Saskatchewan population, neck pain is highly prevalent, with 54% having experienced it in the previous six months and 66% of adults having experiencing it in their lifetime (Cote et al.1998). In addition, 5% were significantly disabled by this condition in the previous six months (Cote et al. 1998). Cassidy et al. (1992) report that 40-50% of the population experience neck pain at some point in their lives.

Bovim et al. (1994) randomly distributed a neck pain questionnaire in Norway and showed that 34.4% of the respondents had experienced neck pain within the last year. He concluded that neck pain is a common complaint. Another study by Drews (1995:66) showed that 57.4% (N = 162) of patients presenting to private chiropractic clinics (N =17) and 54% (N=162) of new patients seen at the teaching clinic at Technikon Natal complained of neck pain.

Females seem to have a higher incidence of neck pain than males (Cote et al. 1998 and Bovim et al. 1994). Furthermore the risk of developing neck pain seems to increase with age up to the age of 65 (Borghouts et al. 1999).

Cote et al. (2000) stated that in their trial, individuals with neck pain tended to have other chronic health problems such as cardiovascular disorders, low back pain and digestive disorders. Furthermore, their study revealed that the prevalence of neck pain and disability was greater in individuals who had been involved in a motor vehicle collision and people who had a lifetime history of neck injury.

Although current research varies in terms of the incidence, prevalence and characteristics of neck pain, there is general agreement amongst the authors that this is a common condition and needs further research.

2.3 ANATOMY: A BRIEF SUMMARY

The cervical spine is made up of seven vertebrae, with the third to the sixth being regarded as typical vertebrae and the first, second and seventh being considered atypical (Gatterman 1990:205). The vertebral artery passes through the transverse foramina of C1 to C6 and sometimes through C7 (Moore 1992:331).

Anteriorly the typical vertebrae are made up of the vertebral body, which consists of a thin cortical shell surrounding cancellous bone. The posterior aspect is composed of a neural arch that includes two pedicles and two laminae (White and Panjabi 1990:28). The sloping

posterior arches form the boundaries of a relatively large triangular vertebral foramen (Haldeman 1992:137). Two transverse processes as well as the spinous process arise from the laminae (White and Panjabi 1990:28). These processes act as levers to which various muscle groups attach to enable cervical spine motion (Foreman and Croft 1995:262).

The superior plateau of the vertebra laterally forms the raised uncinate processes. These projections articulate with the lateral inferior plateau of the vertebrae above forming the joints of Luschka. These joints are clinically significant as they are synovial and can undergo degenerative change particularly, after trauma (Gatterman 1990:206). They protect the nerve root from disc herniation into the lateral canal/ intervertebral foramen.

Intervertebral discs separate the typical vertebrae. These structures provide 25% of the vertical height of the cervical spine and provide adequate spacing to allow the spinal nerves to exit safely from the intervertebral foramina (Foreman and Croft 1995:262).

The articular processes on the superior and inferior surface are known as zygopophyseal joints or facet joints (Haldeman 1992:138). They are lined with hyaline cartilage and enveloped by a loose synovial –lined fibrous capsule. The joints are innervated by nociceptive as well as proprioceptive nerve fibers arising from the medial branch of the dorsal primary ramus (Mooney and Robertson 1976 and Gatterman 1990:14).

The facet joints are orientated at approximately 45 degrees to the horizontal plane and 90 degrees to the sagittal plane (Haldeman 1992:138). The superior facets point backward and upward and are flat and oval, while the inferior facets, which are similarly shaped, are directed forward and downward (Gatterman 1990:206). Like the joints of Luschka these zygopophyseal joints are synovial and hence undergo degenerative change (White and Panjabi 1990:28).

The muscles, ligaments and joint capsules provide postural stability, while allowing adequate spinal motion, and it is these structures that are commonly injured during trauma (Gatterman 1990:14, 205).

2.4 BIOMECHANICS OF THE CERVICAL SPINE

The human neck is an impressive structure, possessing a wide range of mobility in almost every direction (Haldeman 1992:137). Magee (1992:34) states that the cervical spine forgoes stability for mobility and consequently is vulnerable to injury. Positioned between the relatively immobile trunk and the reasonably heavy skull, the neck can suffer critical injury from trauma that would have less implications in other parts of the body (Haldeman 1992:137).

The region involving the atlas, axis and occiput is the most complex area of the spine because the skull has to articulate with the axial skeleton (White and Panjabi 1990:92). These transitional segments (C0-C1-C2) are exposed to greater static and dynamic strains than other spinal segments (Boyling and Palastanga 1994:318).

The primary movement occurring at the atlanto-occipital joint is flexion. Rotation occurs mostly at C1-C2 while there is relatively little rotation at C0-C1 (White and Panjabi 1990:92).

Pronounced coupling of movements have been observed in the cervical spine. This is the automatic contralateral rotation of the vertebral column on lateral bending. It is generally acknowledged that there is significant coupling at C1-C2 (White and Panjabi 1990:94).

The motion segments of the lower cervical spine function as a unit, without selective movement of any one segment (Haldeman 1992:139). The location and structure of the uncovertebral joints control the movements of the middle and lower cervical spine (Gatterman 1990:218). The primary motion in this area is flexion/ extension and generally the movement is coupled (Haldeman 1992:139).

Flexion and extension occurs particularly in the C5-C6 area. White and Panjabi (1990:97) suggest that this large range of motion has contributed to the frequent incidence of cervical spondylosis at this level.

In the lower segments there is less lateral flexion and axial rotation than in the upper segments. However, the coupling patterns are dramatic, distinct and clinically significant. Between C2 and C7 there is a moderate decrease in the extent to which axial rotation occurs.This gradual change may be associated with the alteration in the angle of the zygopophyseal/ facet joints (White and Panjabi 1990:98).

2.5 POSTURE

The natural curve of the cervical spine is lordotic. This lordosis is determined by the architecture of the vertebrae and discs, which are in turn influenced by the force of muscle pull. Consequently muscular spasm or abnormal muscle tone may cause changes in the cervical spine posture (Gatterman 1990:260).

Gatterman (1990:260) states that posture is a result of moment-by-moment adaptations of neuronal circuits that regulate cervical shape. These patterns are either present at birth or become evident as the nervous system matures.

Reflex activity therefore specifically maintains the shape of the cervical spine. These reflexes are set in motion by neural innervation of the cervical muscles, ligaments, zygopophyseal joints and associated structures (Gatterman 1990:260).

Nansel et al. (1993) emphasised the importance of these reflexes in his study. He found that cervical spine manipulation has a significant effect on the tone of the lumbo-pelvic musculature, presumably by facilitating tonic neck reflexes involving intersegmental spinal pathways. This suggests that cervical fixations may play a role in neural reflex phenomena, leading to alteration in the cervical spine posture (Parkin-Smith 1996:10).

Gatterman (1990:220) suggests that altered posture may cause compensatory segmental fixation. Consequently the alteration in cervical posture and abnormal joint coupling could cause dysfunction at adjoining levels (Gatterman 1990:220).

In addition, Gatterman (1990:220) suggests that compensational segmental fixation may occur from changes in postural habits. This complex may be altered by injury or degenerative change to motion segments. Consequently joint dysfunction at adjoining levels may result due to alteration in normal cervical posture and abnormal joint coupling.

Leach (1983) proposes that trauma to the cervical spine may cause nerve irritation that triggers protective muscle spasm or involuntary contraction of the muscles involved in cervical posture.

Postural disturbance (hypolordosis or kyphosis) in the neck can therefore occur due to a number of factors. Leach (1983) has shown that manipulation is able to normalise postural disturbance and interestingly the literature regarding cervical pillows also claims that these postural supports have the potential to restore a hypolordotic curve to a normal cervical lordosis.

2.6 DEFINING MECHANICAL NECK PAIN

2.6.1 Definition and causes of mechanical neck pain: joint dysfunction

Mechanical joint dysfunction is regarded as a frequent and significant cause of spinal pain (Bergmann et al. 1993:58). Gatterman (1995:11) defines this condition as a combination of signs and symptoms that are involved in the pathophysiology of joints. In describing the causes of joint dysfunction he includes early disc degeneration, postural disturbance, uncoordinated movements while sleeping and joint degeneration (Gatterman 1990:232).

Peters (1984) states that patients with mechanical joint dysfunction frequently have a history of activity involving flexion with rotary strain on the facet joints.

Bergmann et al. (1993:54,139) report that this condition can develop from acute injury, repetitive use injury, faulty posture or coordination, aging, immobilization, static overstress, congenital or developmental defects, reflex changes, psychosocial factors, degenerative diseases or other primary disease states.

In addition, Gatterman (1990:220) remarked that biomechanical disorders of the cervical spine are often caused by an external force applied to the head, normally due to a traumatic incident like a fall on the head or a motor vehicle accident.

In Boyling and Palastangas' opinion (1994:392) the two most significant predisposing factors to mechanical neck pain are prolonged poor postural habits and the frequency with which spinal flexion occurs with daily living.

There are a wide variety of factors that are implicated in the cause of mechanical neck pain. Despite steady advancement in regard to understanding spinal pain, there is still a deficit of reliable information regarding the origin of neck pain (Cote et al. 2000).

2.6.2 Signs and symptoms of mechanical neck pain.

Grieve (1988:378) states that mechanical neck pain can present in the following clinical patterns:

- Localised and chronic midcervical pain originating from overstressed midcervical segments (this could be due to postural or traumatic cause),
- Chronic spondylytic changes of the low cervical spine resulting in thickening and stiffening of the joints involved,
- Neck pain that constantly becomes more severe during the day aggravated by certain movements and activities,
- The paravertebral soft tissues are tender and motion of the area is restricted,
- Unilateral pain in the occipital or neck area,
- Rotation and lateral flexion is painful and restricted and
- Prominence of the upper and middle trapezius and the scapulae.

According to Bergmann et al. (1993:63) there are five diagnostic criteria for joint dysfunction in mechanical neck pain, represented by using the acronym P.A.R.T.S.

❖ **P: Pain/ Tenderness**

Pain and/or tenderness are produced by palpation of osseous and soft tissue.

❖ **A: Asymmetry/ Alignment**

This is noted through observation of posture and gait as well as palpation for misalignment of vertebral segments.

❖ **R: Range of motion abnormality**

Change in active, passive and accessory joint motions is noted through procedures of motion palpation and stress x-ray.

❖ **T: Tissue Tone, Texture and/or Temperature abnormality**

Changes in the characteristics of contiguous and associated soft tissues (skin, fascia, muscle and ligaments) are noted through procedures of observation, palpation, instrumentation and tests length and strength.

❖ **S: Special Tests**

For example leg length check, arm fossa test, therapy localization and so forth.

The above criteria can be used to locate the specific dysfunctional area and from there a decision can be made in terms of where the adjustment will be performed.

2.7 TREATMENT OF MECHANICAL NECK PAIN

Various professions offer a wide variety of treatments for mechanical neck pain. Massage, manipulation, acupuncture, physiotherapy, cervical pillows, nonsteroidal anti-inflammatory drugs (NSAIDs) and muscle training are examples of current treatment protocols. Discussion of each modality is beyond the scope of this thesis. Therefore only the treatment performed in this study will be explained.

2.7.1 Efficacy of manipulation

Chiropractic is the principal patron of spinal manipulative therapy (Brunarski 1984). Fityz-Ritson (1990) states that since the inception of chiropractic, the primary treatment modality has been spinal manipulation. This modality is perceived as the most significant and most specialised therapy employed by chiropractors (Bergmann et al. 1993:125).

Manipulation of the neck is still a controversial topic because it has not been the subject of much detailed analysis (Howe et al. 1983, Brunarski 1984 and Giles and Muller 1999). Few well-designed randomised clinical trials have been performed to date (Giles and Muller 1999) and there have been many varying conclusions regarding the efficacy of this treatment (Pikula 1999). However, Terret and Vernon (1984) report that numerous clinical trials have demonstrated that manipulation has resulted in clinically significant relief of spinal pain.

Van Schalkwyk (1998:125-127) found that there was a statistically significant improvement in patients receiving chiropractic manipulation for mechanical neck pain. Although the sample size was small and he recommended that longer follow-up periods be allowed, the results clearly indicated that manipulation was beneficial.

Kavonic (1999:109) investigated two different types of manipulation techniques on neck pain. Although he found no significant objective improvement, the subjective results showed that manipulation had clinically beneficial results. Similar results supporting the efficacy of spinal manipulation in the treatment of mechanical neck pain were found in research performed by Parkin-Smith and Penter (1998), Cilliers and Penter (1998) and Wood (1998:85).

2.7.2 The effects of manipulation

Van Schalkwyk and Parkin-Smith (2000) state that the primary purpose of manipulating a segment is to deliver a line of drive into the fixated segment that will restore restricted motion to normal.

Howe (1983), in a pilot study on the effectiveness of manipulation of the cervical spine had clinically significant results in favor of manipulation. He found that manipulation produced immediate improvement in pain and stiffness as well as an increase in measured rotation and lateral flexion. However, it was the first trial in this field and he suggested that the trial be repeated and thereafter further research be conducted and conclusions drawn.

Cassidy et al. (1992) did a study on the immediate effect of manipulation on pain and range of motion in the cervical spine. Thirty-seven of the fifty patients reported a decrease in pain and all the patients had an increase in range of motion in all directions. The researchers stated however, that this pilot study was not controlled, that it was a measurement of the short term effects of manipulation, that the statistical analysis methods were weak and that a greater sample size should have been used. Nevertheless, the results are clinically instructive and provide an outline for further research.

Parkin-Smith and Penter (1998) confirmed these findings. In their study on the efficacy of manipulation in the treatment of mechanical neck pain, they found an increase in cervical range of motion and a decrease in neck pain. Although the study had a small sample size,

the study lent support to the findings of Cassidy et al. (1992) and they recommended the use of manipulation for mechanical neck pain.

Van Schalkwyk and Parkin-Smith (2000) found that immediately after a manipulation, the cervical range of motion improved. There is agreement amongst the investigators that manipulation reduces neck pain and improves the general motion of the cervical spine.

2.7.3 Pathophysiology of joint dysfunction and the mechanism of manipulation

Several theories exist as to the pathophysiology of joint dysfunction (Bergmann et al. 1993:52-59). Although various theories on joint dysfunction and the effect of manipulation have been described, the hypotheses still remain disputable (Bolton 2000).

Bergmann et al. 1993:52-59 report that a commonly proposed source of joint dysfunction is that of articular soft tissue injury, which causes fibrosis and a loss of elasticity of the involved tissue. Regardless of the cause of injury, an ensuring inflammatory response is triggered and the exudates (which are a byproduct of inflammation) provide a matrix for scar tissue formation. This results in the deposition of collagen, which forms crosslinks along plains of stress. As the collagen repairs the area, there can be a loss of flexibility in the soft tissue, which may limit movement of the joint. An adjustment presumably restores the range of motion of the joint and increases the flexibility of the soft tissue by breaking the collagen crosslinks.

In 1992 Haldeman (1992:206) suggested that innervated synovial folds become entrapped between the facet surfaces. The synovial folds supposedly interfere mechanically with joint movement, causing pain and muscle spasm by traction on pain sensitive tissues or inducing traumatic synovitis.

In 2000 Haldeman (2000) stated that the three predominant theories on the pathophysiology of joint dysfunction and the effect of manipulation are the ***nerve compression, reflex*** and ***pain relief theories***. These will now be discussed in greater detail.

The ***nerve compression*** theory presumes that an abnormal biomechanical relationship between the vertebrae compresses the nerve root, resulting in pain and other clinical symptoms. Giles (2000) described the mechanism by which osteophytes, intrevertebral disc herniations and other related structures can narrow the central canal and lateral recesses and cause compression of nerve roots. Manipulation therefore, should restore the integrity of the biomechanics and decrease or release the nerve compression (Haldeman 2000).

However, Haldeman (2000) remarked that this theory still did not show evidence that abnormal biomechanics can cause nerve root compression, therefore the nerve compression theory is still not considered validated.

The ***reflex theory*** presumes that joint dysfunction stimulates receptors in paraspinal tissues such as muscles, ligaments and facets (Vernon 2000). These

reflexes activate higher centres that in turn cause muscle spasm. Manipulation presumably activates central pathways that normalise the functioning of the muscle and relating structures by stimulating these reflexes (Vernon 2000). Haldeman (2000) commented that a deficiency in the reflex theory was that the effects were only demonstrated for short periods of time under experimental circumstances and he added, that a substantial amount of research should be undertaken before this theory can be an acceptable explanation for joint dysfunction and the effects of manipulation.

The third theory is that of ***pain relief*** (Haldeman 2000). Haldeman (2000) reports that there is notable evidence to show that patients undergoing manipulation describe pain relief which surpasses that ascribed to other treatment methods. Vernon (2000) presented evidence to suggest that manipulation induces hypoalgesia. However, he commented that these effects may be explained in terms of psychophysiologic mechanisms, and may not be applicable long-term.

Although there is insufficient research to consider any one theory valid, the three principal working models can be further developed (Haldeman 2000).

It is clear, however, that the pathophysiology of joint dysfunction and the effect of manipulation remain speculative and are yet to be resolved (Bolton 2000).

2.7.4 Effectiveness of manipulation

Haldeman (1992) states that in the past, when standard medical care has been compared to manipulation for joint dysfunction, there was a higher degree of patient satisfaction by those receiving manipulation.

Giles and Muller (1999) compared manipulation to acupuncture and nonsteroidal anti-inflammatory drugs (NSAIDs) in chronic spinal pain syndromes. Although there were several short-comings regarding this pilot study, the results showed that spinal manipulation produced greater improvement in spinal pain than acupuncture and the NSAIDs.

A study by Williamson (1999:113) showed that the use of NSAIDs combined with chiropractic manipulation was no more effective than chiropractic manipulation alone in the management of mechanical neck pain.

In a study to determine the cost and effectiveness of chiropractic and physiotherapy for low back and neck pain, Skargren et al. (1997) found that they were equally cost effective. Of the 323 patients treated over a period of six months, the effectiveness of both methods of treatment was similar. It is interesting to note, however, that the patients in the chiropractic group tended to evaluate the effectiveness of the treatment on a higher level than in the physiotherapy group. In addition, the chiropractic group needed fewer consultations than the physiotherapy group.

Jordan (1998) researched the effectiveness of three commonly used treatment interventions for persistent neck pain. Intensive training of the cervical muscles, physiotherapy, and spinal manipulative care all showed a similar degree of improvement in terms of self reported pain, disability and medication use. However pain did decrease more rapidly in the chiropractic group. These results were sustained at the fourth and twelve month follow-up sessions. Unfortunately there was no control group, therefore one is unable to assume whether the results were due to the natural history of the condition or due to the treatments performed.

In a study involving patients with back and neck complaints, manual therapy and physiotherapy attained superior results to treatment by a general practitioner (Koes et al. 1992). In addition, the number of visits was less for the manual therapy group and this could be regarded as an advantage of manual therapy over physiotherapy.

Williamson (1999:30) suggests that a greater difference would have been found if a chiropractor had performed the manual therapy. A typical chiropractor has a minimum of 1880 hours of training in manual medicine while medical manipulators and osteopaths receive less than 200 and 700 hours respectively (Brunarski 1984).

Brunarski (1984) examined 50 studies from 1930 to 1983 of patient response to manipulation. Many of the studies were fraught with design flaws and bias against manipulation. However, he stated that overall there is sufficient evidence to suggest that in

the management of painful musculoskeletal problems, spinal manipulative therapy may be more beneficial than standard medical care.

2.7.4.1 Contra-indications to manipulation

Grieve (1988:648), Bergmann et al. (1993:133), Foreman and Croft (1995:469) and Gatterman (1990:67) provide a comprehensive summary of the contra-indications to spinal manipulation. This has been adapted into the following list.

- **Osseous**

  Bone tumor or metastatic disease

  Bone infections (eg. Tuberculosis and osteomyelitis)

  Advanced Osteoarthritis

  Inflammatory arthritis (eg. Rheumatoid arthritis and septic arthritis)

  Severe strains and sprains

  Advanced osteoporosis

  Joint instability and hypermobility

  Metabolic bone diseases

  Cervical fracture

  Dislocation

- **Vascular**

  Vertebrobasilar artery insufficiency

  Clotting disorders

  Atherosclerosis

  Anticoagulant therapy

Aneurysm

- **Neurological**

  Disc prolapse with neurologic deficit

  Space occupying lesion

  Physical involvement of the central nervous system (eg. cord pressure signs in the limbs, cauda equina lesions and neurological disease such as transverse myelitis).

- **Psychological**

  Malingering

  Hysteria

  Hypochondriasis

- **Other**

  Vertigo

  Severe pain

  Advanced diabetes

  Undiagnosed pain

  Lack of formal training in spinal manipulation

2.7.4.2 Complications to manipulation

Complications to cervical manipulation are uncommon, yet do occur and need early detection and expedient management by the clinician. Pre manipulative testing of the vertebral artery is undertaken to detect patients at risk, but there is still controversy regarding their usefulness (Licht et al. 2000 and Rivett et al. 1999).

Most of the complications related to cervical manipulation appear to be vascular in nature. The most common cause is trauma to the vertebral artery (Rivett et al. 1999). Examples of these complications are vertebral artery syndrome and cerebrovascular accidents (Haldeman 1992:552).

Vascular symptoms occur when the blood supply to the area is critically reduced (Boyling and Palastanga 1994:371). A wide variety of symptoms can be caused by vertebrobasilar artery insufficiency such as dizzyness, diploplia, drop attacks, dysarthria and dysphagia. Nystagmus, hemianaesthesia and hemiplegia have also been described (Boyling and Palastanga 1994:371). However, dizziness is the most common symptom (Boyling and Palastanga 1994:371).

Cerebrovascular accidents are the most frequent serious complications resulting from cervical manipulation (Licht et al. 2000). Licht et al. (2000) report that although there are only 183 such cases reported in the literature, recent evidence implies that some cases remain undisclosed. From 1966 to 1994 several of the published studies agreed that the risk of stroke from a cervical adjustment is 1-3 incidence per million treatments (Dabbs and Lauretti 1995:530). Dabbs and Lauretti (1995:530) estimated that the risk of stroke was .52 incidents per million cervical manipulations. Furthermore they stated that a review of the literature showed that NSAID treatment for mechanical neck pain has a greater risk of serious complications than using cervical manipulation (Dabbs and Lauretti 1995:530).

Boyling and Palastanga (1994:371) state that serious complications following cervical manipulation are uncommon, especially when compared to the thousands of adjustments delivered around the world every day. Haldeman (1992:580) assures that the incidence of such complications is so small that the benefits of the treatment far outweigh the possibility of complications.

2.7.5 Cervical pillows

Health professionals (Hagino et al. 1998) commonly recommend cervical pillows for neck pain. In 1990, Busch (as cited by Hagino et al. 1998) reported that in North America there were 12 patented designs on the market.

Some people suffer from more severe neck pain at night and many wake up with a stiff neck (Persson and Moritz 1998). Van den Bos (2000) states that neck problems are compounded by the use of unsuitable pillows that are either too firm and strain the neck muscles or are too soft and do not support the cervical lordosis.

Medical and chiropractic literature has anecdotally discussed a variety of postural supports, which have included cervical pillows (Erfanian et al. 1998). A search of the literature shows that there are few robust randomized clinical trials to investigate the effectiveness of cervical pillows (Hagino et al. 1998).

In a study to develop a new protocol for the management of the cervical spine,

Fitz-Ritson (1990) suggested that a cervical pillow be implemented for sleeping. Hagino et al. (1998) researched the Align-right Cylindrical cervical pillow in terms of the effectiveness of the pillow on neck pain and headache. They concluded that this pillow had clinically significant beneficial effects on the neck pain severity of most chronic neck pain sufferers.

Persson and Moritz (1998) tested the effectiveness of cervical pillows on neck pain and quality of sleep. They found that the majority of patients had a good response to the pillows and experienced better rest and quality of sleep as well as less neck pain. In conclusion they stated that, "a neck pillow with good shape and consistency and with firm support for the cervical lordosis can be recommended as part of treatment for neck pain".

Lavin et al. (1997) compared three different pillows. They commented that although the pillow did not improve disability, proper selection of a pillow can reduce pain and improve the quality of sleep.

Leach (1983) did a study on the correction of cervical curve depth (a hypolordosis or hyperlordosis). He found that the cervical curve depth improved in both experimental groups as compared to the control group. The group receiving manipulation alone, fared better than the combined treatment of manipulation with a cervical pillow, except in the older patients (above 66 years). Hence Leach (1983) recommended that with increasing age, a cervical pillow be added to the manipulation treatment regime.

Lavin et al. (1997) put forward two possible theories as to how the pillow benefited the patient. Firstly, because neck pain often causes a hypolordosis of the cervical spine, a firm

support like a cervical pillow presumably helps to restore the curve to normal. Secondly, the head is kept well aligned and so theoretically the person should have less pain. Similarly, Persson and Moritz (1998) hypothesise that cervical pillows help support the normal lordosis of the cervical spine and so ensure a relaxed resting position for the muscles if the patient is lying supine.

From a wide variety of sources, anecdotal as well as clinical trials report that cervical pillows are beneficial in the treatment of mechanical neck pain. Hagino et al. (1998) reported that although the cervical pillows come in many shapes and sizes and there is some controversy regarding their design, most of them have the common goal of attempting to restore the normal cervical lordosis, thus reducing the severity of neck pain.

2.8 SUMMARY

Neck pain is a common condition and needs efficient and cost effective management. It appears that current forms of treatment for mechanical neck pain are varied and lacking in scientific validity. Manipulation and the use of a cervical pillow have both proved beneficial in the treatment of this condition. It is possible that a combination of the two will attain superior results to that of other prevalent treatment protocols in the management of mechanical neck pain.

CHAPTER THREE

MATERIALS AND METHODS

3.1 INTRODUCTION

This chapter is an outline of the general procedure and methods used in performing the research and collecting the data. The questionnaires used in gathering the subjective data as well as the measurement of the objective data will be discussed. A description of each treatment group is given, as well as the criteria for the acceptance or exclusion of patients. Finally, a discussion of treatment interventions will be followed by a review of the systematic process of statistical analysis.

3.2 MEASUREMENT AND OBSERVATION

3.2.1 The data

The data contained in the study consisted of both primary and secondary data.

3.2.1.1 The Primary data

a) Objective:

This included the use of the pressure algometer that was used to measure the patients' pressure-pain threshold.

b) Subjective:

The patients' perception of their disability in the form of the CMCC Neck Disability Index (Addendum D),

- The patient's perception of the sensory dimension of their pain in the form of the Short Form McGill Pain Questionnaire (Addendum E), and

- The patient's perception of their level of pain in the form of the Numerical Pain Rating Scale-101 (Addendum F).

3.2.1.2 The Secondary data

This was obtained from journal articles, books and other literature related to mechanical neck pain, manipulative treatment (both chiropractic and other) and cervical pillows. Documentation pertaining to the validity and significance of the methods of objective and subjective measurement was also collected. Furthermore, personal interviews with registered chiropractors were conducted.

3.2.2 Methods of measurement

3.2.2.1 Subjective measurement

- **Numerical Pain Rating Scale 101 (NRS 101)**

  This scale includes two horizontal lines, each ranging from 0 (no pain) to 100 (worst pain imaginable). The patient was required to indicate by means of a percentage on the first line the intensity of the pain prior to the treatment, when the pain was at its worst, and on the second line when the pain was at its least. The average of the two figures gave an estimate of the average pain intensity experienced by the patient.

Jensen et al. (1986) investigated six methods of assessing pain intensity. They stated that the Numerical Pain Rating Scale 101 had practical advantages over other measures because:

a) The scale does not appear to be associated with age,

b) it can be noted in either verbal or written form and

c) it is simple and practical to administer and score.

- **CMCC Neck Disability Index Questionnaire (CMCC)**

  This index assesses the patient's ability to manage activities in daily living. The questionnaire comprises ten questions, each scoring a maximum of 5 points and a minimum of 0. The questionnaire is scored out of fifty and can be represented as a percentage disability (Vernon and Mior 1991).

  Vernon and Mior (1991) did a study to assess the validity and reliability of this questionnaire and found that the CMCC Neck Disability Index had a high degree of internal validity and consistency. It also appeared to be sensitive to changes in disability during the treatment period as well as to the severity of the problem. In addition they commented that the questionnaire was applicable to a wide age distribution, had an acceptable level of validity and was unaffected by gender.

- **Short-Form McGill Pain Questionnaire (SFMPQ)**

  This questionnaire provides information on the sensory, affective and quality dimensions of pain. It identifies different types of pain and has become one of the most widely used tests for the measurement of pain. The questionnaire consists of 15 representative descriptors that were selected according to the frequency of their suggestion by patients. Each descriptor was rated on a scale of: 0=none; 1=mild; 2=moderate; 3=severe (Melzack 1987).

Melzack and Katz (1992:164) remarked that the most accurate measurement of pain is "self report" because pain is a subjective quality. This questionnaire has been successful in measuring the sensory dimension of pain.

3.2.2.2 Objective Measurement

- **The Algometer**

This instrument was used to measure the pressure-pain threshold. The algometer was placed over the articular pillar at the level of joint dysfunction and pressure was applied. This level was identified by motion palpation, static palpation and joint challenge.

The force readings were measured in kilograms per square centimeter. A higher reading meant that there was less tenderness over the area and therefore the patient had a higher tolerance to pain (Fischer 1986).

Antonaci et al. (1998), in their study, concluded that manual algometry has a moderate to excellent inter-examiner reliability.

According to Fischer (1986), the pressure algometer has been utilized in many studies, by measuring sensitivity in normal tissue. Furthermore the validity of the algometer in different locations, occasions and between investigators has been confirmed.

A study performed by Vernon et al. (1990) showed that the algometer proved highly beneficial in objectifying the outcome of manipulation.

3.3 THE LOCATION OF THE DATA

The primary data was obtained from the NRS-101, the CMCC Neck Disability Index and the SFMPQ. These questionnaires were completed by the patient at the beginning of the first, third and after the sixth visit. The algometer readings were taken at the same time. This obtained the subjective and objective data respectively. The researcher, who was present when the questionnaires were completed, took the recordings. All consultations were conducted at Technikon Natal Day Clinic.

3.4 STUDY PROTOCOL AND DESIGN

3.4.1 Object of the study

The objective of this study was to identify the relative effectiveness of each treatment method in terms of subjective and objective findings. This investigation attempted to identify a relatively more effective treatment method that should benefit professionals in the treatment of mechanical neck pain.

3.4.2 Allocation of the subjects

The sample size of forty patients were randomly assigned into one of two groups using forty slips of paper (20 of each of the two treatment protocols), which were placed into a hat and randomly drawn. This technique was performed until 20 patients were selected for one of the groups. All remaining patients were put into the other group. The experimental

group (group1) was treated with manipulation and were given an Orthopillow (Van den Bos 2000) to sleep on and the control group (group 2) was treated with spinal manipulation alone.

3.4.3 Criteria for acceptance of subjects

This study was limited to patients who were referred to Technikon Natal day clinic by advertisements. These were placed at the University of Natal, Technikon Natal, local gyms, sports clubs, supermarkets, pharmacists and in community newspapers.

At the initial consultation, patients received a covering letter (Addendum I), which briefly explained the inclusion/exclusion criteria which assessed their acceptability for the study.

The criteria were as follows:

- Only patients between the ages of 18 and 55 years of age (inclusive) were considered for this study, in order to produce a relatively uniform sample group in terms of age.
- Patients with systemic pathology that would contraindicate manipulation were not included.
- If any contra-indications to spinal manipulation were present or suspected, the patient was not included in this study
- Patients complaining of mechanical neck pain as outlined by Grieve (1988:378) of greater than 4 weeks duration were considered for the study.
- Patients were not allowed to take analgesics or receive any other treatment for this condition while participating in this study.

3.4.4 Detailed patient procedure and interventions

The patients in the study were informed as to the nature and reasons for the study. After this, they completed and signed an informed consent form which explained the terms and conditions of the study (Addendum H)

On the initial visit all patients had a consultation, which included a complete case history (Addendum A), physical examination (Addendum B) and a cervical spine examination (Addendum C).

Patients who had not been x-rayed within the previous 3 months were x-rayed at the Technikon Natal Department of Radiography to rule out fractures and other pathology contraindicated to cervical manipulation. The necessity for x-ray examination thus eliminated pregnant females from the study.

Both groups were motion palpated using techniques described by Bergmann et al. (1993:241-292). The techniques used were diversified rotary and lateral break techniques according to Szaraz (1990:46-77) and are summarised below:

Cervical rotary- Thumb extension

This technique is indicated for rotary dysfunction from C1 to C4. The patient is supine with the headpiece horizontal. The indifferent hand cups the occiput while the thumb pad of the contact hand is placed against the posterior arch of the atlas or the articular process of the involved vertebra. The fingers are spread wide and placed across the patients cheek.

Traction is applied with the indifferent hand while the contact hand rotates the head and neck to take out the joint slack. The thrust is a short amplitude, high velocity impulse with the rotary action of the forearm of the contact hand.

Cervical rotary- Index contact

This is indicated for rotary dysfunction from C1 to C7. The doctor stands on the side of the dysfunction and takes a firm index contact on the articular pillar of the involved vertebra. The indifferent hand cups the patients ear with the hooked fingers against the rim of the occiput to provide rotation and cephalad traction. A quick, short amplitude pectoral thrust is then delivered in a rotary direction. Slight ulnar deviation, during thrust, provides rotary movement.

Lateral break

This is indicated for lateral dysfunction from C1 to C6. The patient is supine or seated with the head piece level. The doctor stands at the head of the patient slightly toward the side of the lesion. Once the dysfunction has been identified the neck is deviated away from the lesion to separate the joint. An index contact is taken with the wrist straight. The indifferent hand cups the occiput and provides cephalad traction. Joint slack is taken up toward the lesion and a sudden short amplitude, pectoral thrust is given in a straight line.

Thumb Move

This technique is used for rotational dysfunction of C6 to T3. The patient lies prone. The doctor in fencer stance, on the ipsilateral side of the dysfunctional area and contacts the

side of the involved vertebra with the thumb. The contact forearm is parallel to the floor. The indifferent hand takes contact on the contalateral occiput and temporal bone with a web contact. The patients face is rotated away from the lesion and cephalad traction is applied. The spinous process is used as a lever and the impulse, pectoral thrust is applied straight across.

The patients in group 1 were in addition given the Orthopillow (Van den Bos 2000) to take home and sleep on.

The patients received 6 treatments within a four week period. Any patient who had an excessive exacerbation of their condition (as determined by the duty clinician) as a direct result of the treatment was removed from the study. If a patient became asymptomatic before the completion of the course of treatments, they still had to attend treatments and were assessed but not treated.

3.4.4.1 The Orthopillow

The cervical pillow used in this study was the Orthopillow (Addendum J). This pillow is approved by the Chiropractic association of South Africa and designed by a chiropractor, Dr. M. Van den Bos. He states that the primary objective of this pillow is to provide support for the head and neck of a person lying supine or in a side posture (Van den Bos 2000). Furthermore he reports that the pillow allows for relaxed neck muscles, good air passage, free blood flow to and from the brain and an unimpaired nervous system during sleep (Van den Bos 2000).

The top section consists of dimpled foam and the sides are molded for comfort and are of equal height (Van den Bos 2000).

Van den Bos (2000) states that in the supine position, the soft center and the air space will allow the head to sink down and the firm side will gently support the neck in extension. In a side-lying position, the firmer end pieces will support the neck, keeping the neck horizontal in the side lying position. He suggests that this support of the neck should decrease mechanical neck pain. Furthermore Van den Bos (2000) recommends that the pillow not only be used for the individual with neck pain, but also used as a form of preventative health care (Van den Bos 2000).

3.5 STATISTICAL ANALYSIS

3.5.1 Treatment of the Data

Subjective Data

All questionnaires were checked in order to ensure that they were correctly completed.

The amounts for the questionnaires were converted into percentages for the CMCC Neck Disability index and for the NRS Pain Scale and recorded separately for each group.

The data was then analysed.

Objective Data

The algometer readings were recorded separately for each group.

The data was then analysed.

3.5.2 The Sample Size of the Study

The sample size of the study was 20 patients per group. Group 1 consisted of 20 patients who made up the first treatment group. Group 2 consisted of the remaining 20 patients who made up the second treatment group.

3.5.3 Statistical Analysis of the data

Continuous variables were analysed using parametric methods, while categorical variables were analysed using non-parametric methods regardless of the sample size per group.

Procedure 1.1: Comparison between groups 1 and 2 with respect to categorical variables

The Mann-Whitney U-test was used to compare Groups 1 and 2 with respect to each categorical variable. The null hypothesis states that there is no significant difference between Groups 1 and 2 with respect to the variable of comparison at the $\propto = 0.05$ level of significance. The alternative hypothesis states that there is a significant difference at the same level of significance.

Decision rule:

The null hypothesis is rejected at the $\propto$ level of significance if $p < \propto$ where p is the observed level or probability value. Otherwise, the null hypothesis is accepted at the same level.

Procedure 1.2: Comparison between Groups 1 and 2 with respect to continuous variables

The two –sample unpaired t- test as used to compare Groups 1 and 2 with respect to each continuous variable. The null hypothesis states that there is no significant difference between Groups 1 and 2 with respect to the variable of comparison at the $\propto = 0.05$ level of significance. The alternative hypothesis states that there is a significant difference at the same level of significance.

Decision rule

The null hypothesis is rejected at the $\propto$ level of significance if $p < \propto$ where p is the observed level or probability value. Otherwise, the null hypothesis is accepted at the same level.

Procedure 2.1: Comparison between related samples within Group 1 with respect to categorical variables

Wilcoxen's signed rank test was used to compare results from related samples. In each test, the null hypothesis states that there is no significant improvement between the 2 related samples being compared at the $\propto$ level of significance. The alternative hypothesis states that there is a significant improvement.

Decision rule

The null hypothesis is rejected at the $\propto$ level of significance if $p < \propto$ where p is the observed level or probability value. Otherwise, the null hypothesis is accepted at the same level.

Procedure 2.2: Comparison between related samples within Group 1 with respect to continuous variables

The two-sample paired t-test was used to compare results from related samples. In each test, the null hypothesis states that there is no significant improvement between the 2 related samples being compared at the $\propto$ level of significance. The alternative hypothesis states that there is a significant improvement.

Decision rule

The null hypothesis is rejected at the $\propto$ level of significance if $p < \propto$ where p is the observed level or probability value. Otherwise, the null hypothesis is accepted at the same level.

Procedure 3.1: Comparison between related samples within Group 2 with respect to categorical variables

Procedure 2.1 was repeated within Group 2 with the same decision rule.

Procedure 3.2: Comparison between related samples within Group 2 with respect to continuous variables

Procedure 2.2 was repeated within Group 2 with the same decision rule.

Procedure 4: Comparison using barcharts

Visual summaries of analytical findings were given by the use of bar charts to compare Groups 1 and 2. Average (mean) readings were used to construct barcharts.

3.5.3.1 Statistical package

The statistical package SPSS was used for data entry and analysis.

CHAPTER FOUR

THE RESULTS

4.1 INTRODUCTION

The statistical findings of this study are presented in this chapter. The subjective as well as the objective findings of both groups 1 and 2 are discussed. The objective data was obtained from the algometer readings whilst the subjective data was collected from the questionnaires completed on the first, third and sixth visits.

The intra and inter-treatment results were considered for both groups. Demographic data consisting of age, gender, duration of neck pain and the presence or absence of a hypolordosis have also been shown.

4.2 SOLVING THE SUBPROBLEMS

The two subproblems were solved by the results obtained from the statistical analysis conducted on the collected data. The null (H_o) and alternative (H_a) hypothesis for each of the subproblems were as follows:

4.2.1 The First Subproblem

The first objective was to determine the effectiveness of a cervical pillow combined with manipulation compared to manipulation alone in terms of **objective** findings in the management of mechanical neck pain.

The hypothesis for the experimental and control groups were:

H_o: there would be no statistically significant difference in the **objective** clinical findings on analysis of the data.

H_a: there would be a statistically significant difference in the **objective** clinical findings on analysis of the data.

4.2.2 The Second Subproblem

The second objective was to determine the effectiveness of a cervical pillow combined with manipulation compared to manipulation alone in terms of **subjective** findings in the treatment of mechanical neck pain.

The hypothesis for the experimental and control groups were:

H_o: there would be no statistically significant difference in the **subjective** clinical findings on analysis of the data.

H_a: there would be a statistically significant difference in the **subjective** clinical findings on analysis of the data

4.3 THE ANALYSED DATA

During this and subsequent chapters, the group that was treated with manipulation combined with a cervical pillow will be referred to as group 1 and the patients that received manipulation alone will be referred to as group 2. The null hypothesis was rejected at the $\propto$ level of significance ($\propto$ =0.05) if $p \leq \propto / 2$ (since tests are 2-tailed).

NOTE: P values that are statistically significant are denoted with a **(s)**.

S.D stands for standard deviation.

4.3.1 Demographic data

Table 1 Patient data

Age Distribution	Group 1	Group 2	Total
18 – 30	10	12	22
30 – 40	5	2	7
> 40	5	6	11
Average Age	31.5	36.5	34
Gender Distribution			
Females	9	10	19
Males	11	10	21
Duration of Neck Pain			
< 6 weeks	4	1	5
6 weeks - 3 months	5	4	9
3 months - 6 months	3	2	5
> 6 months	8	13	21
Hypolordosis on X-Ray examinations	11	17	27

4.3.2 Results of Statistical Analysis

Results of Mann-Whitney Test Comparing Categorical Variables between Group 1 and Group 2

Table 2 *Two Sample Analysis of McGill*

	GROUP 1		GROUP 2
VARIABLE	MEAN 1	P VALUE	MEAN 2
MG 1	11.50	0.597	9.50
MG 3	4.50	0.260	5.50
MG 6	1.00	0.676	1.00

No statistically significant differences were found for the McGill Short-form Questionnaire, thus the null hypothesis was accepted for all visit comparisons.

Results of the Two-Sample Unpaired T-Test Comparing the Continuous Variables Between Group 1 and Group 2

SUBJECTIVE DATA RESULTS

Table 3 *Two sample analysis of CMCC Neck Disability Index measurements*

VARIABLE	GROUP 1		P-VALUE	GROUP 2	
	S.D	MEAN		S.D	MEAN
CMCC 1	7.815	21.9885	0.834	11.266	21.8358
CMCC 3	7.626	14.0220	0.512	10.810	15.9995
CMCC 6	4.767	5.1665	0.424	8.5210	7.0526

The null hypothesis was accepted for all visits as no statistically significant differences were found for the CMCC Neck Disability Index for all visits.

Table 4 ***Two sample analysis of Numerical Pain Rating Scale measurements***

VARIABLE	GROUP 1		P VALUE	GROUP 2	
	S.D	MEAN		S.D	MEAN
NRS 1	14.0295	43.8000	0.747	11.1213	42.5000
NRS 3	14.8739	29.6250	0.944	16.2525	29.9750
NRS 6	14.5655	11.3750	0.864	11.8295	12.1000

No statistically significant differences were found for the Numerical Pain Rating Scale and thus the null hypothesis was accepted for all visits.

OBJECTIVE DATA RESULTS

Table 5 ***Two sample analysis of algometer measurements***

VARIABLE	GROUP 1		P VALUE	GROUP 2	
	S.D	MEAN		S.D	MEAN
ALG 1	0.8340	1.9825	0.176	1.5492	2.5250
ALG 3	0.8725	2.3650	0.629	1.4039	2.5450
ALG 6	0.9670	2.7650	0.169	3.2530	3.8300

The null hypothesis was accepted for all visits as no statistically significant differences between the groups were found.

Results of Wilcoxen Signed Rank Test for Categorical Variables

Table 6 One *sample analysis McGill Pain Rating Scale*

GROUP 1				GROUP 2			
VISIT	MEAN		P VALUE	VISIT	MEAN		P VALUE
MG 1-MG 3	12.25	5.65	**.001s**	MG 1-MG 3	10.8	8.1	**.025s**
MG 3-MG 6	5.65	1.55	**.000s**	MG 3-MG 6	8.1	2.15	**.000s**
MG 1 –MG 6	12.25	1.55	**.000s**	MG 1 -MG 6	10.8	2.15	**.000s**

Statistically significant change was seen between all comparisons for both groups. This indicates that in both groups, the patient's perception of the pain intensity was reduced. Thus, the null hypothesis was rejected for all comparisons within both groups.

Results of Paired T-Tests for Continuous Variables for Both Group 1 and Group 2

SUBJECTIVE DATA

Table 7 *One sample analysis of Numerical Pain Rating Scale for group 1 and 2*

GROUP 1				GROUP 2			
VISIT	MEAN		P VALUE	VISIT	MEAN		P VALUE
NRS 1 - NRS 3	43.8	29.6	**0.000 s**	NRS 1 - NRS 3	42.5	29.9	**0.000 s**
NRS 3 - NRS 6	29.6	11.3	**0.000 s**	NRS 3 - NRS 6	29.9	12.1	**0.000 s**
NRS 1 - NRS 6	43.8	11.3	**0.000 s**	NRS 1 - NRS 3	42.5	29.9	**0.000 s**

Statistically significant change was seen between all comparisons for both groups. This indicates that in both groups, the patient's perception of the pain intensity was reduced.

Table 8 ***One sample analysis of CMCC Neck Disability Index for group 1 and group 2.***

GROUP ONE				GROUP TWO			
VISIT	MEAN		P VALUE	VISIT	MEAN		P VALUE
CMCC 1 –3	21.9	14	**0.000 s**	CMCC 1 - 3	21.8	15.9	**0.004s**
CMCC 3 –6	14	5.1	**0.000 s**	CMCC 3 - 6	15.9	7	**0.000 s**
CMCC 1 –6	21.9	5.1	**0.000 s**	CMCC 1 - 6	21.8	7	**0.000 s**

In the comparisons between treatments in group 1 and group 2 all results were statistically significant. This indicated that in both groups the patients' perception of their disability was reduced.

OBJECTIVE DATA

Table 9 ***One sample analysis of algometer readings for group 1 and 2***

Group 1				Group 2			
VISIT	MEAN		P-VALUE	VISIT	MEAN		P-VALUE
ALG 1 – ALG 3	1.98	2.36	**0.036s**	ALG 1 - ALG 3	2.52	2.54	0.931
ALG 3 – ALG 6	2.36	2.76	**0.046s**	ALG 3 - ALG 6	2.54	3.83	**0.027s**
ALG 1 – ALG 6	1.98	2.76	**0.000 s**	ALG 1 - ALG 6	2.52	3.83	0.060

At the 90% level of confidence, group 1 had significant results for all visit comparisons. Thus, the null hypothesis was rejected in this instance. Therefore this indicates that there was a reduction in tenderness over the joint involved. In group 2, the only significant results obtained were between the third and sixth treatment comparisons.

Fig. 4.1 **Bar chart comparing the mean values for NRS between Group 1 and Group 2.**

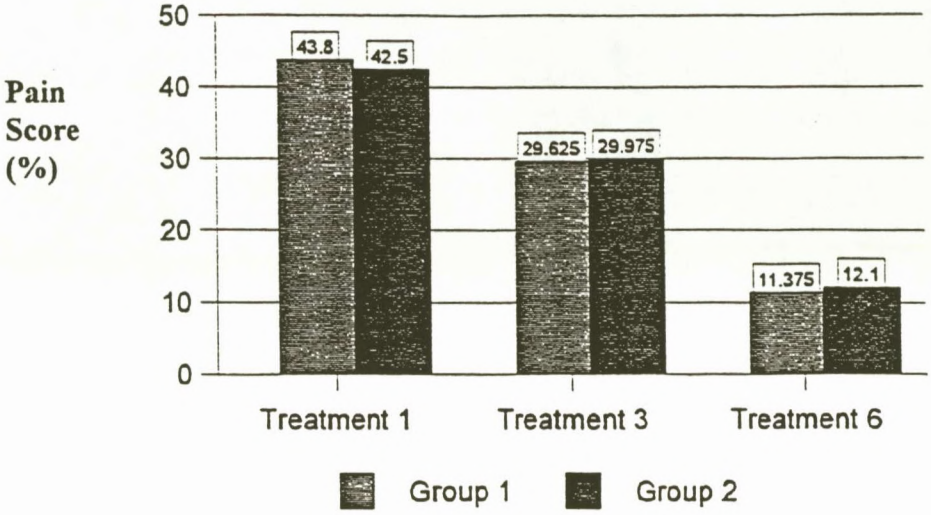


Fig. 4.2 **Bar chart comparing the mean values for McGill pain questionnaire between Group 1 and Group 2.**

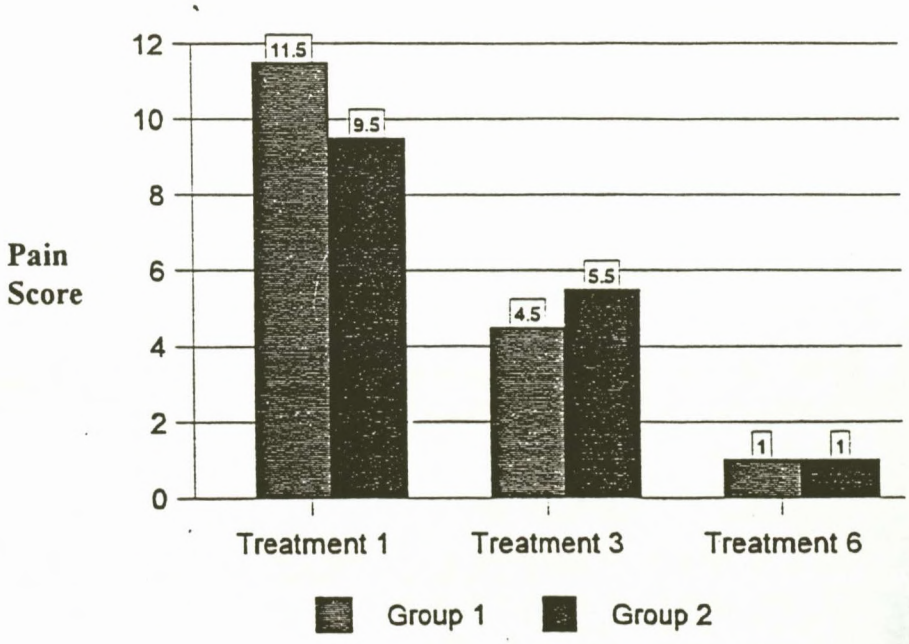
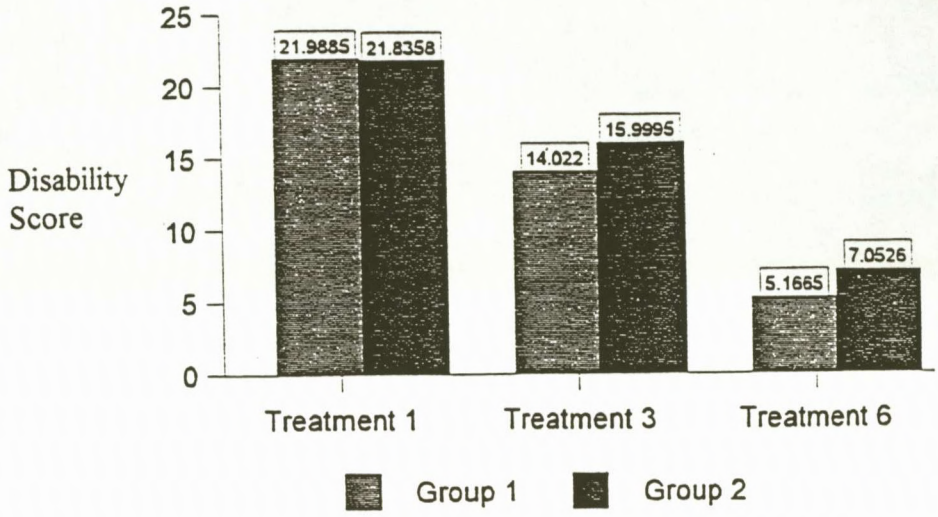


Fig. 4.3 **Bar chart comparing the mean values for CMCC neck disability index between Group 1 and Group 2.**



CHAPTER FIVE

DISCUSSION

5.1 INTRODUCTION

This chapter involves the discussion of the results of the demographic, objective and subjective data that was presented in chapter four. In addition, limitations of this study are mentioned as well as an outline of comparisons with other studies.

The subjective and objective data was divided into 2 sections, which are discussed in terms of intragroup and intergroup comparisons.

5.2 DISCUSSION OF THE OBJECTIVE MEASUREMENT RESULTS

5.2.1 Algometer Readings

Comparison of Intragroup analysis

Results from the analysis of the algometer readings using the Paired T-Test revealed that group 1 (who received manipulation and a cervical pillow) showed statistically significant results for all visit comparisons. Group 2 (who received manipulation alone) only showed statistically significant results between treatment 3 and 6.

Where there were clinically significant results, there was a reduction in joint tenderness (increased pressure-pain threshold) at the involved level.

Intergroup analysis

The Two-Sampled Unpaired T-Test was used to compare the results of the algometer readings between group 1 and group 2. No statistically significant differences were seen between the two groups, indicating that clinically there was no difference in improvement between the groups. Although significant improvements were seen within group 1, these were obviously not large enough to produce a statistically significant inter-group difference.

5.2.2 Summary of Objective Findings

To conclude, in both groups, the mean algometer readings improved, indicating that there had been a clinical reduction in joint tenderness and therefore presumably in joint pain. Although there was not a statistically significant difference between the two groups over the full period, group one did seem to have a faster and clearer effect in increasing the pressure/pain threshold. This could be considered an indication that adding a cervical pillow to the manipulation treatment regime may be more effective in reducing joint tenderness when compared to manipulation alone in the short term only.

5.3 DISCUSSION OF SUBJECTIVE MEASUREMENT RESULTS

5.3.1 McGill Pain Questionnaire

Intragroup comparison

Results from the analysis of this questionnaire using the Wilcoxens signed rank test revealed that both groups 1 and 2 showed statistically significant improvement for all

assessments. That is, between the first and sixth treatments, all patients had an impressive reduction in the perception of their neck pain.

Intergroup comparison

The Mann-Whitney test was used to compare the results of the McGill Pain Questionnaire between group 1 and group 2. The results in terms of pain severity were similar. Group 1 showed a greater improvement when compared to group 2 from the first to the third treatment and group 2 showed slightly greater improvement than group 1 from the third to the sixth treatment.

5.3.2 CMCC Neck Disability Index

Intragroup comparison

Results from the Intragroup analysis using the Wilcoxen signed rank test revealed that both groups 1 and 2 showed statistically significant results for all treatment comparisons. Therefore the patients in both groups indicated that they had considerable improvement in the disability that the neck pain had caused.

Intergroup Analysis

The Mann Whitney test was used to compare the results of the CMCC between group 1 and group 2. Although group 1 showed a slightly greater improvement in the mean value from treatment 1 to 6, both groups showed similar results.

5.3.3 Numerical Pain Rating Scale

Intragroup analysis

Results from the Paired T-Test for group 1 and group 2, showed that there was statistically significant improvement between all treatments for both groups. This meant that both groups experienced beneficial results in terms of their perceived pain intensity.

Intergroup Analysis

The Two Sampled Unpaired T-Test was used to compare the results of the Numerical Pain Rating Scale-101. No statistically significant differences were found between the two groups.

5.3.4 Summary of subjective results

Although no statistically significant results were seen between the two groups, statistically significant results were seen for all intra-group comparisons of the questionnaires. This indicates that the patients felt that their pain and disability was dramatically reduced, regardless of whether they received manipulation with a cervical pillow or manipulation alone. Hence, the above results suggest that both groups displayed uniformity in experiencing a favorable clinical response. This suggests that both groups 1 and 2 have equal efficacy in the treatment of mechanical neck pain.

Therefore the addition of a cervical pillow to the manipulation treatment regime did not play a more active role in improving the patient's signs and symptoms as both groups improved equally.

5.4 DISCUSSION OF DEMOGRAPHIC DATA

Of the 40 patients participating, 21 were male and 19 were female. The average age of the patients was 34 years old. Skargen et al. (1997), in their study of 900 patients found that the mean age of their patients were 41.4 years old for the group receiving chiropractic care and 40.5 years old for those receiving physiotherapy. The location of the research clinic could have influenced the age of patients treated in this study. Although great care was taken to advertise widely and obtain a realistic spectrum of neck pain sufferers, the clinic is on a campus and therefore is readily accessible to people of a younger age group.

Twenty-one of the forty patients had suffered from neck pain for greater than 6 months. This supports the findings of Bovim et al. (1994) who found that the most common duration of neck pain in the general population, was pain of greater than 6 months.

Of the 40 patients participating, 27 had a hypolordosis of the cervical spine on x-ray examination, as determined by a radiologist. This is interesting to note as it supports the statement by Leach (1983), that it is generally recognized that a hypolordosis of the cervical spine may be associated with neck pain.

Although some of the demographic data has been recorded for interest, it cannot reliably be compared to other studies that have emphasised or principally investigated the demographics of mechanical neck pain.

5.5 LIMITATIONS

- ***Subjective questionnaires***

In the questionnaires, a lack of human understanding may have caused a biased result due to human error. It was noted that English was not the first language of 2 of the patients. In addition, it was possible that the subjects tried to please the researcher by reporting improvement in successive consultations. However, this should not have prejudiced any one group, as each group was treated as similarly as possible.

The lack of statistically significant differences seen between the two groups queries the sensitivity of the questionnaires, as perhaps subtle changes in patient disability and pain intensity were undetected. Some patients expressed a degree of difficulty in describing and quantifying their pain as well as explaining it in terms of a percentage.

- ***The Orthopillow***

The Orthopillow was only used to sleep on at home, and so there was no way in which the researcher could check that the patient was using the pillow. The researcher had to rely on the honesty and the integrity of the patient.

Furthermore the Orthopillow only came in one size. As a result this did not take into consideration the wide variety of sizes of peoples head/necks in the population. Several patients complained that the pillow was too thick. A few others complained that the pillow made an irritating "crinkley" noise due to the type of foam constituting the pillow.

One patient chose to withdraw from the study due to an aggravation of her symptoms that she attributed to the Orthopillow. Although many patients mentioned that initially the pillow felt a little awkward, 19 out of the 20 patients using the pillow approved of it. Most of the patients commented that they felt it did help to alleviate neck pain and found it comfortable while sleeping.

Other Limitations

A critical weakness in this study was that the sample sizes were too small (20 per group). This creates a problem in that the sample chosen may not have been representative of the whole population of mechanical neck pain sufferers. However, financial and time constraints did not allow for a larger sample size.

Emotional stress, occupational daily activity and chronic myofascitis of the neck muscles should also have been considered in treating the patient. Factors such as these could have influenced the patient's degree of pain and disability between treatments. In a study by Linton (2000), he concluded that psychological factors play an important role in chronic neck pain and also in the etiology of acute neck pain.

In terms of algometer readings, a greater difference between the two groups was expected, however this did not occur. Perhaps in some instances the algometer recorded the tenderness of overlying muscle spasm as opposed to joint tenderness. It was noted that all 40 patients had an associated myofascitis of the Posterior cervical and/or upper Trapezius muscles.

Furthermore, several of the patients complained of post-excercise muscle stiffness that they attributed to sports activities or lifting heavy boxes. This could have resulted in a decreased pressure pain threshold due to the muscular tenderness, although the joint may have been unaffected.

A sixth year chiropractic intern and not a qualified doctor of chiropractic performed all manipulations and measurements. Perhaps more reliable results would have been attained if someone more experienced or qualified had carried out the treatments.

5.6 COMPARISON OF THE RESULTS WITH OTHER RESEARCH

No study involving the comparison of the effectiveness of manipulation combined with a cervical pillow to manipulation alone for mechanical neck pain has been found in journals, CD-ROMs, textbooks or the Internet. Thus, it is difficult to make direct comparisons to other research studies.

Leach (1983) investigated the effects of spinal manipulation combined with a cervical pillow, corrective manipulation and a control group on the correction of a cervical hypolordosis or kyphosis. The group receiving corrective manipulation alone attained the most outstanding results in terms of correcting a hypolordosis or a kyphosis. The group receiving manipulation and a cervical pillow did, however, improve the cervical curve depth of the older patients in the study. Leach's study is dissimilar to this investigation as he had a smaller sample of patients, there were three groups involved and he did not primarily research neck pain.

Pikula (1999) did a study on the effect of manipulation on pain reduction and range of motion in 36 patients with acute unilateral neck pain. He concluded that immediately following a single manipulation to the ipsilateral side of the neck, there was less pain intensity and a greater range of motion in the neck.

Although there are similarities between this research and that of Pikula (1999) in terms of dramatic subjective relief of pain intensity and a comparable sample size, Pikula did not include a cervical pillow in the treatment regime. In addition he used different methods of subjective and objective measurement (Visual Analog Scale and Cervical –range-of-motion respectively).

In a randomized study Koes et al. (1992) evaluated the effectiveness of manual therapy, physiotherapy, placebo and treatment by a general practitioner for non-specific neck and back complaints in 256 subjects. The manual and physiotherapy groups had a significantly greater effect in reducing pain and severity of the main complaint as compared to treatment by a general practitioner.

The study by Koes et al. (1992) cannot be directly compared to this study as the sample sizes were different and back complaints were also treated. However, in both studies there are similarities in the reduction of pain observed in the patients who received manipulation.

Cassidy et al. (1992) carried out a study to compare the effect of manipulation and mobilization on neck pain and range of motion in patients suffering from unilateral neck pain. In their study there were 100 patients and the outcome measures used were the NRS 101 Scale and the cervical range of motion. The results showed that both treatments caused an increase in the range of motion, but manipulation was significantly more effective in the reduction of pain intensity. The study by Cassidy et al. (1992) has similar findings to this study in term of the effectiveness of manipulation on pain intensity. However, they used mobilization and did not include a cervical pillow in the treatment regime, therefore it is difficult to compare the two.

Van Schalkwyk and Parkin-Smith (2000) investigated the effect of a cervical rotary adjustment and a lateral break in the treatment of mechanical neck pain in 30 subjects. Statistical analysis suggested that both treatments had a beneficial effect on mechanical neck pain, and neither was superior to the other. Their study is similar to this study in that the sample sizes are alike, both groups received cervical manipulation, the subjective measurements used were identical and both groups in both studies showed significant improvement. However, no cervical pillow was used in Van Schalkwyk and Parkin-Smiths' study and so close comparison between the two studies cannot be made.

As mentioned previously, there is no research directly comparing the effects of manipulation combined with a cervical pillow to manipulation alone in the treatment of mechanical neck pain. Therefore, it is problematic to make direct and meaningful comparisons with other studies as there are a wide variety of dissimilar factors being

considered. Despite this, most of the studies concur with each other and this research, that manipulation has extremely beneficial effects on mechanical neck pain.

5.7 SUMMARY

The results of the statistical analysis show no significant differences between either group in terms of subjective findings. The objective readings however, do seem to initially favor group 1 who used the Orthopillow. Both groups had a dramatic decrease in pain intensity, disability and joint tenderness.

The limitations discussed are to be considered normal in the light of this being a pilot study. These should in no way invalidate the research, but rather provide recommendations for future studies of this nature.

Finally, the comparison of this study with other research supported the findings of numerous other studies, that manipulation is an effective form of treatment for mechanical neck pain. However no study included the use of a cervical pillow in a treatment regime for mechanical neck pain and therefore no specific correlation's could be made.

Fig 5.1 This research compared to van Schalkwyk's study

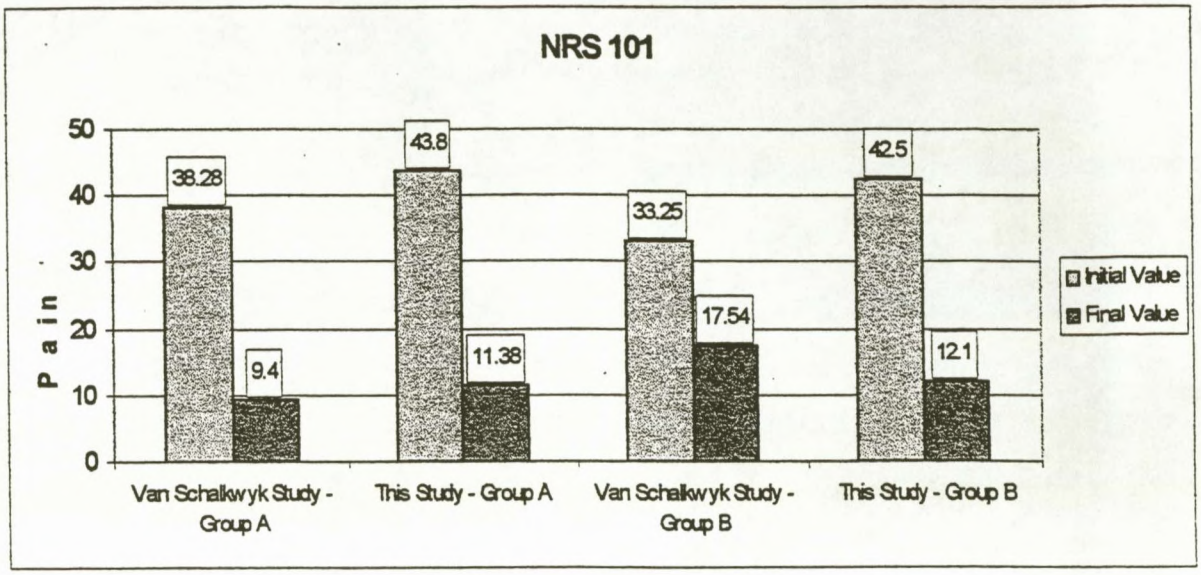
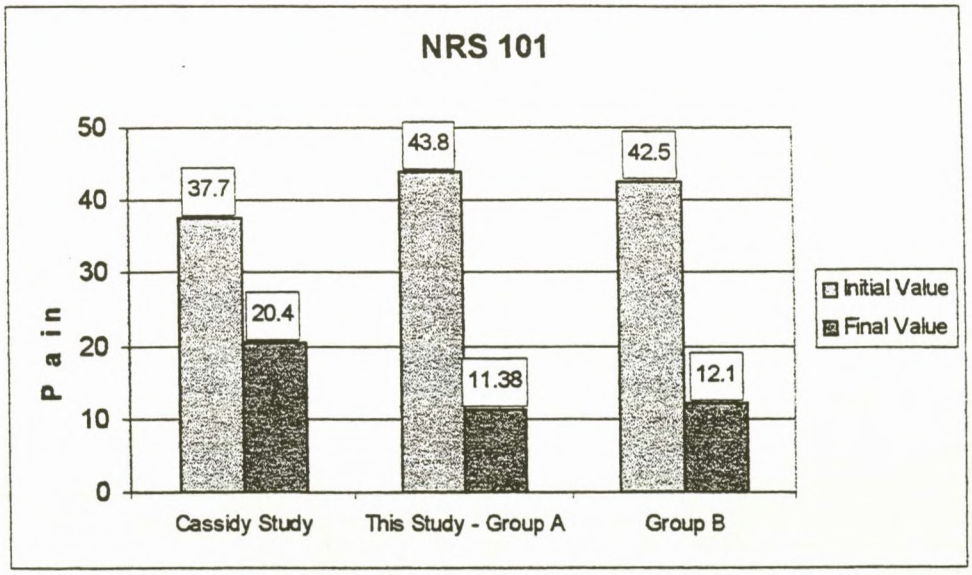


FIG 5.2 This research compared to Cassidy's study



CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

In this chapter recommendations for further research is discussed and final conclusions are drawn.

6.2 RECOMMENDATIONS

On the initial orthopaedic examination of the cervical spine all 40 patients had myofascial trigger points, particularly in the posterior cervical and upper trapezius muscles. As this study focused on treating joint dysfunction, future studies should include treatment of the associated myofascial syndromes (eg. stretching, massage and dry needling). This should help to reduce the patients' pain intensity and give a more holistic and therefore beneficial treatment protocol when combined with manipulation and a cervical pillow for mechanical neck pain.

Manipulation of the thoracic spine should also be included in future studies as it was noted that a large number of patients also suffered from thoracic spine symptoms.

It is advisable that the clinician involved in treating the patients be blinded, so as not to influence the outcome of the results. The researcher could utilize a chiropractor who is unaware of the dynamics of the study to adjust the patients.

Successful manipulation requires a high level of skill and experience. Therefore it might be beneficial in future studies that the manipulator has at least 5 years clinical experience.

Due to the variable nature of mechanical neck pain, subsequent studies should consider methods of producing a more uniform sample group. Selection techniques should possibly take into account age, occupation, emotional stress, mechanism of injury (eg. motor vehicle accident) and stricter criteria in terms of duration of pain. In addition, a larger sample size should be used in order to get a more realistic sample of the population.

It may also be useful to conduct a study assessing the association between pain of an area and joint tenderness at the same location. This should determine the reliability and validity of tenderness of a joint as an objective measurement for mechanical neck pain.

It would have been interesting to have a third group receiving a cervical pillow alone as this should clearly show the effects of the pillow with no other intervention. In the researchers opinion, the Orthopillow is a well designed pillow that was found suitable by patients in terms of comfort and relief of neck pain. Consequently, the researcher recommends that this pillow is used by clinicians in the treatment of mechanical neck pain and that the Orthopillow is used in further research into cervical pillows. One of the limitations discussed was the large size of the pillows. Perhaps the pillow could be made in different sizes for example small, medium and large to accommodate for different neck sizes.

The long-term efficacy of manipulative therapy and the use of a cervical pillow in the treatment of mechanical neck pain was unfortunately not considered in this study. As a change in sleeping posture can take several weeks to months to occur, the Orthopillow combined with manipulation may have shown superior results if measured over a longer period of time. This may be achieved in future studies by including 1 month, 3 months and 6 month follow-up consultations.

6.3 CONCLUSIONS

This study consisted of 40 patients who were randomly divided into 2 equal groups. All patients underwent an extensive medical history, physical and orthopaedic examination. After this, it was determined whether the patient would be included in the study.

Both groups had 6 treatments within a 4 week period, in which the patient either received manipulation combined with a cervical pillow or manipulation alone to the cervical spine.

The patients perception of their pain, comfort and disability was assessed using questionnaires. These did not show any significant difference between the 2 groups. However, the results showed that in both groups there was a dramatic decrease in pain.

The objective measurements showed that the algometer readings improved faster and more dramatically in the group using the cervical pillow, which may be a indication that the pillow does have an advantage over manipulation alone in decreasing joint tenderness.

However, these differences were not great enough to show a significant difference on statistical examination.

Thus, both treatment protocols have equal efficacy and can be recommended in the management of mechanical neck pain. This study should provide a basis for future studies on the effects of manipulation and cervical pillows in the management of mechanical neck pain.

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Addendum A

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: Current:

X-Ray Studies:
Previous: Current:

Clinical Path. lab:
Previous: Current:

Case Status:

PTT: Conditional: Signed Off: Final Sign out:

Recommendations:

Intern's Case History

1. Source of History:

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

3. Present Illness:

- Location
- Onset
- Duration
- Frequency
- Pain (Character)
- Progression
- Aggravating Factors
- Relieving Factors
- Associated S & S
- Previous Occurrences
- Past Treatment and Outcome

4. Other Complaints:

5. Past Medical History:

- General Health Status
- Childhood Illnesses
- Adult Illnesses
- Psychiatric Illnesses
- Accidents/Injuries
- Surgery
- Hospitalizations

6. Current health status and life-style:

- Allergies
- Immunizations
- Screening Tests
- Environmental Hazards (Home, School, Work)
- Safety Measures (seat belts, condoms)
- Exercise and Leisure
- Sleep Patterns
- Diet
- Current Medication
- Tobacco
- Alcohol
- Social Drugs

7. Immediate Family Medical History:

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

8. Psychosocial history:

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

9. Review of Systems:

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

Addendum B

TECHNIKON NATAL

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

PHYSICAL EXAMINATION

Patient:_____ File#: _____ Date:_____
Clinician:_____ Signature:_____
Intern:_____ Signature:_____

1. VITALS

Pulse rate:
Respiratory rate:
Blood pressure: R L
Temperature:
Height:
Weight:

2. GENERAL EXAMINATION

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

Urinalysis:

3. CARDIOVASCULAR EXAMINATION

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

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

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

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

Percussion: - borders of heart

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

4. RESPIRATORY EXAMINATION

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

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

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

Percussion
- Percussion note:
- Cardiac dullness:
- Liver dullness:

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

5. ABDOMINAL EXAMINATION

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

Inspection
- Shape:
- Scars:
- Hernias:

Palpation
- Superficial:
- Deep = Organomegally:

- Masses (intra- or extramural)
- Aorta:

Percussion - Rebound tenderness:
- Ascites:
- Masses:

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

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

6. G.U.T EXAMINATION

External genitalia:
Hernias:
Masses:
Discharges:

7. NEUROLOGICAL EXAMINATION

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

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

G.C.S.:
- Eyes:
- Motor:
- Verbal:

Evidence of head trauma:

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

Cranial Nerves:

I Any loss of smell/taste:
Nose examination:

II External examination of eye:
- Visual Acuity:
- Visual fields by confrontation:

- Pupillary light reflexes = Direct:
  = Consensual:
- Fundoscopy findings:

III Ocular Muscles:
Eye opening strength:

IV Inferior and Medial movement of eye:

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

b. Motor - Masseter:
- Jaw lateral movement:

c. Reflexes - Corneal reflex
- Jaw jerk

VI Lateral movement of eyes

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

b. Taste - Anterior two-thirds of tongue:

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

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

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

XII Inspection of tongue (deviation):

Motor System:

a. Power
- Shoulder = Abduction & Adduction:
  = Flexion & Extension:
- Elbow = Flexion & Extension:
- Wrist = Flexion & Extension:

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

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

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

Sensory System:

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

b. Joint position sense
- Finger:
- Toe:

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

Cerebellar function:

Obvious signs of cerebellar dysfunction:
= Intention Tremor:
= Nystagmus:
= Truncal Ataxia:

Finger-nose test (Dysmetria):
Rapid alternating movements (Dysdiadochokinesia):
Heel-shin test:
Heel-toe gait:
Reflexes:
Signs of Parkinsons:

8. **SPINAL EXAMINATION:**(See Regional examination)

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

9. **BREAST EXAMINATION:**

Summon female chaperon.

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

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

Addendum C

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC
REGIONAL EXAMINATION - *CERVICAL SPINE*

Patient: _____ File: _____

Date: _____ Intern/Resident: _____

Clinician: _____ Sign: _____

OBSERVATION:

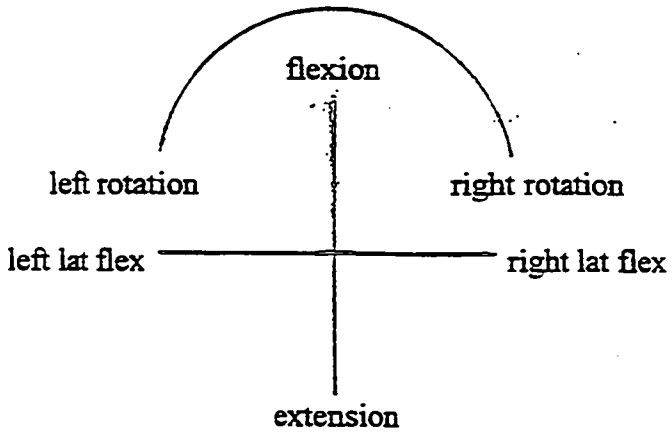
Posture
Swellings
Scars
Discolouration
Hair Line
Bony & Soft Tissue Contours

Shoulder position:
Left:
Right:
Muscle spasm
Facial expression

RANGE OF MOTION:

Flexion (45'):
L/R Rotation (70'):

Extension (70'):
L/R Lat Flex (45'):



PALPATION:

Lymph Nodes
Thyroid Gland

Trachea

ORTHOPAEDIC EXAMINATION:

Tenderness
Trigger Points: SCM, Scalenii, Post Cervicals, Trapezius, Lev Scap

Doorbell sign
Kemp's test
Cervical distraction
Halstead's test
Hyperabduction test
Shoulder abduction test

Cervical compression
Lateral compression
Adson's test
Costoclavicular test
Eden's test
Shoulder depression test

Dizziness rotation test
Brachial plexus tension

Lhermitte's sign

NEUROLOGICAL EXAMINATION:

Dermatomes	Left	Right	Myotomes	Left	Right	Reflexes	Left	Right
C2			C1			C5		
C3			C2			C6		
C4			C3			C7		
C5			C4					
C6			C5					
C7			C6					
C8			C7					
T1			C8					
			T1					

VASCULAR:

	Left	Right
Blood Pressure		
Carotid arts.		
Subclavian arts.		
Wallenberg's test		

MOTION PALPATION & JOINT PLAY:

Left: Motion Palpation:
Joint Play:

Right: Motion palpation:
Joint Play:

Basic Exam: Shoulder:
Case History:

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

Upper T horacics:
Motion Palpation:
Joint Play:

Basic Exam: Thoracic Spine:
Case History:

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

Addendum D

CMCC NECK DISABILITY INDEX

Patient Name:_____File no.:_____Date:_____

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

Section 1 - Pain Intensity

- ☐ I have no pain at the moment.
- ☐ The pain is very mild at the moment.
- ☐ The pain is moderate at the moment.
- ☐ The pain is fairly severe at the moment.
- ☐ The pain is very severe at the moment.
- ☐ The pain is the worst imaginable at the moment.

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

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

Section 3 - Lifting

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

Section 4 - Reading

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

Section 5 - Headaches

- ☐ I have no headaches at all.
- ☐ I have slight headaches which come infrequently.
- ☐ I have moderate headaches which come infrequently.
- ☐ I have moderate headaches which come frequently.
- ☐ I have severe headaches which come frequently.
- ☐ I have headaches almost all the time.

Section 6 - Concentration

- ☐ I can concentrate fully when I want to with no difficulty.
- ☐ I can concentrate fully when I want to with slight difficulty.
- ☐ I have fair degree of difficulty in concentrating when I want to.
- ☐ I have a lot of difficulty in concentrating when I want to.
- ☐ I have a great deal of difficulty in concentrating when I want to.
- ☐ I cannot concentrate at all.

Section 7 - Work

- ☐ I can do as much work as I want to .
- ☐ I can do only my usual work, but no more.
- ☐ I can do most of my usual work, but no more.
- ☐ I cannot do my usual work.
- ☐ I can hardly do any work at all.
- ☐ I cannot do any work at all.

Section 8 - Driving

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

Section 9 - Sleeping

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

Section 10 - Recreation

- ☐ I am able to engage in all my recreation activities with no neck pain at all.
- ☐ I am able to engage in all my recreation activities, with some pain in my neck.
- ☐ I am able to engage in most, but not all of my usual recreation activities because of pain in my neck.
- ☐ I am able to engage in a few of my usual recreation activities because of pain in my neck.
- ☐ I can hardly do any recreation activities because of pain in my neck.
- ☐ I cannot do any recreation activities at all.

Vernon/Hagino, modified from Foubister et al.,Physiotherapy, 1980

Addendum E

Short-form McGill Pain Questionnaire (SF-MPQ)

Ronald Melzack (1984)

Date:_____ File no.:_____ Visit no:____

Patient name:_____

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

Addendum F

Numerical Rating Scale - 101 Questionnaire

Date:_____ File no:_____ Visit no:_____

Patient name:_____

Please indicate on the line below, the number between 0 and 100 that best describes the pain you experience **when it is at its worst**. A zero (0) would mean "no pain at all", and one hundred (100) would mean "pain as bad as it could be".

Please write only **one** number.

_____

Please indicate on the line below, the number between 0 and 100 that best describes the pain you experience **when it is at its least**. A zero (0) would mean "no pain at all" and one hundred (100) would mean "pain as bad as it could be".

Please write only **one** number.

_____

ALGOMETER READINGS

Name: _____

File No. _____

Group: _____

VISIT : ONE	VISIT : TWO	VISIT : THREE

Addendum G

Addendum H

INFORMED CONSENT FORM

(To be completed by patient / subject)

Date :

Title of research project :

Name of supervisor :

Name of research student :

Please circle the appropriate answer

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

If you have answered no to any of the above, please obtain the necessary information before signing

Please Print in block letters:

Patient /Subject Name:_____Signature:_____

Parent/ Guardian:_____Signature:_____

Witness Name:_____Signature:_____

Research Student Name:_____Signature:_____

Addendum I

PATIENT INFORMATION SHEET

Welcome to this research study. You have been selected to participate in a clinical trial comparing two different forms of treatment for mechanical neck pain.

Both groups will receive treatment for mechanical neck pain. You have an equal chance of being in either group.

Group A will receive manipulation and will use a neck support pillow upon retiring to bed in the evening. The subjects in this group will have 6 consultations over a 3-week period for treatment and evaluation of this condition. Group B will receive identical treatment however they will use a neck support pillow.

Please could you refrain from doing any new or unaccustomed activities during this time as this could interfere with the results of the study. Furthermore you are not allowed to receive any other treatment for this condition, and this includes the administration of analgesics and anti-inflammatories. If you need to take medication for any reason, please let me know.

The treatment will be free and will be supervised by qualified chiropractors.

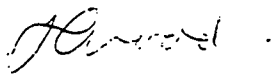
Please will you be honest and inform me if there is any reason why you think you will not be able to participate in this study. If you drop out before the completion of this study, you are required to return the neck support pillow.

However you are free to withdraw at any time and please do not hesitate to ask me questions.

Your full co-operation will assist the chiropractic profession in increasing its knowledge and improving its treatment for mechanical neck pain.

Thank-you for agreeing to participate in this trial.

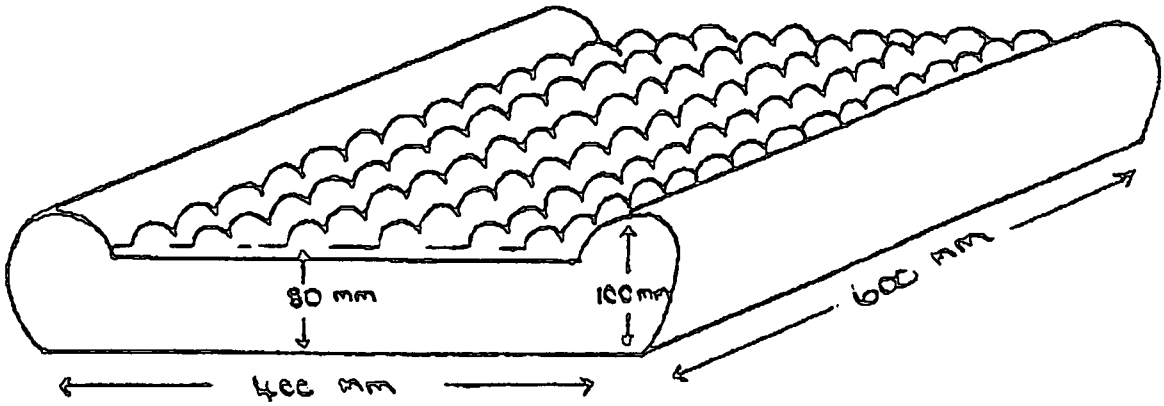
Yours sincerely



Tracey Allwood (senior intern)

ORTHOPILLOW

TOP VIEW



BOTTOM VIEW