THE RELATIVE EFFECTIVENESS OF MANIPULATING THE SUPERIOR VERTEBRAL SEGMENT COMPARED TO MANIPULATING THE INFERIOR VERTEBRAL SEGMENT IN FACET SYNDROME OF THE LUMBAR SPINE

by

GRANT WEBB

A dissertation submitted in partial compliance with the requirements for the Masters Degree in Technology : Chiropractic in the Faculty of Health at Technikon Natal.

I, Grant Webb, do declare that this dissertation is representative of my own work.

Grant Webb 5-5-98 Date

Approved for final submission

Dr J W Brantingham 10-5-98 Date

AS (USA), B.S. (USA), B.M. (USA), D.C. (USA), C.C.F.C. (USA)

Supervisor

DEDICATION

This work is dedicated to my parents,

who in the face of great adversity have

persevered and triumphed.

ACKNOWLEDGEMENTS

I would like to express my sincere thanks and appreciation to the following people for their help in my studies and their guidance in the formulation of this thesis:

Dr A.G. Till for helping me out of the starting blocks of this study.

Dr J.W. Brantingham for his constant supervision.

My friend and colleague, Brendon Bailes for his support and help.

Aurette, for her love and support through my years of study.

Claudine, for her help in the final stages.

Finally, and most importantly, thanks and praise to the Lord for His leading in my life and for His help both financially and academically through my years of study.

ABSTRACT

The purpose of this study was to evaluate the relative effectiveness of adjusting the superior vertebral segment as opposed to adjusting the inferior vertebral segment, of the two vertebral motion segments forming the facet joint responsible for the patient's symptoms and resulting in the diagnosis of facet syndrome, in the treatment of mechanical low back pain.

Thirty subjects with mechanical low back pain were screened for facet syndrome and randomly divided into two groups of fifteen. Each patient received spinal manipulation for six treatments over 4 weeks, but the contact vertebra was different for each group. In the one group, contact was taken on the superior of the two vertebrae making up the facet syndrome, whereas contact was taken on the inferior of the two involved vertebrae in the second group.

In the "superior" group, the manipulative thrust was directed in the direction of the motion palpation findings, whereas in the "inferior" group, the manipulative thrust was directed in the opposite direction to the motion palpation findings of the superior segment.

Both groups were evaluated in terms of subjective and objective clinical findings by making use of questionnaires (Oswestry Back Pain and Disability Index; Numerical Pain Rating Scale-101; Short Form McGill) and goniometer measurements respectively.

This data was collected at the initial and final treatment as well as at the one month follow-up consultation for each patient.

The data was analysed statistically for intra-group as well as for inter-group comparison by making use of the Wilcoxon Signed Rank test and the Mann Whitney U - test respectively.

As regards pain, both groups responded favourably and showed improvement between the first and last treatments. The vast majority of the patients also demonstrated long term benefits from the treatments as was determined from the data collected at the one month follow-up consultation. Those patients who had previously suffered additional low back injuries at unrelated sites from the treatment sites showed somewhat limited but definite improvement.

Of particular interest was the fact that all the patients were suffering from facet syndrome involving the lower three lumbar vertebrae.

In terms of the patients' subjective response to treatment, both groups showed a significant decrease in pain disability (Oswestry scores) as well as improvement from a pain perception point of view (McGill and NRS-101 scores). A clinically significant improvement was noted in both groups during the treatment period. Statistical inter-group comparison however, showed no significant difference between the two treatment groups, which suggests that either of the two treatment protocols is as effective as the other from a subjective point of view.

From an objective point of view, the goniometer measurements showed a general improvement in all ranges of motion particularly in the extension range which is a significant indicator of facet syndrome improvement. Once again, no significant statistical difference was noted between the two groups from an objective point of view.

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LIST OF ABBREVIATIONS

OBDI	OSWESTRY LOW BACK PAIN AND DISABILITY INDEX QUESTIONNAIRE
SFM	SHORT FORM MCGILL PAIN QUESTIONNAIRE
NRS-101	NUMERICAL PAIN RATING SCALE - 101 QUESTIONNAIRE
SMT	SPINAL MANIPULATIVE THERAPY

DEFINITIONS

FACET SYNDROME - pain or dysfunction arising primarily from the zygapophyseal joints and their immediately adjacent soft tissues (Gatterman 1995: 415).

INFERIOR VERTEBRAL SEGMENT - the lower of the two vertebrae making up a motion segment.

MANIPULATION - a manual procedure that involves a directed thrust to move a joint past the physiological range of motion, without exceeding the anatomic limit (Gatterman 1995: 474).

OBJECTIVE CLINICAL FINDINGS - those findings obtained from recording the patient's ranges of motion using a goniometer.

SPINAL MANIPULATIVE THERAPY - manipulation directed to the spinal joints.

SPINAL MOTION SEGMENT - two adjacent vertebrae and the connecting tissues binding them to each other (Gatterman 1995: 475).

SUBJECTIVE CLINICAL FINDINGS - those findings obtained from the patient through the use of the Oswestry Low Back Pain and Disability Index Questionnaire ; the Short Form McGill Pain Questionnaire and the Numerical Pain Rating Scale - 101 Questionnaire.

SUPERIOR VERTEBRAL SEGMENT - the uppermost of the two vertebrae making up a motion segment.

CHAPTER ONE

1.1 Introduction

Low back pain is thought to occur in almost 80% of adults at some point in their lives (Deyo 1983).

According to Kelsey and White (1980), disorders of the lumbar spine are among the most common medical problems in Western countries, affecting up to 80% of the population at some time during their lives.

Cassidy and Wedge (1988: 7) refer to industrial studies which show that more than 50% of the working population will be affected by low back pain at some stage in their working career. They concluded that 60% to 80% of the general population will suffer from low back pain at any given time.

According to Frymoyer et al. (1980), low back pain is an extremely significant cause of disability and has a major socio-economic impact. In their study done in the United States, they calculated that 217 million workdays would be lost annually in patients between the ages of 18 and 55 as a result of low back pain.

Deyo (1983) suggested that back problems are the most frequent cause of activity limitation in persons younger than 45 and that patients with back pain incur an enormous amount of medical expenses. According to Deyo (1983), most physicians agree that nearly all patients with back pain require a trial of conservative therapy before use of invasive interventions.

Di-Fabio (1982) researched the effectiveness of manual therapy in the treatment of low back pain and concluded that manipulation is a particularly effective modality in treating patients with low back pain.

Anderson et al. (1991: 105) conducted a study researching the effectiveness of spinal manipulative therapy using meta-analytical methods. They concluded that spinal manipulative therapy proved to be consistently more effective in the treatment of low back pain than any other comparison treatment.

Even though research has shown that spinal manipulative therapy is an effective treatment protocol for mechanical low back pain, further research is required to prove how and why adjustments work and which techniques work best so we can eliminate those that don't and use only those that do.

This study proposes to do just that. It would be useful to know if one form of manipulation is more effective than another as this might result in quicker recovery time, fewer medical costs and less time lost from work.

1.1.2 THE STATEMENT OF THE PROBLEM

This study proposes to investigate the effects of adjusting the superior vertebral segment as opposed to adjusting the inferior vertebral segment, in the treatment of facet syndrome in the lumbar spine, in terms of the patient's perception, as well as objective clinical findings, in order to determine the relative effectiveness of each treatment protocol.

1. **Objective One** 3

The first objective was to compare the relative effectiveness of adjusting the superior vertebral segment to adjusting the inferior vertebral segment, with regards to the treatment of facet syndrome in the lumbar spine, in terms of subjective clinical findings.

2. **Objective Two**

The second objective was to compare the relative effectiveness of adjusting the superior vertebral segment to adjusting the inferior vertebral segment, with regards to the treatment of facet syndrome in the lumbar spine, in terms of objective clinical findings.

3. **Objective Three**

The third objective was to integrate the data from the two treatment protocols with reference to the respective objective and subjective clinical findings, in order to establish the relative effectiveness of both treatment protocols in the treatment of mechanical low back pain as a result of lumbar facet syndrome.

1.1.3 Need for a solution to the problem

A review of the literature shows that the side of joint fixation in a suspected facet joint segment is clinically difficult to determine. According to Peterson and Bergmann (1990: 438), rotational dysfunction of the lumbar spine may result from decreased mobility in the posterior joints on the side of rotational restriction or on the side opposite rotational restriction.

Although the movements on each side are small, reduced joint play in either joint is potentially detrimental to joint function. Fixation in the joint on the side of rotational restriction may produce a loss of facet separation. Fixation in the joint on the side opposite the rotational restriction may produce a loss of anterior glide of the inferior facet relative to the superior facet below. It was concluded that the side of fixation and to what degree each joint may be responsible for inducing rotational dysfunction, is a matter of clinical speculation.

General conversation with practitioners reveals that it is generally considered impossible to determine exactly which joint is the involved one in a facet syndrome. Objective and orthopaedic tests place the practitioner in more or less the correct area but the joint above or as Bergmann et al. explain, the joint opposite that to which the tests indicate as being responsible for the patient's symptoms, may in fact be the involved joint.

Consider a facet syndrome involving the first and second lumbar vertebrae on the right hand side, as revealed by joint challenge findings and Kemp's test. Motion palpation findings may reveal loss of right rotation of the first lumbar vertebra or loss of left rotation of the second lumbar vertebra. The direction of motion restriction as revealed by motion palpation is taken with the spinous process of the involved vertebra as the anatomical land mark as this is the most posterior of the vertebral structures and therefore the most easily palpable. Hence, a loss in right rotation of a motion segment means that the spinous process of the involved segment is not moving to the right of the midline.

Now consider the same vertebral segment being involved in a lumbar facet syndrome on the same side in two different patients. Performing a thrust on the first lumbar vertebra in the direction of the motion palpation findings will "open" the right facet joint between the first and second lumbar vertebra. Alternatively, performing a thrust on the second lumbar vertebra in the opposite direction to the motion palpation findings of the first lumbar vertebra, will also "open" the right facet joint between the first and second lumbar vertebra. Either of these techniques might then be successful in treating the involved joint. However, taking contact on the superior vertebra and thrusting it in the direction of the motion palpation findings (to the right) may open or cavitate the left facet joint between the twelfth thoracic and the first lumbar segments, whereas taking contact on the second lumbar vertebra and thrusting it in the opposite direction to the motion palpation findings of the first lumbar vertebra may open or cavitate the left facet joint between the second and third lumbar vertebrae. This suggests that theoretically a thrust may cavitate one of two joints depending on the thrust direction.

1.1.4 **Benefits**

If, as a result of this study, it was determined that one treatment protocol was more effective than the other in the treatment of lumbar facet syndrome as a cause of mechanical low back pain, it would enable the chiropractor to be that much more efficient in the treatment of low back pain as a result of lumbar facet syndrome. This would result in less disability, fewer medical costs and less time lost from work.

Also, it may help to determine what further research is needed to clarify and substantiate currently accepted diagnostic techniques in determing joint dysfunction, with regard to the exact facet joint involved, as well as help to determine the clinical implications and benefits of adjusting bilaterally, or at multiple levels, in order to ensure that the correct facet joint is treated.

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1 Incidence And Prevalance Of Low Back Pain

According to Lehmann et al. (1986), low back pain is one of the most common ailments in Western society and 80% of all adults will have significant back pain sometime during their lifetime.

In a comparative study done by Nyiendo et al . (1989) at six chiropractic college teaching clinics of patient main complaints, it was revealed that low back pain represented between 31% and 41% of all complaints.

In the United States, 6.8% of the adult population has been found to have back pain at any given time. The prevalence of low back pain rises after age 25 to a peak in the 55 to 64 year old range with a falling prevalence after age 65 (Deyo et al. 1987). In their study of particular consideration of specific age of onset of low back pain, it was shown that 11% of persons are afflicted at less than 20 years of age; 28% at 20 to 29 years; 25% at 30 to 39 years; 20% at 40 to 49 years; 11% at 50 to 59 years and 5% at more than 60 years of age.

In a retrospective and cross-sectional analysis in the United States of 1221 thousand males between 18 and 55 years of age, in a family practice from 1975 to 1978, almost 70% had low back pain (Deyo et al., 1987).

In a study among employees at a plant in New York City over a ten year period, Rowe found that low back pain is the second most common excuse for sickness absence, second only to upper respiratory tract infection. Thirty - five percent of sitting workers and 47% of workers with physically heavy jobs visited the medical department for low back pain in the same time period. Recurrences were frequent in almost 85% of the patients (Rowe, 1969).

Facet syndrome in particular has been found by many authorities as the most common condition encountered in lower back patients (Cox and Schreiner, 1984).

In a study by Cox and Schreiner in the diagnosis and treatment of 576 consecutive cases of low back pain in 1984, facet syndrome at L4 vertebral level was diagnosed in 21,9% of cases and at L5 vertebral level in 44,5% of cases. The perpetuating factors relating to facet syndrome, that is physical stresses, spinal strain and sprain and degenerative processes are common to all people and therefore the high prevalence of patients presenting with facet syndrome is not surprising (Cox and Schreiner, 1984).

2.2 Cost Of Low Back Pain

According to Anderson et al. (1991), back injuries account for 21% of compensational work injuries but averaged 33% of the total compensational cost. Total compensational costs in the United States for low back pain in 1988 were estimated at 4.6 to 13.4 billion dollars and 6000 dollars per case where 25% of the cases accounted for 90% of the cost.

In a ten year industrial study of low back pain, Rowe (1969) reports that low back pain was the second most common reason for work absenteeism.

To evaluate the impact of low back pain on industry, Spengler (1986) conducted a retrospective analysis of injuries among hourly employees of a large industrial manufacturer. The Boeing Company provided injury information on 31200 employees for a fifteen month period. Of the 4645 injuries reported, 900 were back injuries. Claims related to these back injuries constituted 19% of all workers compensation claims but were responsible for 41% of the total injury costs or approximately 1000 000 dollars.

Snook (1980) stated that 25% of back cases accounted for 90% of the total cost of treatment. One third of the cost of the treatment is for medical cost and disability payments make up the remaining two thirds. Workers compensation reports from the United States state that back injuries average 21% of all compensable work injuries. It is estimated that 2.7 billion dollars per year is paid for care of all back pain in general in the United States, of which low back pain constitutes a large part (Snook, 1980).

According to Cox (1989), costs between 16 and 60 million dollars are lost annually in the United States due to low back pain. There is an average of 250 000 lumbar surgeries with a 15% failure rate and 40 000 re-operations per year. It is estimated today that in the United States there are 75 million people suffering from low back pain with 7 million new victims yearly. Of these, 5 million are partly disabled and 2 million are unable to work at all. The financial costs are enormous with 5 billion dollars spent annually on the diagnosis and treatment of low back pain, 10 billion dollars on disability compensation, lawsuits and workers compensation. The cost of low back pain treatment is surpassing that of heart disease treatment or traffic accidents. Ninety three million working days are lost annually due to low back pain (Cox, 1989).

2.3 FACET SYNDROME AS A CAUSE OF LOW BACK PAIN

According to Cox (1990: 437), facet syndrome is a subluxation complex of the articular processes in which increased weight-bearing occurs at the posterior facets due to intervertebral disc narrowing and degeneration, or hyperextension subluxation to the superior vertebra on the inferior vertebral segment. Facet capsule irritation, stenosis of the intervertebral foramen, and arthrosis may be the result.

In a study done by Miller et al. (1983) in which a two-dimensional biomechanical model was assembled using two rigid bodies as the vertebrae and six elastic springs to represent the tissues of the disc and posterior elements, and to which compressive loads were inflicted, the following facts were determined :

A. In response to anteroposterior shear loads, the location of the facet joints relative to that of the intervertebral disc in the supero-inferior direction is a major determinant of what loads each structure will bear. This is relative to the angle of the lordosis or the amount of extension that is present in the lumbar spine, ie. the more the extension, the more the load shifts from the intervertebral disc to the posterior facets and vice versa.

B. The facet joints are not loaded heavily by compression or flexion-extension loads but can be heavily loaded by antero-posterior shear loads.

C. Resistances developed by the facet joints are not very effective in relieving loads on the intervertebral disc when the motion segment is compressed but they can be effective in relieving pressure on the disc when the segment is flexed, extended or anteroposteriorly sheared.

2.3.1 Unequal Facet Loading Leads To Unequal Degeneration

Panjabi (1984) presents the following algorithm for different stages of injury to the functional spinal unit (FSU), that is the three joint complex composed of the two facet joints, the intervertebral disc between two vertebrae and the vertebrae themselves :

1. Asymmetric disc injury at one FSU level leads to :
2. Disturbed kinematics of FSU's above and below this level which leads to:

3. Asymmetric movement at facet joints which leads to:
4. Unequal sharing of facet loads which leads to:
5. High load on one facet joint resulting in facetal intra-articular cartilage degeneration, joint space narrowing, and atrophy.

Slight rotational lateral-flexion subluxation of a lumbar vertebra with unilateral disc degeneration results in greater facet loading on the concave side of the subluxation which leads to degenerative changes seen in the triple joint complex at the facet (Cox 1990: 440).

2.4 ANATOMY RELATED TO SPINAL SUBLUXATION

2.4.1. General Description

The junction between the superior and inferior articular facets of the articular process on one side of two adjacent vertebrae is known as a zygapophyseal or facet joint. They are classified as synovial (diarthrodial) joints. There is a left and right facet joint between each pair of vertebrae and although they allow motion to occur, they are more important because of their ability to determine the direction and limitations of movement that can occur between vertebrae.

2.4.2 Articular Capsules

Each facet joint is surrounded by a capsule posterolaterally which consists of an outer layer of dense fibroelastic connective tissue, a vascular central layer of areolar and loose connective tissue and an inner layer consisting of a synovial membrane.

The anterior and medial aspect of the facet joint is covered by the ligamentum flavum. The synovial membrane lines the articular capsule, the ligamentum flavum and the synovial joint folds.

2.4.4. The Synovial Folds

These are extensions of the articular capsule that protrude into the joint space and are also known as menisci. They contain free nerve endings responsible for nociceptive impulses making them pain sensitive structures. This means that if the meniscus becomes compressed or trapped between the articular facets, pain could be the result (Gatterman 1995: 19-21).

2.4.5 Nerve Supply To The Facet Joint

The facet joints are innervated by nerves that arise from the medial branches of the dorsal primary rami of the spinal nerves which lie in grooves on the posterior surfaces of the transverse processes (Moore 1985: 592).

2.5 Facet Tropism As A Cause Of Facet Syndrome 14

According to Gatterman (1990: 418), tropism is asymmetrical articular facings. Sagittal facet facings are normal for the upper lumbar spine with coronal facet facings normal in the lower lumbar spine.

Cyron and Hutton (1980), claim to have found and believe that articular tropism (in which one facet faces coronally while the other faces more sagitally) can lead to lumbar instability manifesting itself as joint rotation.
This rotation occurs toward the side of the more oblique (coronally) facing facet which may place additional stress on the annulus fibrosus of the intervertebral disc and the capsular ligaments of the facet joints.

The predisposition to facet-joint locking believed to occur in patients with articular tropism may make the biomechanical effects of this specific congenital anomaly especially amenable to spinal manipulation (Gatterman, 1990: 424).

Cyron and Hutton (1980) report that if sliding is prevented by the locking of the facets, there may be a high compressive force generated in the oblique-facing facet. The unlocked joint may then manifest stress concentration with the ligaments put under extra tensile strain.

The persistent extra strain on the highly innervated synovial joints is believed to cause pain (Cyron and Hutton, 1980).

Like any synovial joint, degenerative changes can occur, with stress concentration and cartilage breakdown predisposing to osteoarthritis in the posterior spinal articulations (Steindler, 1973: 163, 165-166).

While it is believed that jamming or imbrication of asymmetrical facet joints has a tendency to recur, response to manipulation is rapid (Helfet et al., 1978: 21,28,61).

Repeated manipulation of joints manifesting tropism is not recommended in the absence of joint locking, but prompt manipulative therapy when joint fixation does occur may prevent the development of the pain-spasm-pain cycle seen in chronic low back pain patients, quickly resolving the recurring symptoms.

2.6 The Pathogenesis Of Low Back Pain

According to Kirkaldy-Willis (1984), the majority of patients presenting with low back pain have the origins of this pain as a result of dysfunction. This dysfunction implies that at one anatomical level, the three components of the joint (the two facet joints and the intervertebral disc) are not functioning normally. He divides this condition as it presents into three types :

1. Pain occurring after unusual activity for that patient

2. Rotational or compressive strain as a result of major or minor trauma

3. Recurrence of pain due to a very minor traumatic episode

A traumatic episode causes facet joint sprain leading to small capsular tears. A small degree of joint subluxation takes place causing synovitis because of trauma to the posterior joint synovium. A protective hypertonic contraction of the posterior musculature of the involved segment results in muscle ischemia and increased perceived pain by the patient (Kirkaldy-Willis 1984).

Two mechanisms have been proposed by Giles (1989: 27-40) whereby pain may be produced in the synovial folds as a result of the stimulation of nociceptive endings within the synovial folds :

1. Traumatic synovitis causing ischemia of the synovial membrane with the genesis of ischemic pain and
2. Mechanical pinching of meniscal tissue leading to traction of pain sensitive tissues, tissue damage and the release of nociceptive substances resulting in nociceptive impulses.

According to Bogduk (1983), the capsule of the articular facets is richly innervated with sensory fibres. The recurrent nerve of the anterior primary division and the posterior division of the spinal nerve, innervate the capsule. This sensory nerve supply is sufficiently developed to support the hypothesis that irritation of the capsule of the lumbar articular facets could well produce pain stimuli, which could return to the central nervous system through the posterior primary division and produce referred pain associated with the dermatomes of the involved nerves.

According to Haldeman (1993), although there is still difficulty in determining the exact aetiology of back pain in a single individual, there has been substantial physiological, psychosocial and biomechanical research done which has provided enough information concerning the risks predisposing to back pain and disability in the population. Six factors appear synonomous with the pathogenesis of back pain :

1. Ageing
2. Exercise
3. Mechanical occupational stresses
4. General health
5. Acute trauma
6. Psychosocial factors (Haldeman 1993).

2.7 Clinical Features Of The Facet Syndrome

Classic lumbar facet syndrome is characterised by the following signs as outlined by Lippit (1984):

1. Local paralumbar tenderness
2. Pain on spine hyperextension
3. Absence of neurological deficit
4. Absence of root tension signs
5. Hip, buttock or back pain with straight leg raising

In addition to low back pain, Lippit (1984) includes the following symptoms:

1. Hip and buttock pain
2. Cramping leg pain above the knee
3. Low back stiffness, especially in the morning or after decreased activity.

2.8 Effectiveness of Chiropractic Spinal Manipulative Therapy

In a recent study by Meade et al. (1990), to compare chiropractic and hospital outpatient treatment for managing low back pain of mechanical origin, the following was reported.

The study was a randomised controlled trial involving 741 patients aged 18-65 who had no contraindications to manipulation. Treatment administered by the chiropractors consisted of manipulation in most of the patients, whereas the hospital staff most commonly used Maitland mobilisation or manipulation or both.

The main outcome measures were changes in scores of the Oswestry pain/disability questionnaire and tests of straight leg raising and lumbar flexion.

The results showed that chiropractic treatment was more effective than hospital outpatient treatment, mainly in patients with chronic or severe low back pain. Secondary outcome measures also showed that chiropractic was more beneficial.

It was concluded by Meade et al., (1990) that for patients with low back pain in whom manipulation is not contraindicated, chiropractic almost certainly confers worthwhile, long term benefits in comparison with hospital outpatient management.

This suggests that chiropractic manipulation is effective in the treatment of low back pain as well as being more effective than manual therapy administered by other health care providers.

In a short-term placebo controlled trial of chiropractic adjustments for the relief of non-acute low back pain, Waagen (1986) concluded that after two weeks of therapy, the experimental patients had significantly more relief from pain and an increase in spinal mobility when compared with the control patients.

In a descriptive Canadian study performed by Cassidy and Kirkaldy-Willis, 283 patients with low back pain and leg pain were treated by spinal manipulation for 2 or 3 weeks (Kirkaldy-Willis and Cassidy, 1985). The results showed that of the patients with referred pain, 81% improved markedly and had no pain or mild intermittent pain and no restriction for activity and 48% of the patients with nerve compression experienced a similar marked improvement in their condition.

Numerous other studies have suggested that the chiropractic management of low back pain is superior to the medical approach in terms of limiting patient work time loss and lowering treatment cost eg. Wolk, 1988; Johnson, 1989; Dillon, 1981; Bronfort, 1986.

According to Gatterman (1995: 424), many studies have investigated the effectiveness of manipulation for low back pain, but few have focused on facet syndrome specifically.

Banks (1983) demonstrated a reduction of disc angle values after manipulation for radiographically verified facet syndrome.

Cox et al. (1983) reported excellent results in 69% and good or very good results in 15% of facet syndrome patients treated with manipulation.

2.9 Effects of spinal manipulative therapy

Spinal manipulation directed at the facet articulation is generally considered the treatment of choice for facet syndrome (Cox, 1990; Rahlmann, 1987;Banks, 1983; Wood, 1984).

Because facet syndrome generally involves pain and dysfunction of the joint (Rahlmann, 1987; Wood, 1984) it seems logical to apply treatment that not only relieves pain but helps correct the underlying dysfunction.

Below is a summary of specific proposed effects manipulation has on facet articulations :

1. Release of entrapped meniscoid (Giles, 1989;Rahlmann, 1987)
2. Reduction in articular cartilage displacement by chronically entrapped meniscoid (Lewit, 1985)
3. Pain relief by co-activation of various receptors (Peterson et al., 1993)
4. Reduced weight-bearing (Cox, 1990)

7. Reduction of post immobilisation collagen cross-linking (Rahlmann, 1987)
8. Reduced intracapsular or extracapsular adhesions (Rahlmann, 1987)
9. Reduction of intervertebral foramen stenosis caused by segmental hyperextension (Cox, 1990)
10. Release of osseous mechanical locking (Gatterman, 1985)

2.10 Rotational Adjustments In The Treatment Of Facet Syndrome

In this study, rotational adjustments are the technique of choice and a brief synopsis of these techniques will be discussed here.

Rotational dysfunction of the lumbar spine may result from decreased mobility in the posterior joints on the side of rotational restriction or on the side opposite rotational restriction (Peterson et al., 1990).

According to Schafer and Faye (1990: 203), in the lumbar spine as a whole, lateral-flexion is relatively free followed in order of mobility by extension, flexion and minimal rotation.

An example is when the lumbar spine bends laterally, it tends to also rotate posteriorly on the side of convexity and assume a hyperlordotic tendency. Thus fixation effects are also coupled.

This suggests that when a patient has a lateral-flexion fixation for example, there is also a rotational fixation in the same joint. Hence, a rotational adjustment will "open" the involved facet joint, remove the fixation and restore normal mobility to that level.

According to Peterson et al., (1993) although the movement in each facet joint is small, reduced play in either joint is potentially detrimental to joint function.

Fixation in the joint on the side of rotational restriction may produce a loss of facetal separation, whereas fixation in the joint on the side opposite the rotational restriction may produce a loss of anterior glide of the inferior facet relative to the superior facet below.

Whether the side of fixation can be clinically differentiated and to what degree each joint may be responsible for inducing rotational dysfunction remains a matter of speculation.

On the side opposite the direction of trunk rotation, the facets act as a major barrier to axial rotation. Bony impact of these structures are largely responsible for limiting lumbar rotation.

As a result, functional changes in the periarticular soft tissues of these joints is unlikely to significantly affect the range of axial rotation. However, reduced play at the end of motion may still be a significant hindrance to normal joint function.

In contrast, the joints on the side of the trunk rotation are not limited by bony impact. Therefore, functional changes in these articulations may have a greater potential to limit joint movement (Peterson et al., 1993).

2.11 Clinical Application And Consideration

With regard to the available literature mentioned above and taking into consideration the diversified technique of manipulation as outlined by Szaras (1990), with particular reference to the lumbar roll, spinous push and spinous pull techniques, this section deals with the interpretation and understanding of the role and clinical efficacy of rotatory manipulation of the lumbar spine by this author, in the treatment of facet syndrome.

Consider a patient presenting with low back pain at L4 vertebral level. On examination, this patient presents with a Kemp's test and joint challenge positive for the right facet joint between the third and fourth lumbar vertebrae.

Motion palpation reveals a rotatory fixation of this same joint with the fourth lumbar vertebra limited in rotation to the right.

According to Szaras (1990: 136), a lumbar roll may be performed with the patient lying on the left side and contact taken on the mamillary process of the fourth lumbar vertebra. The thrust in this technique will restore right rotation to the fourth lumbar vertebra and "open" the right facet joint between the third and fourth lumbar vertebrae. Similarly, a spinous pull on the third lumbar vertebra will achieve the same purpose. Alternatively, a spinous push technique to the fourth lumbar vertebra can be employed with the patient lying on the right side to "open" the same involved facet joint (Szaras, 1990: 144, 145).

Motion palpation findings are generally listed in terms of the superior vertebra (Till, 1997). Therefore, in terms of the involved vertebrae as just discussed, thrusting the third lumbar vertebra in the direction of its motion palpation findings (to the left in this case) will achieve the same purpose as thrusting the fourth lumbar vertebra in the opposite direction. The question to be answered is, which technique is more effective, or does it make no difference?

2.12 Contraindications to spinal manipulative therapy

It is of utmost importance that the chiropractor is aware of the contraindications to spinal manipulation and that he rules them out by an extensive examination, as failure to do so may result in spread or acceleration of the disorder or injury to the patient. Geiringer et al., (1988: 283) presents the following contraindications to spinal manipulation. These have been arranged in decreasing order of severity by this author, although different texts present different lists of contraindications and no differentiation is made between them.

1. Vertebral malignancy
2. Abdominal aneurysm
3. Aseptic necrosis
4. Osteoporosis
5. Vertebral bone diseases
6. Multiple adjacent radiculopathies
7. Myelopathy or spondylolysis
8. Severe diabetes
9. Vertebral joint instability
10. Spinal deformity - severe kyphosis or scoliosis
11. Infection or inflammation
12. Cauda equina syndrome
13. Severe degenerated joint disorders
14. Atherosclerosis
15. Ligamentous instability

2.13 Reliability of Motion Palpation

Careful investigation reveals a definite lack of knowledge as to the efficacy of motion palpation as a diagnostic procedure in determining joint dysfunction. Certainly many books contain information on motion palpation procedures and many studies make use of motion and static palpation as part of the clinical assessment and yet, even a concise text like Motion Palpation and Chiropractic Technique by Schafer, R.C. and Faye, L.J. 1989., while dealing with the procedure and its performance in detail, makes no mention of its reliability in determining joint dysfunction.

Careful evaluation of previous dissertations yields no information on motion or static palpation reliability. While many texts describe the procedure and mention its use as an objective test in making a clinical diagnosis, a definite lack of knowledge is evident as to the reliability of this widely used and popular technique. Certainly, this leaves the field wide open to future researchers. For the purpose of this research then, it was assumed that motion palpation is a reliable means of determining the contact vertebra and direction of thrust in performing a manual therapy for restoring movement to a particular articulation.

2.14 Summary

Low back pain is a common disorder affecting a large proportion of the population at some point in their lives. The cost of low back pain in industry in terms of work time loss, as well as treatment cost in terms of surgery and workers compensation, is well documented.

Facet syndrome as a cause of low back pain is a recognisable and readily accepted diagnosis.

The anatomy and role of the facet joints in the biomechanics of the lumbar spine and the pathology involved in a lumbar facet syndrome, is well understood.

Spinal manipulative therapy performed by the chiropractor has proven to be a cost-effective and successful modality in the treatment of low back pain as a result of facet syndrome.

In his presidential address to the North American Spine Society in 1990, Haldeman stated that "it is increasingly evident that a conservative or surgical cure for back pain in unlikely to be found. Although the capability of easing pain and suffering even temporarily and of reducing periods of disability cannot be diminished in importance, it is essential that the larger picture of back pain be addressed. It is increasingly difficult for society to deal with a disease which affects workers for periods of 3 weeks to 6 months and that is estimated to cost between 14 and 18 billion dollars per year."

The exact joint involved in the lumbar facet syndrome remains difficult to determine even though the available orthopaedic and movement analysis tests will place the practitioner in more or less the correct area. Only extensive research will prove which techniques are most effective in the diagnosis and management of lumbar facet syndrome and enable the chiropractor to be more effective in the treatment of mechanical low back pain as a result of lumbar facet syndrome.

CHAPTER 3

Materials and methods

The object of this study was to determine the relative effectiveness of adjusting the superior vertebral segment as opposed to adjusting the inferior vertebral segment making up a facet syndrome in the treatment of mechanical low back pain.

This study was a randomised comparative study where the objectives were to assess each of the two treatment groups for intra-group improvement. Once this had been achieved, an inter-group statistical analysis could determine which of the two treatments was more effective. The more effective of the two could then be considered to be the treatment of choice in the chiropractic management of mechanical low back pain as a result of facet syndrome.

The patient sample was obtained by means of convenient sampling of patients attending the chiropractic clinic at the Natal Technikon. Each potential patient underwent an extensive examination involving a case history, physical examination and a lumbar spine regional examination to determine the cause for their lower back pain. If this was determined to be due to lumbar facet syndrome, the patient was considered eligible for the study.

In those patients in whom the diagnosis was not clearly definable and the presence of a systemic or vascular pathology or congenital anomaly was a possible concern, as determined from the case history and/or the physical examination, lumbar spine radiographs were taken. If no contra-indications to manipulation and no systemic pathology was evident, these patients became eligible to take part in the study.

Thirty-five patients were selected in this way, fifteen for each of the two treatment groups plus an additional five for non - compliancy or drop - out of any patients taking part in the study. Each qualifying patient was then required to complete an informed consent form as an indication of their willingness to take part in the study.

The group of patients were then divided into two equal groups of fifteen patients using random sampling. This was achieved using thirty pieces of paper with fifteen having "superior" written upon them and the other fifteen having "inferior" written upon them. As a patient qualified for the study, a piece of paper was then drawn from the thirty pieces and that patient received that particular treatment ie. if a piece of paper with "superior" written upon it was drawn, that patient received an adjustment of the superior vertebral segment of the two vertebrae making up their lumbar facet syndrome, for the duration of their treatment programme. Once drawn, each piece of paper was not returned to the others, but discarded.

Before treatment, the symptomatic joints were determined by making use of motion palpation (Schafer and Faye, 1989: 211-216, 256-259) and orthopaedic tests. The orthopaedic tests used specifically for the diagnosis of facet syndrome were Kemp's test and lumbar facet joint challenge (Gatterman,1990: 141).

The patient was then positioned for a rotatory spinal manipulation of the lumbar spine and a high velocity and low amplitude thrust was delivered to the affected segment. These rotatory manipulations consisted of either the spinous pull technique (Szaraz, 1990: 144) or the lumbar roll technique (Szaraz, 1990: 136).

However, the contact vertebra, as determined by the random sampling was either the superior or inferior vertebral segment of the two involved vertebrae making up the patient's facet syndrome. If contact was taken on the superior vertebral segment, it was directed in the direction of its motion palpation findings. If contact was taken on the inferior vertebra, it was thrust in the opposite direction to the motion palpation findings of the superior vertebra making up the involved facet joint.

The data collected consisted of observational findings of the patients and questionnaires completed by the patients. The data was collected at the initial consultation and the final treatment as well as at the one month follow-up consultation, before treatment was commenced.

The primary data was collected over six treatments for a minimum of four weeks ie. each patient received two treatments in the first week, two treatments in the second week and one treatment each in the third and fourth weeks. The follow-up consultation was conducted one month after the sixth treatment to assess the long term effects of the treatment administered. The primary data consisted of :

1. The Oswestry Back Pain and Disability Index Questionnaire, (Appendix A)
2. The Short-Form McGill Pain Questionnaire (Appendix B) and
3. The Numerical Pain Rating Scale-101 Questionnaire (Appendix C)

These questionnaires were used to record the patient's subjective pain response. A goniometer (BROM II) supplied by Performance Attainment Associates (36600 La Bore Road, Suite 6, St Paul MN 55110-4144) was used to measure the subjects lumbar spine range of motion. This was done at the initial and last treatments as well as at the one month follow-up. The questionnaires were also completed at these same intervals. This was performed to subjectively and objectively determine the response to treatment. The primary data also included the case history, physical examination and the lumbar spine regional examination forms.

The secondary data included information contained in books and journal articles that pertained to this research. A format was followed for each patient who received treatment and a summary of this format is presented below.

1. The initial consultation - a detailed case history was recorded from the patient and then a comprehensive physical and lumbar spine regional examination were performed. The physical examination was directed at ruling out systemic pathology as a cause of the patient's low back pain.

If deemed necessary lumbar spine radiographs were obtained. Any contra-indications to manipulation or the prescence of a non-mechanical cause of the patient's low back pain, as revealed by the physical examination and/or the radiographs, rendered the patient unsuitable for this study and they were referred appropriately.

2. Treatments - the following questionnaires were completed by each patient before the first and final treatments :

a. Short-Form McGill Pain Questionnaire (Melzack, 1987)

b. Numerical Pain Rating Scale - 101 Questionnaire (Downie et al., 1978)

c. Oswestry Back Pain Disability Index Questionnaire (Fairbank et al., 1980)

A brief description of these questionnaires is discussed here.

a. Short-Form McGill Pain Questionnaire - this questionnaire has become one of the most widely used tests for the measurement of pain (Melzack, 1987). It provides valuable information on the sensory, affective and evaluative dimensions of pain experience and is capable of discriminating among different pain problems. In this study it was used to measure the extent of pain experienced by the patient. The questionnaire consists of two different sections. The first section consists of eleven questions and represents the sensory dimension of pain experience. The second section consists of four questions which represents the affective dimension ie. they assess the emotional and behavioural aspects of pain. In this study, only the first section was completed by each patient. This section deals with the direct description of the low back pain as outlined by each patient. For each of the eleven descriptions, a patient could record the description as absent or mild or moderate or severe. A score was assigned to each descriptive indication. This scoring system was the most current one in use. This data was collected, recorded and analysed. The sum of all the scores was calculated and given a percentage of the highest possible score (The highest possible score for this questionnaire was 91.17).

According to Melzack (1987), a downfall of this questionnaire is that it takes 5-10 minutes to administer, which is too long for some studies. The alternative is the Visual Analogue Scale but this provides data on pain intensity only but not on the qualities of pain.

b. Numerical Pain Rating Scale 101 - this questionnaire instructed the patient to rate their pain at its worst and at its least on a numerical scale ranging from 0, which represented no pain at all to 10, which represented pain as bad as it could be. It was used to measure the patients subjective response to treatment in terms of their perception of pain intensity. The data was collected, recorded and analysed. The average pain intensity was calculated by adding the values representing worst and least pain and then dividing this score by two. The average pain intensity experienced by each patient over the treatment and follow-up periods was then used for statistical analysis. According to Downie et al., (1978) the alternative to this questionnaire is the Behavioural Rating Scale and the Visual Analogue Scale but the NRS-101 has several practical advantages over these questionnaires in that is is simple to administer and score, can be administered either in verbal or written form and it has a number of response categories. It is therefore more likely to be accepted by clinicians and researchers because it does not limit a patient's response as the other questionnaires tend to do.

c. The Oswestry Low Back Pain and Disability Index- this questionnaire provides information regarding the extent to which the patient's pain affects their daily life. It consists of ten sections of six questions each. The total possible score for each section is five points, with the point distribution varying from 0 if the first statement of the respective section was marked and up to 5 if the sixth statement was marked. The points obtained from each section were added together, with the maximum possible score being fifty, and decreased by five for each section not completed. The final score was converted to a percentage score for each individual patient.

The patient's lumbar spine range of motion was then measured using a goniometer(BROM II). The patient was then treated.

At the other consultations, the patient only received treatment. At the follow-up consultation conducted one month after the sixth treatment, the three questionnaires were once again completed by the patient and goniometer measurements were recorded.

All the collected data from the questionnaires was then converted to percentages and entered together with the goniometer measurements in degrees onto a spreadsheet. This was entered into the statisticians computer for the statistical analysis.

The statistical data obtained from this study was treated by means of the Mann-Whitney U-Test and the Wilcoxon's Signed Rank Test. The data was tabled, analysed and interpreted as described by Daniel (1978) and Steyn et al. (1994).

The Wilcoxon Signed Rank Test (intra-group analysis) was used to determine whether any significant improvement occurred between the initial and final treatments and the final treatments and the follow-up consultations, within each respective study group.

The Mann-Whitney U-Test (inter-group analysis) was used to determine whether there was any significant difference between the two groups at the time of initial consultation, final consultation and at the follow - up consultation. Confidence intervals were constructed at 95% ie. alpha = 0.05.

The respective objective and subjective responses of the patients were integrated in the final statistical evaluation to determine the relative efficancy of both treatment protocols in the treatment of mechanical low back pain as a result of facet syndrome.

Below follows a detailed description of how the data was analysed.

Procedure 1 :

Comparison between groups 1 and 2

27 Mann-Whitney unpaired tests were used to compare groups 1 and 2, the 2 groups treated as being independent of one another (unpaired).

The purpose was to find out whether there was any significant difference with respect to forward flexion, extension, right rotation, left rotation, left lateral flexion, right lateral flexion, NRS 101, McGill and Oswestry scores.

Hypothesis testing and decision rule :

The null hypothesis (H_0) states that there is no significant difference between the 2 groups with respect to the variable of interest. The alternative hypothesis (H_1) states that there is a significant difference between the 2 groups.

$H_0 : H_1 = H_2$

$H_1 : H_1$ and H_2 are significantly different from each other.

$\alpha = 0.05$ = level of significance of test.

Decision rule:

For a two-tailed test,

Reject H_0 if $P \leq \alpha / 2 = 0.025$

Accept H_0 if $P > \alpha / 2 = 0.025$

P is the observed significance level of the test.

Procedure 2

27 Wilcoxon's Signed Rank tests were used within group 1 to find out whether there was any significant improvement between consultations 1 and 2, 1 and 3, and 2 and 3. All tests were done at the $\alpha = 0.05$ level.

Hypothesis testing and decision rule:

The null hypothesis (H_0) states that there is no significant improvement between consultations 1 and 2, 1 and 3, and 2 and 3 within group 1 with respect to the variable of interest. The alternative hypothesis (H_1) states the contrary of what the null hypothesis does.

H_0 : There is no significant improvement

H_1 : There is a significant improvement

$\alpha = 0.05$ = level of significance of test.

Decision rule:

For a two-tailed test,

Reject H_0 if $P \leq \alpha / 2 = 0.025$

Accept H_0 if $P > \alpha/2 = 0.025$

P is the observed significance level of the test.

Procedure 3

27 Wilcoxon's Signed Rank tests were used within group 2 to find out whether there was any significant improvement between consultations 1 and 2, 1 and 3, and 2 and 3. All tests were done at the α = 0.05 level.

Hypothesis testing and decision rule :

The null hypothesis (H_0) states that there is no significant improvement between consultations 1 and 2, 1 and 3, and 2 and 3 within group 2, with respect to the variable of interest. The alternative hypothesis (H_1) states the contrary of what the null hypothesis does.

H_0 : There is no significant improvement

H_1 : There is a significant improvement

α= 0.05 = level of significance of test.

Decision rule :

For a two-tailed test,

Reject H_0 if $P \leq \alpha / 2 = 0.025$

Accept H_0 if $P > \alpha/2 = 0.025$

P is the observed significance level of the test.

Procedure 4

Summary statistics (mean, mode, median, standard error, the coefficient of variation) were obtained.

Procedure 5

Barcharts were constructed to present major findings of the study as a visual summary. The barcharts are able to give a visual summary of results obtained from the Mann-Whitney and Wilcoxon's Signed Rank tests.

Statistical package

The statistical package STATGRAPHICS version 6 + was used for data entry and analysis.

Results

This chapter deals with the results and statistical analysis obtained from the subjective clinical data (Oswestry Low Back Pain and Disability Index Questionnaire; Numerical Pain Rating Scale -101 Questionnaire; Short-Form Mc Gill Pain Questionnaire and the objective clinical data (Goniometer measurements).

These are presented in table form and each variable or pair of variables have been subjected to the Mann - Whitney U-Test and the Wilcoxon's Signed Rank Test to statistically determine any difference between the two treatment groups (Mann-Whitney or inter-group comparison) and improvement between treatments and between the last treatment and the one-month follow-up consultation. (Wilcoxon's or intra-group comparison).

The results were tabulated to display the mean for each group and the exceedence probability value (p-value). The null hypothesis which states that there is no significant statistical difference between the two treatment groups and no significant statistical improvement between treatments was either accepted or rejected according to the p-value. If the p-value was less than or equal to 0,025, the null hypothesis was rejected. If the p-value was greater than 0,025, the null hypothesis was accepted. All variables were evaluated with the alpha level of significance set at 0,05. Median values for each variable were then used to construct bar charts. According to the statistician, median values are the most suitable for the representation of a small sample.

4.1 DISABILITY

4.1.1 Oswestry Back Pain and Disability Index Questionnaire (OBDI)

The following results were obtained :

TABLE 4.1 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE OSWESTRY BACK PAIN AND DISABILITY INDEX QUESTIONNAIRE (OBDI) BETWEEN THE FIRST TREATMENT (1ST TX) AND FINAL TREATMENT(FTX)

	1ST TX	FTX	P-VALUE
SUPERIOR GROUP	19,2	8,53	0,00554577
INFERIOR GROUP	28,66	12,8	0,00194591

The null hypothesis was rejected for both groups which indicated that at the 5% level of significance, a significant statistical improvement took place between the first and final treatments.

TABLE 4.2 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE OBDI BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FOLLOW-UP CONSULTATION (F/UP)

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	19,2	6,4	0,00554577
INFERIOR GROUP	28,66	10,93	0,00194591

The null hypothesis was rejected for both groups which indicated that at the 5% level of significance, a significant statistical improvement took place.

TABLE 4.3 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE OBDI BETWEEN THE FINAL TREATMENT (FTX) AND THE FOLLOW-UP CONSULTATION (F/UP)

	FTX	F/UP	P-VALUE
SUPERIOR GROUP	8,53	6,4	0,72367
INFERIOR GROUP	12,8	10,93	0,751826

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance no significant statistical improvement took place between the final treatment and the follow-up consultation.

FIGURE 4.1 **MEDIAN VALUES OF THE OBDI AT THE FIRST TREATMENT (1ST TX);FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)**

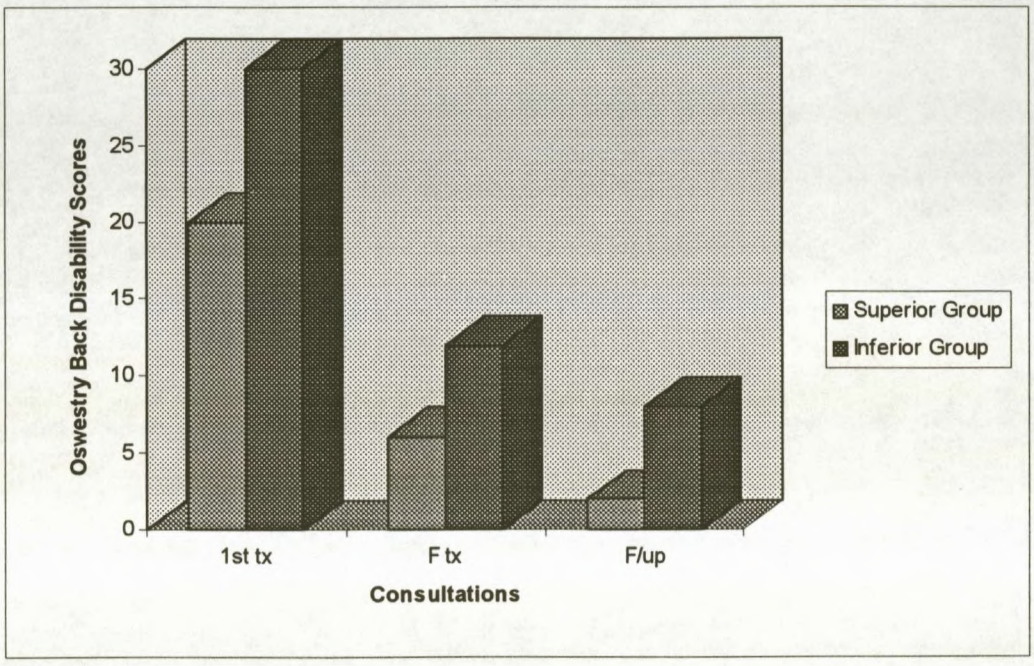


TABLE 4.4 **THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR THE OBDI COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX) , FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	FTX	F/UP
SUPERIOR GROUP	19,2	8,53	6,4
INFERIOR GROUP	28,66	12,8	10,93
P-VALUE	0,109732	0,451346	0,289219

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between the treatments or between the final treatment and follow-up consultation.

4.2 PAIN INTENSITY

4.2.1 The Short-Form McGill Pain Questionnaire (SFM)

The following results were obtained :

TABLE 4.5 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE SFM BETWEEN THE FIRST TREATMENT (1ST TX) AND FINAL TREATMENT (FTX)

	1ST TX	FTX	P-VALUE
SUPERIOR GROUP	32,42	9,42	0,000874198
INFERIOR GROUP	46,01	13,47	0,00194591

The null hypothesis was rejected for both groups which indicated that at the 5% level of significance, a significant statistical improvement took place between the first and final treatments.

TABLE 4.6 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE SFM BETWEEN THE FIRST TREATMENT (1ST TX) AND FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	32,42	8,18	0,00554577
INFERIOR GROUP	46,01	12,77	0,00328359

The null hypothesis was rejected for both groups which indicated that at the 5% level of significance, a significant statistical improvement took place between the first treatment and the follow-up consultation.

TABLE 4.7 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE SFM BETWEEN THE FINAL TREATMENT (FTX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	FTX	F/UP	P-VALUE
SUPERIOR GROUP	9,42	8,18	0,44969
INFERIOR GROUP	13,47	12,77	0,579097

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement took place between the final treatment and the follow-up consultation.

FIGURE 4.2 **MEDIAN VALUES OF THE SFM AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP).**

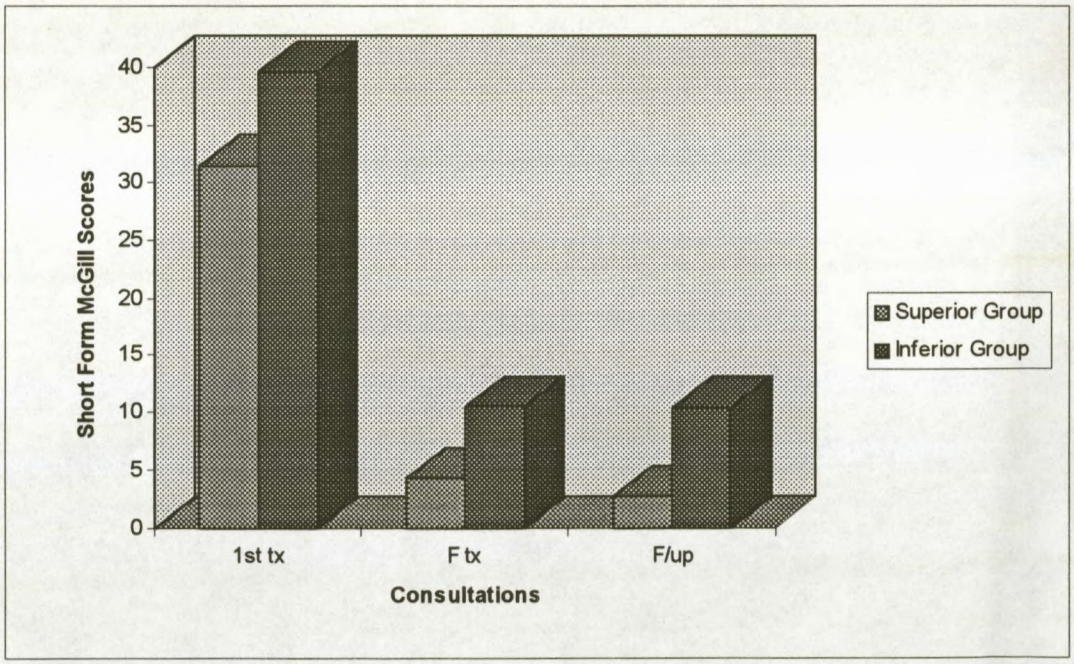


TABLE 4.8 **THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR THE SFM COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (F TX) AND FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F TX	F/UP
SUPERIOR GROUP	32,42	9,42	8,18
INFERIOR GROUP	46,01	13,47	12,77
P-VALUE	0,146531	0,32655	0,300428

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between the treatments or between the final treatment and the follow-up consultation.

4.2.2 THE NUMERICAL PAIN RATING SCALE - 101 QUESTIONNAIRE (NRS-101)

The following results were obtained :

TABLE 4.9 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE NRS-101 BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FINAL TREATMENT (F TX).**

	1ST TX	F TX	P-VALUE
SUPERIOR GROUP	42,86	19,36	0,00554577
INFERIOR GROUP	50,3	19,33	0,00194591

The null hypothesis was rejected for both groups which indicated that at the 5% level of significance, a significant statistical improvement took place between the first treatment and the final treatment.

TABLE 4.10 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE NRS-101 BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	42,86	12,2	0,00554577
INFERIOR GROUP	50,3	18,86	0,00194591

The null hypothesis was rejected for both groups which indicated that at the 5% level of significance, a significant statistical improvement took place between the first treatment and the follow-up consultation.

TABLE 4.11 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR THE NRS-101 BETWEEN THE FINAL TREATMENT (FTX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	F TX	F/UP	P-VALUE
SUPERIOR GROUP	19,36	12,2	0,0455
INFERIOR GROUP	19,33	18,86	0,579097

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement took place between the final treatment and the follow-up consultation.

FIGURE 4.3 **MEDIAN VALUES OF THE NRS-101 AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)**

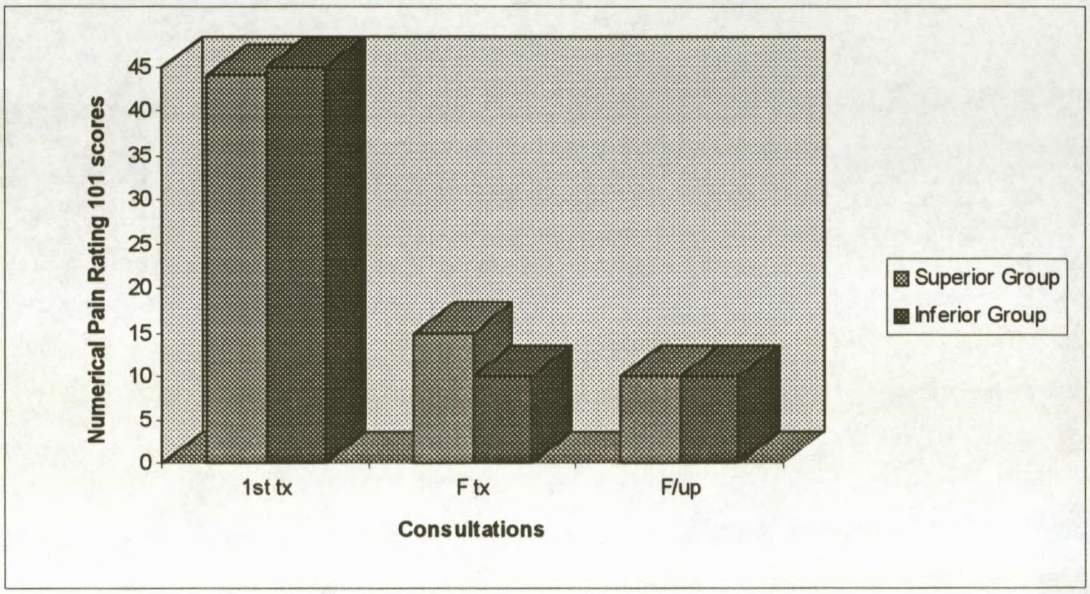


TABLE 4.12 **THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR THE NRS-101 COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (F TX) AND FOLLOW-UP CONSULTATION (F/UP).**

	1ST TX	F TX	F/UP
SUPERIOR GROUP	42,86	19,36	12,2
INFERIOR GROUP	50,3	19,33	18,86
P-VALUE	0,349773	0,900403	0,279962

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between treatments and between the final treatment and the follow-up consultation.

4.3 LUMBAR SPINE RANGES OF MOTION

4.3.1 FORWARD FLEXION

TABLE 4.13 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR FORWARD FLEXION BETWEEN THE FIRST TREATMENT (1ST TX) AND FINAL TREATMENT (F TX)

	1ST TX	FTX	P-VALUE
SUPERIOR GROUP	23,53	26,6	0,0704401
INFERIOR GROUP	21,73	23,13	1

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement took place between the first and final treatments.

TABLE 4.14 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR FORWARD FLEXION BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FOLLOW-UP CONSULTATION (F/UP)

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	23,53	28,86	0,227799
INFERIOR GROUP	21,73	27,26	0,181449

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement took place between the first treatment and the follow-up consultation.

TABLE 4.15 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR FORWARD FLEXION BETWEEN THE FINAL TREATMENT (FTX) AND THE FOLLOW-UP CONSULTATION (F/UP)

	F TX	F/UP	P-VALUE
SUPERIOR GROUP	26,6	28,86	0,504983
INFERIOR GROUP	23,13	27,26	0,096092

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement took place between the final treatment and the follow-up consultation.

FIGURE 4.4 **MEDIAN VALUES OF FORWARD FLEXION AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)**

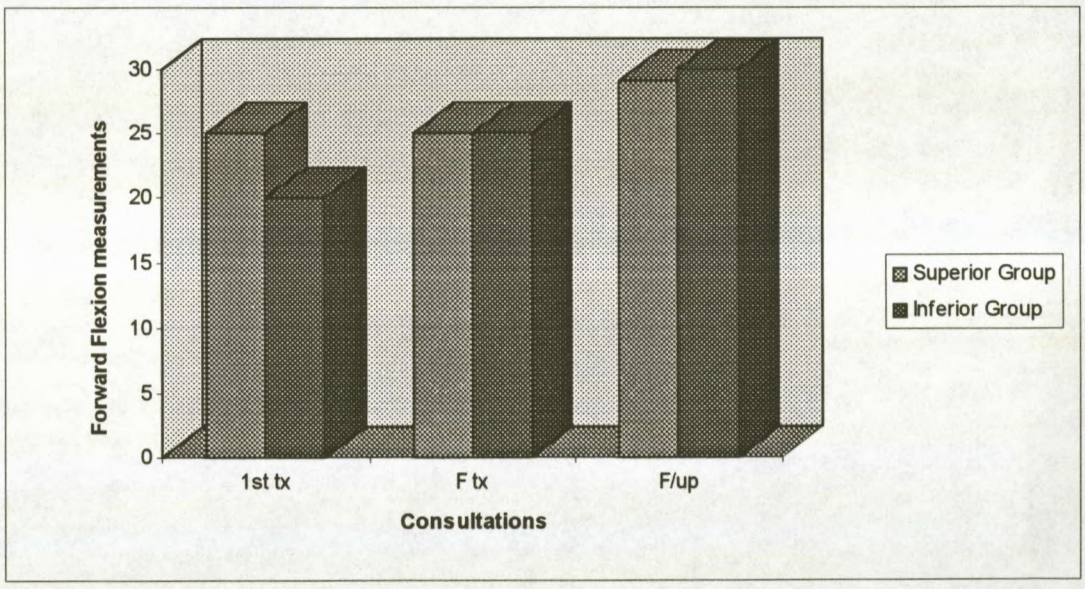


TABLE 4.16 **THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR FORWARD FLEXION COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (F TX) AND FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F-TX	F/UP
SUPERIOR GROUP	23,53	26,6	28,86
INFERIOR GROUP	21,73	23,13	27,26
P-VALUE	0,463153	0,206371	0,932791

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between treatments and between the final treatment and the follow-up consultation.

4.3.2 EXTENSION

TABLE 4.17 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR EXTENSION BETWEEN THE FIRST TREATMENT (1ST TX) AND FINAL TREATMENT (F TX)**

	1ST TX	F-TX	P-VALUE
SUPERIOR GROUP	10,93	14,93	0,00256896
INFERIOR GROUP	10,86	15,06	0,00328359

The null hypothesis was rejected for both groups which indicated that at the 5% level of significance, a significant statistical improvement occurred between the first and final treatments.

TABLE 4.18 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR EXTENSION BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	10,93	16	0,0265001
INFERIOR GROUP	10,86	15,6	0,0161569

The null hypothesis was accepted for the superior group which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the follow-up consultation.

The null hypothesis was rejected for the inferior group which indicated that at the 5% level of significance, a significant statistical improvement occurred between the first treatment and the follow-up consultation.

TABLE 4.19 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR EXTENSION BETWEEN THE FINAL TREATMENT (FTX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	F-TX	F/UP	P-VALUE
SUPERIOR GROUP	14,93	16	0,504983
INFERIOR GROUP	15,06	15,6	0,504983

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant improvement occurred between the final treatment and the follow-up consultation.

FIGURE 4.5 **MEDIAN VALUES OF EXTENSION AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)**

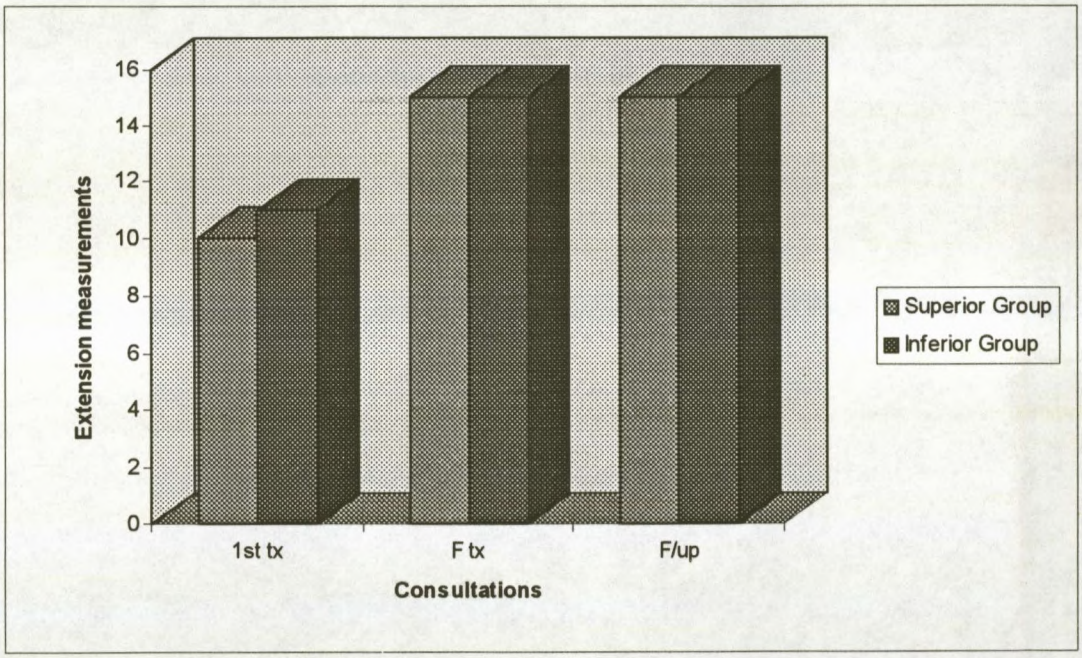


TABLE 4.20 **THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR EXTENSION COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F-TX	F/UP
SUPERIOR GROUP	10,93	14,93	16
INFERIOR GROUP	10,86	15,06	15,6
P-VALUE	0,802335	0,828189	0,949048

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between treatments and between the final treatment and the follow-up consultation.

4.3.3 LEFT ROTATION

TABLE 4.21 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR LEFT ROTATION BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FINAL TREATMENT (FTX)**

	1ST TX	F-TX	P-VALUE
SUPERIOR GROUP	19,53	23,46	0,267256
INFERIOR GROUP	18	22,86	0,00442664

The null hypothesis was accepted for the superior group which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the final treatment.

The null hypothesis was rejected for the inferior group which indicated that at the 5% level of significance, a significant statistical improvement occurred between the first treatment and the final treatment.

TABLE 4.22 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR LEFT ROTATION BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	19,53	24,2	0,0265001
INFERIOR GROUP	18	23,33	0,113846

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the follow-up consultation.

TABLE 4.23 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR LEFT ROTATION BETWEEN THE FINAL TREATMENT (F-TX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	FTX	F/UP	P-VALUE
SUPERIOR GROUP	23,46	24,2	0,113846
INFERIOR GROUP	22,86	23,33	0,72367

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the final treatment and the follow-up consultation.

FIGURE 4.6 **MEDIAN VALUES OF LEFT ROTATION AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)**

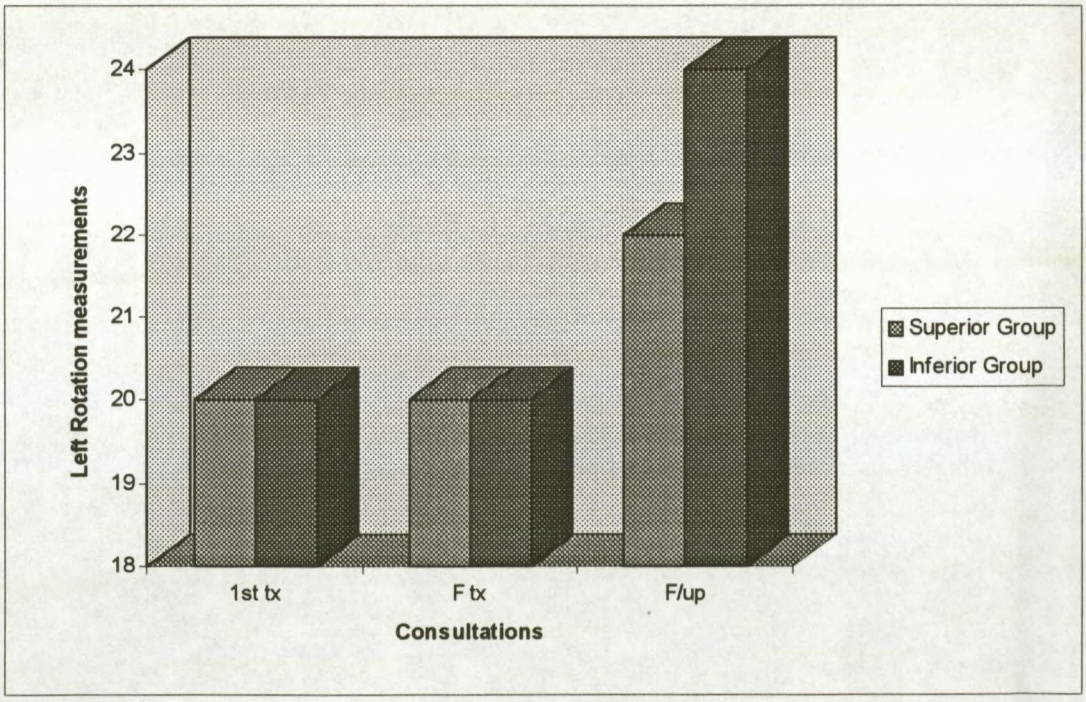


TABLE 4.24 **THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR LEFT ROTATION COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F-TX	F/UP
SUPERIOR GROUP	19,53	23,46	24,2
INFERIOR GROUP	18	22,86	23,33
P-VALUE	0,830629	0,767645	0,949755

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between treatments and between the final treatment and the follow-up consultation.

4.3.4 RIGHT ROTATION

TABLE 4.25 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR RIGHT ROTATION BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FINAL TREATMENT (FTX)**

	1ST TX	F-TX	P-VALUE
SUPERIOR GROUP	20,33	25,06	0,148914
INFERIOR GROUP	17,26	22,4	0,0433079

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the final treatment.

TABLE 4.26 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR RIGHT ROTATION BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	20,33	23,46	0,772826
INFERIOR GROUP	17,26	20,93	0,422676

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the follow-up consultation.

TABLE 4.27 **THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR RIGHT ROTATION BETWEEN THE FINAL TREATMENT (F TX) AND THE FOLLOW-UP CONSULTATION (F/UP)**

	F TX	F/UP	P-VALUE
SUPERIOR GROUP	25,06	23,46	1
INFERIOR GROUP	22,4	20,93	0,422676

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the final treatment and the follow-up consultation.

FIGURE 4.7 **MEDIAN VALUES OF RIGHT ROTATION AT THE FIRST TREATMENT (1ST TX) FINAL TREATMENT (F TX) AND FOLLOW-UP CONSULTATION (F/UP)**

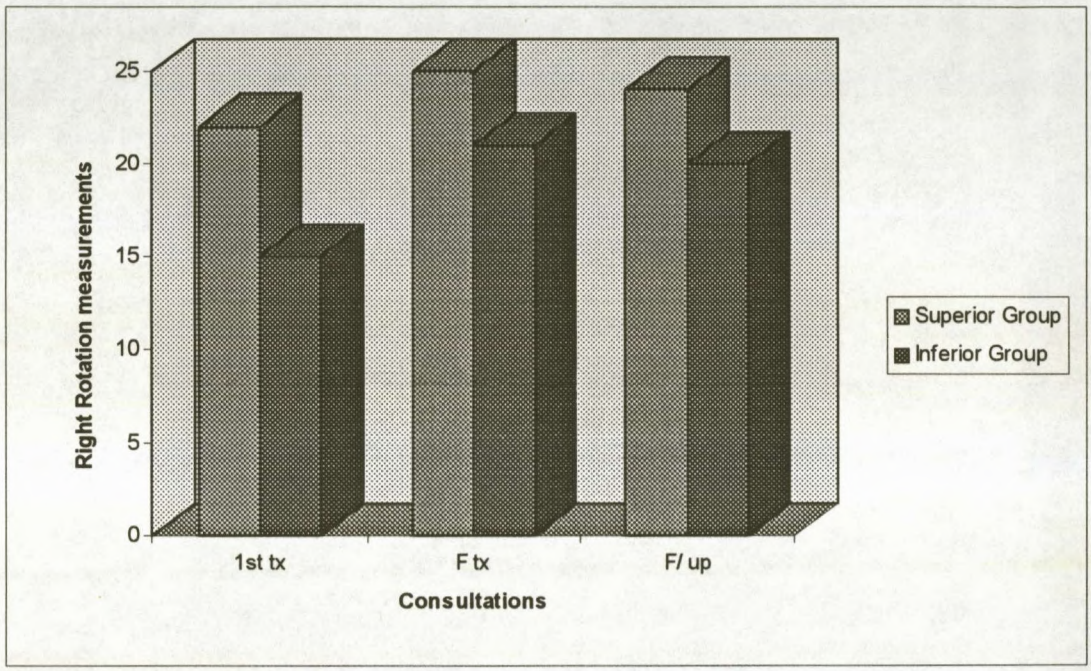


TABLE 4.28 THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR RIGHT ROTATION COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (FTX) AND FOLLOW-UP CONSULTATION (F/UP)

	1ST TX	FTX	F/UP
SUPERIOR GROUP	20,33	25,06	23,46
INFERIOR GROUP	17,26	22,4	20,93
P-VALUE	0,14342	0,503956	0,316144

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between the treatments and between the final treatment and the follow-up consultation.

4.3.5 LEFT LATERAL FLEXION

TABLE 4.29 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR LEFT LATERAL FLEXION BETWEEN THE FIRST TREATMENT (1ST TX), AND THE FINAL TREATMENT (FTX)

	1ST TX	F TX	P-VALUE
SUPERIOR GROUP	26,33	26,53	0,751826
INFERIOR GROUP	24,73	27	0,422676

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the final treatment.

TABLE 4.30 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR LEFT LATERAL FLEXION BETWEEN THE FIRST TREATMENT AND THE FOLLOW-UP CONSULTATION (F/UP)

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	26,33	24,4	0,772826
INFERIOR GROUP	24,73	23,46	0,789264

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the follow-up consultation.

TABLE 4.31 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR LEFT LATERAL FLEXION BETWEEN THE FINAL TREATMENT (F TX) AND THE FOLLOW-UP CONSULTATION (F/UP)

	FTX	F/UP	P-VALUE
SUPERIOR GROUP	26,53	24,4	1
INFERIOR GROUP	27	23,46	0,789264

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the final treatment and the follow-up consultation.

FIGURE 4.8 **MEDIAN VALUES OF LEFT LATERAL FLEXION AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (F TX) AND FOLLOW-UP CONSULTATION (F/UP)**

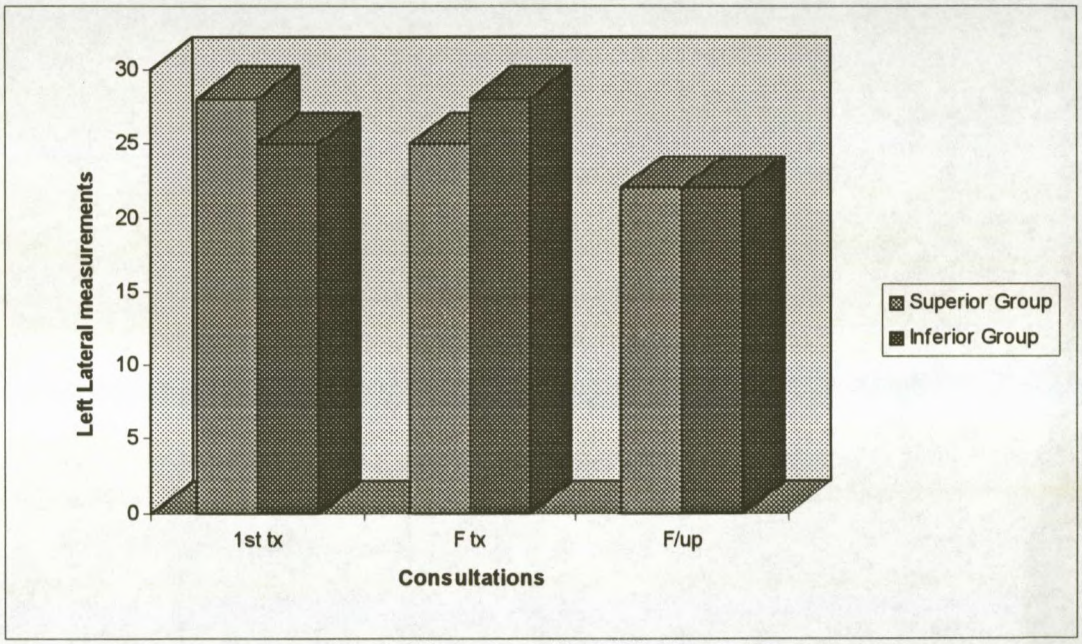


TABLE 4.32 THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR LEFT LATERAL FLEXION COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (F TX) AND FOLLOW-UP CONSULTATION (F/UP)

	1ST TX	F TX	F/UP
SUPERIOR GROUP	26,33	26,53	24,4
INFERIOR GROUP	24,73	27	23,46
P-VALUE	0,380908	0,802813	0,785469

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between the treatments and between the final treatment and the follow-up consultation.

4.3.6 RIGHT LATERAL FLEXION

TABLE 4.33 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR RIGHT LATERAL FLEXION BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FINAL TREATMENT (F TX)

	1ST TX	FTX	P-VALUE
SUPERIOR GROUP	23,93	27,46	1
INFERIOR GROUP	23,26	27,4	0,0388669

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the final treatment.

TABLE 4.34 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR RIGHT LATERAL FLEXION BETWEEN THE FIRST TREATMENT (1ST TX) AND THE FOLLOW-UP CONSULTATION (F/UP)

	1ST TX	F/UP	P-VALUE
SUPERIOR GROUP	23,93	25,26	0,772826
INFERIOR GROUP	23,26	26,33	0,605574

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the first treatment and the follow-up consultation.

TABLE 4.35 THE MEAN VALUES AND RESULTS OF THE WILCOXON'S SIGNED RANK TEST OF THE TWO GROUPS FOR RIGHT LATERAL FLEXION BETWEEN THE FINAL TREATMENT (FTX) AND THE FOLLOW-UP CONSULTATION (F/UP)

	FTX	F/UP	P-VALUE
SUPERIOR GROUP	27,46	25,26	0,148914
INFERIOR GROUP	27,4	26,33	0,789264

The null hypothesis was accepted for both groups which indicated that at the 5% level of significance, no significant statistical improvement occurred between the final treatment and the follow-up consultation.

FIGURE 4.9 MEDIAN VALUES OF RIGHT LATERAL FLEXION AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (F TX) AND FOLLOW-UP CONSULTATION (F/UP)

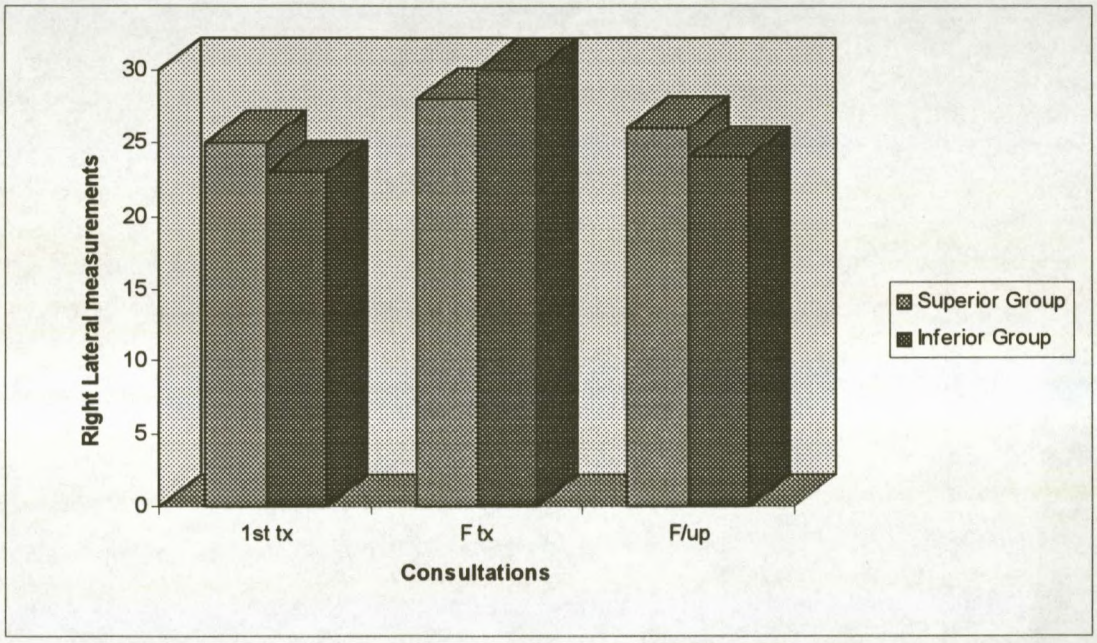


TABLE 4.36 THE MEAN VALUES AND RESULTS OF THE MANN-WHITNEY U-TEST FOR RIGHT LATERAL FLEXION COMPARING THE TWO GROUPS AT THE FIRST TREATMENT (1ST TX), FINAL TREATMENT (F TX) AND FOLLOW-UP CONSULTATION (F/UP)

	1ST TX	FTX	F/UP
SUPERIOR GROUP	23,93	27,46	25,26
INFERIOR GROUP	23,26	27,4	26,33
P-VALUE	0,545351	1	1

The null hypothesis was accepted for all three consultations for both groups which indicated that at the 5% level of significance, no significant statistical difference occurred between the two groups between the treatments and between the final treatment and the follow-up consultation.

4.4 DEMOGRAPHICAL DATA

	SUPERIOR GROUP	INFERIOR GROUP	TOTAL
RACIAL DISTRIBUTION			
BLACK	1	0	1
WHITE	6	5	11
INDIAN	8	10	18
AGE DISTRIBUTION			
AGE RANGE	19-60	21-70	19-70
AVERAGE AGE	37,8	40	38,9
GENDER DISTRIBUTION			
FEMALES	9	10	19
MALES	6	5	11
OCCUPATION			
PENSIONER	1	2	3
HOUSEWIFE	2	3	5
EXECUTIVE	0	1	1
LECTURER	0	1	1
COMPUTER PROGRAMMER	0	1	1
CLERK	0	1	1
REP	2	1	3
STUDENT	4	2	6
BUSINESSMAN	1	0	1
UNEMPLOYED	0	2	2
POLICEMAN	1	0	1
PRINTER	1	0	1
BOOKKEEPER	1	0	1
SECRETARY	1	0	1
LIBRARY ASSISTANT	0	1	1
BUILDER	1	0	1

4.5 LEVEL OF INVOLVEMENT

LEVEL	NUMBER OF PATIENTS - SUPERIOR GROUP	NO OF PATIENTS - INFERIOR GROUP	%
L2/L3	1	1	6,66
L3/L4	5	5	33,33
L4/L5	9	9	60

FIGURE 4.10

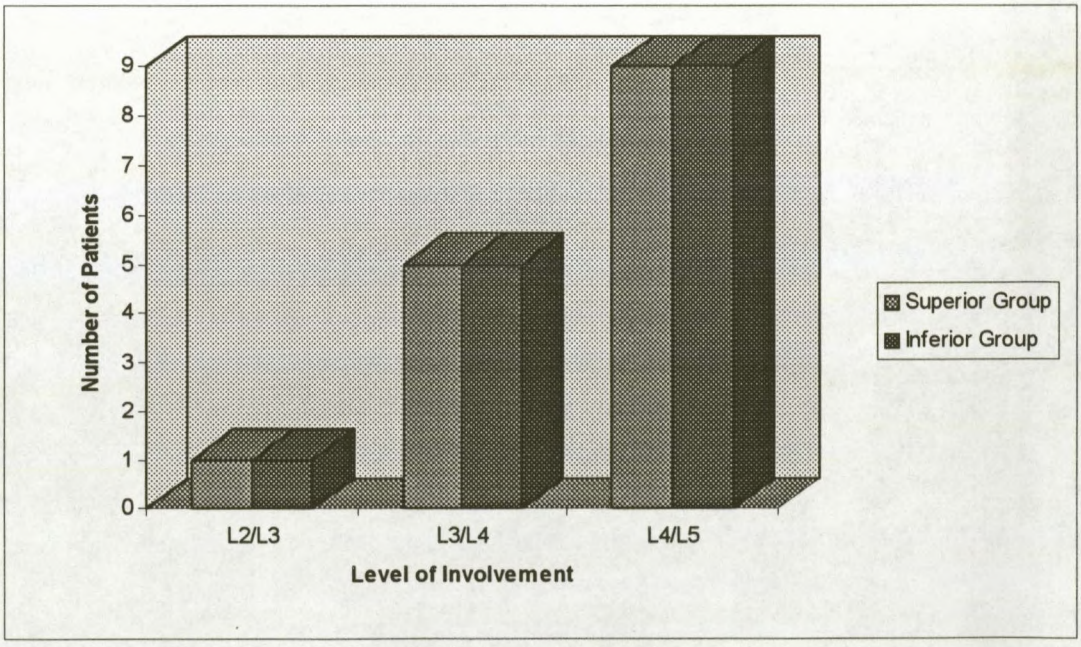
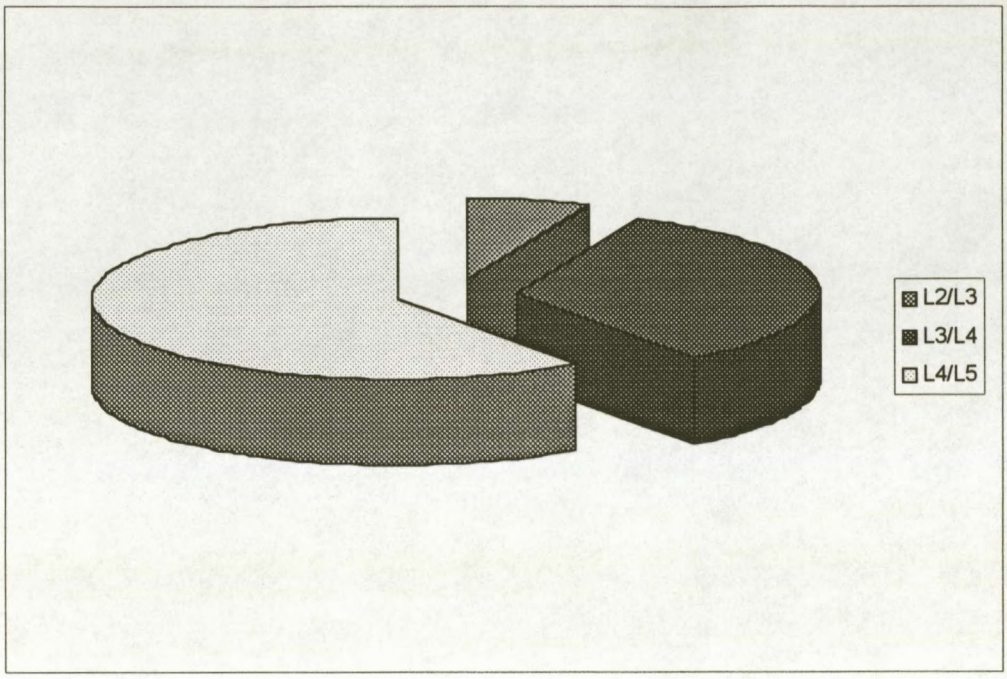


FIGURE 4.11



CHAPTER 5

This chapter deals with the discussion of the tabulated results in chapter 4 of both the subjective and objective clinical findings.

5.1 SUBJECTIVE CLINICAL FINDINGS

The results of the completed questionnaires were as follows :

5.1.1 OSWESTRY BACK PAIN AND DISABILITY INDEX QUESTIONNAIRE

Comparison of the p-values of the means for the three recorded Oswestry readings resulted in rejection of the null hypothesis between the first and final (Table 4.1) as well as between the first and follow-up (Table 4.2) treatments for both treatment groups. This indicated that the patients perceived a significant decrease in disability during the course of their treatments.

Comparison of the p-values for the Oswestry means between the final treatment and the follow-up consultation (Table 4.3) resulted in acceptance of the null hypothesis for both groups which indicated that the patients perceived no further decrease in disability during the time they received no treatment. This suggested that without further treatment, no further improvement could be made and no long-term benefits were experienced.

Comparison of the p-values for the Oswestry means between all three consultations between the groups as calculated from the Mann-Whitney U-Test, resulted in the acceptance of the null hypothesis. This indicated that neither treatment group benefited more than the other from a point of disability (Table 4.4).

5.1.2 SHORT-FORM MCGILL PAIN QUESTIONNAIRE

Comparison of the p-values of the means for the three recorded McGill readings resulted in the rejection of the null hypothesis between the first and final treatments (Table 4.5) for both groups; rejection of the null hypothesis between the final and follow-up treatments for the "superior" group (Table 4.7) and rejection of the null hypothesis between the first and follow-up treatments for the "inferior" group.(Table 4.6). This indicated a perceived decrease in pain by the patients between these treatments.

Comparison of the p-values of the mean McGill scores between all three treatments using the Mann-Whitney U-test, showed no significant difference between the two treatment groups. (Table 4.8) This indicated that neither group benefited more than the other from a pain point of view even though the most improvement took place between different treatments for the two groups (equally between first and second treatment; between the final and follow-up treatments for the "superior" group; between the first and follow-up treatments for the "inferior" group). This suggested long-term benefits for both groups but neither one more than the other.

5.1.3 THE NUMERICAL PAIN RATING SCALE - 101 QUESTIONNAIRE

Comparison of the p-values of the means for the three NRS-101 scores resulted in the rejection of the null hypothesis between the first and final treatments (Table 4.9) for both groups as well as the rejection of the null hypothesis between the first and follow-up treatments (Table 4.10) for both groups. The null hypothesis was accepted between the final treatment and the follow-up consultation (Table 4.11) for both groups.

This indicated that both groups experienced significant decrease in pain between the treatments but not significant long-term benefits from the treatments, as indicated by no significant change between the NRS-101 scores from the final treatment and the follow-up consultation.

Comparison of the p-values of the means of the NRS-101 scores using the Mann-Whitney U-test (Table 4.12), showed no significant difference between the two treatment groups and therefore resulted in the acceptance of the null hypothesis. This indicated that from a pain point of view, neither treatment group benefited more than the other.

5.2 OBJECTIVE CLINICAL FINDINGS

As with the subjective clinical findings, the means of each of the six ranges of motion were used to calculate p-values for flexion, extension, left rotation, right rotation, left lateral flexion and right lateral flexion. These were also analysed to determine intra-group improvement (Wilcoxon) and inter-group difference (Mann-Whitney).

The null hypothesis was rejected for the "superior" group for extension between the first and final treatments as well as for extension for the "inferior" group between the first and final treatments (Table 4.17). This indicated that from an objective point of view, both groups responded favourably to the treatments as was noted by the increase in the amount of extension in the lumbar spine.

The null hypothesis was rejected for the "inferior" group for the extension measurement between the first treatment and the follow-up consultation (Table 4.18). This indicated long-term benefits from the therapy.

The null hypothesis was rejected for the "inferior" group for the left rotation measurement between the first and final treatments (Table 4.21).
This indicated significant improvement in the "inferior" treatment group in terms of left rotation as a result of the treatments.

The null hypothesis was accepted for both groups for comparisons between flexion measurements between the first and final treatments (Table 4.13); first and follow-up treatments (Table 4.14) and final and follow-up treatments (Table 4.15). This indicated no significant improvement in flexion measurements

The null hypothesis was accepted for comparisons between the extension measurement between the first treatment and the follow-up consultation for the "superior" group (Table 4.18). It was also accepted for extension measurements between the final treatment and the follow-up consultation for the "superior" group (Table 4.19). For the "superior" group, this indicated no significant improvement in extension between the first treatment and the follow-up consultation as well as no long-term benefits from the treatments in terms of improved extension.

Comparison of p-values also resulted in acceptance of the null hypothesis for the "inferior" group in terms of extension between the final treatment and the follow-up consultation (Table 4.19). This indicated no significant long-term improvement for the "inferior" group in terms of extension.

Null hypothesis acceptance for the "inferior" group for left rotation improvement between the first and follow-up treatments (Table 4.22) and between the final and follow-up treatments (Table 4.23) showed both no significant improvement and no long-term benefit from the treatment in terms of left rotation.

The null hypothesis was accepted for right rotation, left lateral flexion and right lateral flexion, for both groups between the first treatment and the final treatment; between the first treatment and the follow-up treatment as well as between the final treatment and the follow-up consultation (Tables 4.25; 4.26; 4.27; 4.30; 4.31; 4.33; 4.34; 4.35). This indicated no significant improvement in any of these ranges of motion between treatments for both groups, as well as no long-term benefits from either treatment in terms of these movements.

In essence, it appeared that the "inferior" group benefited more from their particular treatment, as they showed not only significant improvement in extension between the first and final treatments as did the "superior" group (Table 4.17), but in addition, significant improvement in extension between the first and follow-up treatment (Table 4.18) and significant improvement in left rotation between the first treatment and the final treatment (Table 4.21). This was not the case with the "superior" group.

However, all the Mann-Whitney U-test comparisons for all six ranges of motion between the treatments, as well as between the treatments and the follow-up consultations, showed no significant difference between the two treatment groups in terms of these objective clinical findings. This resulted in acceptance of the null hypothesis for all the movements and indicated that neither group benefited more than the other from an objective or examiner point of view. (Tables 4.16; 4.20; 4.24; 4.28; 4.32 and 4.36).

Many factors need to be considered as to the viable outcome of this study. The sample size was small and future studies with larger samples may yield different results. I believe that the questionnaires were an efficient measurement of subjective clinical findings but perhaps certain questions need to be reworded or even redirected. From an objective point of view, reliability of the use and application of the goniometer must be questioned. Not only is placement and attachment subject to examiner error, but it was found that patients performed only part of the desired movement unless prompted otherwise. This prompting by the words "is that as far as you can go" was directed to every patient in order to overcome this error.

Breum et al., (1995) performed a study involving forty -seven asymptomatic patients and found the BROM II to be reliable in the measurement of lumbar spine mobility in forward flexion and lateral flexion and to a somewhat lesser degree in lumbar spine extension and rotation. The reliability of the BROM II was questioned because the study involved asymptomatic patients only. They suggested that further studies be conducted on symptomatic patients as the instrument reliability may be affected as a result of patients having difficulty in performing the relative movements. Breum et al., (1995) concluded that it was vital that the reliability of the BROM II be determined on symptomatic patients before being used as an assessment tool in clinical trials. In this study, the BROM II supplied by the Chiropractic Day Clinic was used as the most reliable instrument in measuring the range of motion of each patient, in order to collect the necessary objective clinical data for the final statistical analysis. Future studies could possibly use some other objective measure.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

The results show that either of the two treatment protocols is just as effective as the other in the treatment of mechanical low back pain as a result of facet syndrome. These findings would help explain why competing theories about the manipulative joint lesion and its appropriate treatment, for example adjusting into fixation or stiffness and adjusting into free motion (no stiffness) achieve similar outcomes. Also, these findings might help explain why chiropractors that adjust both sides of an involved joint still achieve acceptable results.

If contact is taken on the superior of the two segments involved in a lumbar facet syndrome and it is adjusted in the direction of the restriction as determined by the motion palpation findings, it is just as effective as taking contact on the inferior segment and adjusting it in the opposite direction. Theoretically, this will cavitate the same zygapophyseal joint. No conclusive proof exists exactly which joint cavitates during a manipulative thrust (Till, 1997).

It would be interesting to investigate adjusting the inferior of the two segments in the same direction as the motion palpation findings of the superior segment. Theoretically, this should cavitate the opposite side facet joint which may in fact be the involved articulation. I personally believe that the movement analysis and orthopaedic tests place the practitioner in the correct area of involvement but by no means indicate exactly which articulation is involved. Possibly adjusting the superior segment in both directions as compared to one direction will benefit the patient more, as this should theoretically cavitate both articulations between it and the inferior segment. Future research may yield interesting results.

Analysis of this study may give the first impression that no results were obtained. However, I and my supervisor are in agreement that no results are still results. Questions have most certainly still been answered. It has been shown once again how effective manipulation is in the treatment of low back pain. Every patient benefited from the treatments as can be seen from the evaluation of the questionnaires. No drugs were administered, nothing was removed, just a simple safe technique and relief was obtained.

In terms of research as a requirement at Technikon Natal in order to qualify as a Chiropractor, much criticism has been directed. In support of the requirement as well as a rebuttal to the criticism, Dr Till, HOD : Chiropractic at Technikon Natal had the following to say in his October 1996 newsletter entitled, "Quo Vadis?":

" 4.1.1 The difference between learning theoretically about research and actually doing research is the same as reading a book on how to swing a golf club and actually doing it and getting it right.

4.1.2 Requiring all students to do research may well turn some of them "off" research for life. True. But then they probably wouldn't have got involved in research even without having done it at Technikon.

4.1.3 Turning research into an elective would be a waste of time as it would be a huge elective and what student of sound mind would take that on!

4.1.4 Suggesting that research should be left to those graduates who might become interested in it will result in very little research being done. Chiropractors have been in South Africa since the 1920's. It is only in the last few years that anyone (in South Africa) is doing any research.

4.1.5 Numerous students have told me (Dr Till) that whilst they were doing the research it was "hell" but now that they have completed it they are glad that they did it for the following reasons.

- they have become more critical thinkers in terms of what they read and hear;
- they understand better the scientific method with its strengths and weaknesses;
- they have become very knowledgeable ("mini-experts") in the field of their research.

4.1.11 I am convinced that the greater critical thinking skills generated from doing the research will result in a more careful, thoughtful, responsible clinician, which is the primary goal of the programme, anyhow".

I must agree with the above statements by Dr Till and prospective graduates, even though many colleagues and future students may criticise me for it, as I was also critical when I first read them. However, now that I have tackled and completed the task my views have certainly changed. Firstly, yes it is a lot of extra work and after many years of study few people feel motivated to take on such a difficult requirement in order to graduate, myself included. Yet it is necessary.

Chiropractic will only grow as a profession and earn public and scientific acceptance as the research pool of knowledge is expanded. Without research, this growth is impossible because the most effective therapeutic techniques for a particular condition will not have been ascertained. I am sure no one can disagree with that.

Finally, I'd like to quote a statement that is reputed to have been said by Thomas Edison. It is what first caused me to become interested in chiropractic.

"The doctor of the future will give no medicine but will interest his patients in the care of the human frame, in diet and in the cause and prevention of disease".

REFERENCES

Andersson, G.B.J., Pope, M.H., Frymoyer, J.W., and Snook, S. 1991. Epidemiology and cost, In Anderson, G.B.J., Chaffin, D.B., Frymoyer, J.W., and Pope, M.H. Occupational Low Back Pain: Assessment, Treatment and Prevention. 1st ed. St Louis, Mosby Year Book. ISBN 0801662524. 325p.

Anderson, R.,Meeker, W.C., Wirick, B.E., Mootz, R.D., Kirk, D.H. and Adams, A.H. 1992. A meta-analysis of clinical trials of spinal manipulation. Journal of Manipulative and Physiological Therapeutics. 15 (3) : 181-194.

Banks, S.D.1993. The use of spinographic parameters in the differential diagnosis of lumbar facet and disc syndromes. Journal of Manipulative and Physiological Therapeutics. 6 (3): 113-116.

Banks, S.D. 1983. Lumbar facet syndrome: Spinographic assessment of treatment by spinal manipulative therapy. Journal of Manipulative and Physiological Therapeutics. 6 (4): 175-180.

Bogduk, N. 1983. The innervation of the lumbar spine. SPINE. 8 (3): 286-293.

Breum, J., Wiberg, J., Bolton, E. 1995. Reliability and concurrent validity of BROM II for measuring lumbar mobility. Journal of Manipulative and Physiological Therapeutics. 18 (8): 497-502.

Bronfort, G. 1986. Chiropractic treatment of low back pain: A prospective survey. Journal of Manipulative and Physiological Therapeutics. 9:99-113.

Cassidy, J.D., and Wedge, J.H.1988. The epidemiology and natural history of low back pain and spinal degeneration. In Kirkadly-Willis, W.H., and Burton, C.V. Managing Low Back Pain. 3rd ed. Churchill Livingstone. ISBN 044308789. 419p.

Cox, J.M., Fromelt, K.A., Schreiner, S. 1983. Chiropractic statistical survey of 100 consecutive low back pain patients. Journal of Manipulative and Physiological Therapeutics. 6 (3): 117-128.

Cox, J.M. and Schreiner, S.1984. Chiropractic manipulation in low back pain and sciatica: statistical data on the diagnosis, treatment and response of 576 consecutive cases. Journal of Manipulative and Physiological Therapeutics. 7:1-11.

Cox, J.M., 1990. Low Back Pain: Mechanism, Diagnosis and Treatment. 5th ed. Williams and Wilkins. ISBN 0683021524.645p.

Cyron, B.M., Hutton, W.C. 1980. Articular tropism and stability of the lumbar spine. SPINE. 5(2): 168-172.

Daniel, W.W.1978. Applied Nonparametric Statistics. Houghton Mifflin Company. 31-39,84-89. U.S.A. Houghton Mifflin. ISBN 0395257956.503p.

Deyo, R.A.1983. Conservative therapy for low back pain. Journal of the American Medical Association. 250(8): 1057-1058.

Deyo, R.A., Tsui-Wu, Y.1987. Descriptive epidemiology of low back pain and its related medical care in the United States. SPINE. 12(3): 264.

Di-Fabio, R.P. 1992. Efficacy of manual therapy. Physical therapy. 72(12):853-864.

Dillon, R.1981. A comparative study of the treatment of lower back pain by chiropractors and medical physicians in terms of work time loss and treatment cost. ACAJ Chiropractic. 12:18-21.

Downie, W.W., Leatham, P.A., Rhind, V.W., Wright, V.,Brabco, J.A. and Anderson, J.A.1978. Studies with pain rating scales. Annals of the Rheumatic Diseases. 37:378-381.

Fairbanks, J.C.T., Cooper, J.,Davies, J.B. and O'Brien, J.P.1980. The Oswestry Low Back Pain and Disability Index. Physiotherapy. 66:271.

Frymoyer,J.W., Pope, M.H., Costanza, M.C., Rosen, J.C., Goggin, J.E., and Wilder, D.G. 1980. Epidemiologic studies of low-back pain. SPINE. 5(5):419-423.

Gatterman, M.I. Foundation of Chiropractic Subluxation.1995. Von Hoffman Press. ISBN 0815135432. 484p.

Geiringer, S.R., Kincard, C.B., Rechtien, J.T.1988.Traction, manipulation and massage:in Delise, J.A. Rehabilitation Medicine : Principles and Practice. Philadelphia, PA. JB Lippincott Co. ISBN 039750764. 903p.

Giles, L.G.F.1989. Anatomic Basis of Low Back Pain. 2nd ed. Oxford, Baltimore, Williams and Wilkins. ISBN 0683035258. 197p.

Giles, L.G.F.1991. The relationship between the medial branch of the lumbar posterior ramus and the mamillo-accessory ligament. Journal of Manipulative and Physiological Therapeutics. 14(3): 189-192.

Giles, L.G.F.1992. Pathoanatomical studies and clinical significance of lumbosacral zygapophyseal joints. Journal of Manipulative and Physiological Therapeutics. 15(1):36-40.

Gulezian,R.C. 1979. Statistics for Decision Making. W.B. Saunders Company, Philadelphia, U.S.A. ISBN 0-7216-4350-7. 665p.

Haldeman, S.1990. Presidential address, North American Spine Society: Failure of the pathology model to predict back pain. SPINE. 15(7):718-724.

Haldeman, S.1993. Research supporting the efficacy of chiropractic manipulation. Presented at the South African International Chiropractic Conference, Sun City, Transvaal, 13 October 1993.

Helfet, A.J.,Griebel Lee, D.M.1978. Disorders of the Lumbar Spine. Philadelphia, J.B.Lippincott. ISBN 0876352412.

Johnson, M.R.1989. A Comparison of Chiropractic, Medical and Osteopathic care for work-related sprains and strains. Journal of Manipulative and Physiological Therapeutics. 12:335-344.

Jones, T.R.1989. Lumbar zygapophyseal joint meniscoids: evidence of their role in chronic intersegmental hypomobility. Journal of Manipulative and Physiological Therapeutics. 12(5):374-385.

Kelsey, J.L. and White, A.A. 1980. Epidemiology and impact of low-back pain. SPINE. 5(2):133-139.

Kirkaldy-Willis, W.H.1984. The relationship of structural pathology to the nerve root. SPINE. 9 (1): 49-51.

Kirkaldy-Willis, W.H. and Cassidy, J.D. 1985. Spinal manipulation in the treatment of low-back pain. Canadian Family Physician. 31:535-540.

Lehmann, T.R. Russel, D.W., Spratt, K.F., Colby, H., King Liu, Y., Fairchild, M.L. and Christensen, S.1986. Efficacy of electroacupuncture and TENS in the rehabilitation of chronic low back pain patients. PAIN. 26 (1986): 277-290.

Lewitt, K.1984. Manipulative therapy in rehabilitation of the locomotor system. 2nd ed. Boston. Butterworth. ISBN 0750611235. 308p.

Lippitt, D.B.1984. The facet joint and its role in spine pain. SPINE. 9(7): 746-750.

Meade, T.W.,Dyer, S.,Browne, W.,Townsend, J. and Frank, O.A.1990. Low back pain of mechanical origin:randomized comparison of chiropractic and hospital outpatient treatment. British Medical Journal. 300:1431-1436.

Melzack, R.1987. The Short-form McGill Pain Questionnaire. PAIN. 30:191-197.

Miller, J.A.A., Haderspeck, K.A., Schultz, A.B.1983. Posterior element loads in lumbar motion segments. SPINE. 8(3):331-337.

Moore,K.L.1985. Clinically Oriented Anatomy. 2nd ed. Williams and Wilkins. ISBN 0683 06132 1.1101p.

Nyiendo, J.,Phillips, R.B., Meeker, W.C., Kousler, R.J., Jansen, R.,Menon, M.1989. A comparison of patients and patient complaints at six chiropractic college teaching clinics. Journal of Manipulative and Physiological Therapeutics. 12: 79-85.

Panjabi, M.M., Krag, M.H., Chung, T.Q.1984. Effects of disc injury on mechanical behaviour of the human spine. SPINE. 9 (7):707-713.

Peterson, D.H., Bergmann, T.F.1993. The Spine: Anatomy, biomechanics, assessment and adjustive techniques. In Bergmann, T.F.,Peters, D.H., Lawrence, D.J. Chiropractic Technique. Churchill Livingstone. ISBN 0443087520.803p.

Rahlmann, J.F. 1987. Mechanisms of intervertebral joint fixation:a literature review. Journal of Manipulative and Physiological Therapeutics. 10 (4): 177-187.

Rowe, M.L. 1969. Low back pain in industry. A position paper. Journal of Occupational Medicine. 11:161-169.

Schafer, R.C. and Faye, L.J. 1989. Motion Palpation and Chiropractic Technique. 2nd ed. Motion palpation institute, California. ISBN 0922224889004. 426p.

Snook, S.1991. In Anderson, G.B.J., Chappin, D.B., Frymoyer, J.W. and Pope, M.H. Occupational Low Back Pain: Assessment, Treatment and Prevention. 1st ed. St Louis, Mosby Year Book. ISBN 0801662524. 325p.

Spengler, D.M., Bigos, S.J., Martin, N.A., Zeh, J., Fisher, L., Nachemson, A.1986. Back injuries in industry : a retrospective study. Overview and cost analysis. SPINE. 11 (3): 241-245.

Steyn, A.G.W., Smit, C.F., Du Toit, S.H.C. and Strasheim, C.1994. Modern statistics in practice. J.L. van Schaik. 599p.

Szaras, Z.T.1990. Compendium of Chiropractic Technique. 2nd ed. Toronto. Villian, L.R. Associates Ltd. Technical Productions. ISBN 0874526754.160p.

Till, A.G. 1997. Personal Communication.

Waagen, G.N.1986. Short term trial of chiropractic adjustments for the relief of chronic low back pain. Manual Medicine. 2: 63-67.

Wolk, S.1988. An analysis of Florida Worker's Compensation and Medical Indemnity Claims for Back-Related Injuries. Arlington, V.A. Foundation of Chiropractic Education and Research. 1-29.

Wood, L.1984. Acute locked facet syndrome and its treatment by manipulation under local periarticular anesthesia. Journal of Manipulative and Physiological Therapeutics. 7 (4): 211-217.

LIST OF APPENDICES

OSWESTRY BACK DISABILITY INDEX

PATIENT NAME:_____ FILE #:_____ DATE:_____

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

Section 1 - Pain Intensity
- ☐ I have no pain at the moment.
- ☐ The pain is very mild at the moment.
- ☐ The pain is moderate at the moment.
- ☐ The pain is fairly severe at the moment.
- ☐ The pain is very severe at the moment.
- ☐ The pain is the worst imaginable at the moment.

Section 2 - Personal Care (Washing, Dressing etc.)
- ☐ I can look after myself normally without causing extra pain.
- ☐ I can look after myself normally but it causes extra pain.
- ☐ It is painful to look after myself and I am slow and careful.
- ☐ I need some help but manage most of my personal care.
- ☐ I need help every day in most aspects of self care.
- ☐ I do not get dressed, I wash with difficulty and stay in bed.

Section 3 - Lifting
- ☐ I can lift heavy weights without extra pain.
- ☐ I can lift heavy weights but it gives extra pain.
- ☐ Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example on a table.
- ☐ Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.
- ☐ I can lift very light weights.
- ☐ I cannot lift or carry anything at all.

Section 4 - Walking
- ☐ Pain does not prevent me walking any distance.
- ☐ Pain prevents me walking more than 1 mile (2.2 km).
- ☐ Pain prevents me walking more than 1/2 mile (1.1 km).
- ☐ Pain prevents me walking more than 1/4 mile (0.5 km).
- ☐ I can only walk using a stick or crutches.
- ☐ I am in bed most of the time and have to crawl to the toilet.

Section 5 - Sitting
- ☐ I can sit in any chair as long as I like.
- ☐ I can only sit in my favorite chair as long as I like.
- ☐ Pain prevents me from sitting more than 1 hour.
- ☐ Pain prevents me from sitting more than 1/2 hour.
- ☐ Pain prevents me from sitting more than 10 minutes.
- ☐ Pain prevents me from sitting at all.

Section 6 - Standing
- ☐ I can stand as long as I want without extra pain.
- ☐ I can stand as long as I want, but it gives me extra pain.
- ☐ Pain prevents me from standing for more than one hour.
- ☐ Pain prevents me from standing for more than 30 minutes.
- ☐ Pain prevents me from standing for more than 10 minutes.
- ☐ Pain prevents me from standing at all.

Section 7 - Sex Life
- ☐ My sex life is normal and causes no extra pain.
- ☐ My sex life is normal but causes some extra pain.
- ☐ My sex life is nearly normal but it is very painful.
- ☐ My sex life is severely restricted by pain.
- ☐ My sex life is nearly absent because of pain.
- ☐ Pain prevents any sex life at all.

Section 8 - Social Life
- ☐ My social life is normal and gives me no extra pain.
- ☐ My social life is normal but increases the degree of pain.
- ☐ Pain has no significant effect on my social life apart from limiting my more energetic interests, for example, dancing.
- ☐ Pain has restricted my social life and I do not go out as often.
- ☐ Pain has restricted my social life to my home.
- ☐ I have no social life because of pain.

Section 9 - Sleeping
- ☐ I have no trouble sleeping.
- ☐ I can sleep well only by using pills.
- ☐ Even when I take pills I have less than six hours sleep.
- ☐ Even when I take pills I have less than four hours sleep.
- ☐ Even when I take pills I have less than two hours sleep.
- ☐ Pain prevents me from sleeping at all.

Section 10 - Travelling
- ☐ I can travel anywhere without extra pain.
- ☐ I can travel anywhere but it gives me extra pain.
- ☐ Pain is bad but I manage trips over two hours.
- ☐ Pain restricts me to trips of less than one hour.
- ☐ Pain restricts me to trips under 30 minutes.
- ☐ Pain prevents me from travelling, except to the doctor or hospital.

APPENDIX B

SHORT-FORM McGILL PAIN QUESTIONNAIRE

RONALD MELZACK

94

PATIENT'S NAME: _____ DATE: _____

	NONE	MILD	MODERATE	SEVERE
THROBBING	0) _____	1) _____	2) _____	3) _____
SHOOTING	0) _____	1) _____	2) _____	3) _____
STABBING	0) _____	1) _____	2) _____	3) _____
SHARP	0) _____	1) _____	2) _____	3) _____
CRAMPING	0) _____	1) _____	2) _____	3) _____
GNAWING	0) _____	1) _____	2) _____	3) _____
HOT-BURNING	0) _____	1) _____	2) _____	3) _____
ACHING	0) _____	1) _____	2) _____	3) _____
HEAVY	0) _____	1) _____	2) _____	3) _____
TENDER	0) _____	1) _____	2) _____	3) _____
SPLITTING	0) _____	1) _____	2) _____	3) _____

APPENDIX C

NUMERICAL RATING SCALE -101 QUESTIONNAIRE

Patient Name :_____ File No. :____ Date :_____

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 .

_____

TECHNIKON NATAL CHIROPRACTIC RAY CLINIC

CASE HISTORY

Patient:_____ Date #_____

File #:_____

X-ray #:_____

Age: _____ Sex:_____ Occupation: _____

Intern: _____ Signature: _____

FOR CLINICIAN'S USE ONLY

Initial visit clinician: Signature:

Case History:

Examination:

Previous: TN Other Current: TN Other

X-ray Studies:

Previous: TN Other Current: TN Other

Clinical path. lab.:

Previous: TN Other Current: TN Other

Case status:

PTT: Conditional: Signed off: Final sign out:

Recommendations:

Intern's case history

1. Source of history:

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

3. Present illness:

Location

Onset

Duration

Frequency

Pain (character)

Progression

Aggravating factors

Relieving factors

Associated S & S

Previous occurrences

Past treatment and outcome

4. Other complaints:

5. Past history:

General health status

Childhood illnesses

Adult illnesses

Psychiatric illnesses

Accidents/injuries

Surgery

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. Family history:
   - Immediate family:
     - Age
     - Health
     - Cause of death
     - DM
     - Heart disease
     - TB
     - HBP
     - Stroke
     - Kidney disease
     - CA
     - Arthritis
     - Anaemia
     - Headaches
     - Thyroid disease
     - Epilepsy
     - Mental illness
     - Alcoholism
     - Drug addiction
     - Other

8. Psychosocial history:

   Home situation

   Daily life

   Important experiences

   Religious beliefs

9. Review of systems:

   General

   Skin

   Head

   Eyes

   Ears

   Nose/sinuses

   Mouth/throat

   Neck

   Breasts

   Respiratory

   Cardiac

   Gastro-intestinal

   Urinary

Genital

Vascular

Musculoskeletal

Neurologic

Haematologic

Endocrine

Psychiatric.

PHYSICAL EXAMINATION

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

Patient:_____ File #_____

Last name First name

Clinician:_____ Signature:_____

Intern:_____ Signature:_____

Date:_____

Height:_____ Weight:_____ Temp:_____

Rates: Heart:_____ Pulse:_____ Respiration:_____

Blood pressure: Arms: L / R /

Legs: L / R /

General appearance:

vessels
general background
macula
vitreous
lens

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

Nose:
external
internal
septum
turbinates
olfaction
Sinuses (frontal & maxillary):
tenderness
transillumination
Mouth and pharynx:
lips
buccal mucosa
gums and teeth
roof
tongue
inspection
movement
taste
palpation
pharynx
inspection
[illegible] X
Neck:
posture
size
swelling
scars
discoloration
hair line

ROM:

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

Flex.

L.Rot. R.Rot.

L.Lat. flex. R.lat. flex.

Ext.

lymph nodes
trachea
thyroid
carotid arteries (thrills, bruit)
☐ V
☐ VII
☐ VIII (nystagmus)
☐ IX
☐ XI
☒ —
Inspection
ROM
deviation
Palpation
crepitus
tenderness

Neurological:
- Dermatomes
  - C5
  - C6
  - C7
  - C8
  - T1
- Tendon reflexes
  - biceps
  - triceps
  - brachioradialis
- Muscle strength
  - C5
  - C6
  - C7
  - C8
  - T1
- Coordination:
  - point-to-point
  - dysdiadochokinesia

Thorax:
- Chest:
  - Inspection:
    - skin
    - shape
    - respiratory distress
    - rhythm (respiratory)
    - depth "
    - effort "
    - intercostal/supraclavicular retraction
  - Palpation:
    - tenderness
    - masses
    - respiratory expansion
    - tactile fremitus
  - Percussion:
    - lungs (posterior)
    - diaphragmatic excursion
    - kidney punch
  - Auscultation:
    - breath sounds
      - vesicular
      - bronchial
    - adventitious sounds
      - crackles (rales)
      - wheezes (rhonchi)
    - voice sounds
      - broncophony
      - whispered pectoriloquy
      - egophony

Cardiovascular:
auscultation (aortic murmurs)
Allen's test

SUPINE EXAMINATION

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

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

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

Neurological:
dermatomes
L1
L2
L3
L4
L5
S1
muscle strength
hip flexion
knee extension
ankle dorsiflexion
plantar flexion
tendon reflexes
patellar
Achilles
plantar reflex
Rectal examination:
Inspection
sacrococcygeal & perianal areas
Palpation
sphincter tone
tenderness
induration
nodules
prostate
seminal vesicles

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

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC.

REGIONAL EXAMINATION -- LUMBAR SPINE AND PELVIS.

PATIENT:_____

FILE # :_____ DATE:_____

INTERN/RESIDENT:_____

SUPERVISING CLINICIAN :_____

STANDING :

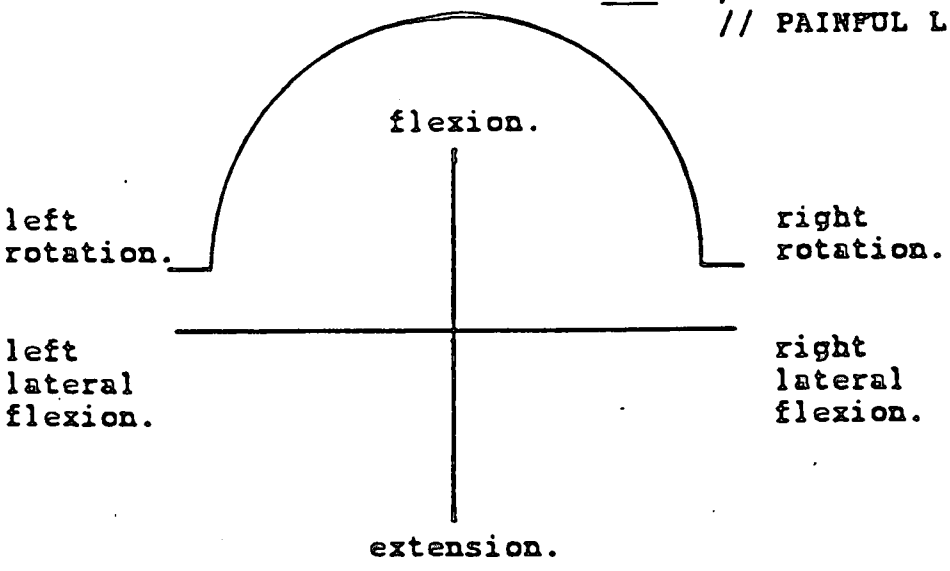
Posture
Minor's Sign
Skin
Scars
Discoloration
Muscle tone
Bony and soft tissue contours

Spinous percussion
Schober's Test (6cm)
Treadmill
Body Type
Attitude

RANGE OF MOTION.

Forward Flexion = 40-60 degrees.(15cm from floor)
Extension = 20-35 degrees.
L/R Rotation = 3-18 degrees.
L/R Lateral flexion = 15-20 degrees.

KEY : / PAINLESS LIMITATION.
// PAINFUL LIMITATION.



SUPINE :

Skin.
Hair.
Nails.

Observe abdomen
Fasciculations
Abdominal reflexes
Auscultate abdomen/groin
Palpate abdomen/groin
Pulses (abdomen)
Pulses (extremities)

SLR
Bowstring
Plantar reflex
Circumference (thigh, calf)
Leg length :
- actual
- apparent

Sciatic notch
Patrick Faber
Gaenslen's Test
Gluteus Maximus Stretch
Hip medial rotation
Psoas Test
Thomas' Test :
- hip joint
- rectus femoris

LATERAL RECUMBENT :

S-I compression
Ober's Test
Femoral nerve stretch
Myotomes :
- QL
- Gluteus Medius

PRONE :

Gluteal skyline
Skin rolling
Iliac crest compression
Facet joint challenge
S-I tenderness
Erichson's Test
Pheasant's Test
Myotomes :
- GluteusMaximus

Active MF Trigger Points:
- QL
- Glut. Med.
- Glut. Max.
- Glut. Min.
- Piriformis
- Hamstrings
- TFL

NON-ORGANIC SIGNS :

Pin Point Pain.
Axial Compression.
Trunk Rotation.
Burn's Bench Test.
Flip Test.
Hoover's Test.
Ankle Dorsiflexion Test.

GAIT :

Rhythm
On toes (standing)
On heels (standing)
Half-squat on one leg

Remarks : _____

_____

_____

_____

NEUROLOGICAL EXAMINATION :

DERMATOMES: Left	Right	MYOTOMES: Left	Right	REFLEXES: Left	Right
T12		hip flex		C5	
L1		hip int rot		C6	
L2		hip ext rot		C7	
L3		hip abd			
L4		hip add			
L5		knee flex			
S1		knee ext			
S2		dorsiflex			
S3		plantarflex			
		eversion			
		ext.hall.long			

Tripod
Kemp's Test

COMMENTS: _____

_____

_____

_____

MOTION PALPATION :

Jt.play		Left						Right					Jt.pl	
P/A	Lat	Fle	Ext	LF	AR	PR		Fle	Ext	LF	AR	PR	P/A	L
							T10							
							T11							
							T12							
							L1							
							L2							
							L3							
							L4							
							L5							
					U	L	SI	U	L					