A RANDOMIZED COMPARATIVE CLINICAL TRIAL OF THE RELATIVE EFFECTIVENESS OF MANIPULATION OR MANIPULATION AND ACUPUNCTURE FOR THE TREATMENT OF LOWER BACK PAIN.

by

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"I Horace Lindsay White do declare that this dissertation is representative of my own work."

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DEDICATION

To my dear wife, Cheryl, without whose constant faith and support, this qualification would never have been achieved. To my in-laws, whose daughter married a successful teacher with a promising future, and who never bemoaned the fact that a short 18 months into that marriage she ended up supporting her husband financially through seven long years of study. To my two beautiful tiny daughters, Melanie & Sue, who have not always had a Daddy to play with when they wanted him to at the weekends as he was on the other side of the study door all too often.

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ABSTRACT

Among the many modalities used by chiropractors is acupuncture. However, it has not yet been put to the test by research whether the addition of acupuncture for the treatment of lower back pain is of benefit or not to the patient. It is hypothesised that the addition of the acupuncture modality with the chiropractic adjustment will be of more benefit than the chiropractic adjustment alone. As the purpose of this study was to compare a chiropractic adjustment to a chiropractic adjustment followed by acupuncture the experimental method was used. The adjustments used were those indicated after following the diagnostic protocol of Natal Technikon using the Diversified Technique of Chiropractic. The acupuncture points used were the Urinary Bladder, 23, 25, 31, 36 and 40 and Gall Bladder 30 in all patients in the group receiving acupuncture. Thirty patients were selected randomly and split into two groups of 15. Patients were treated a maximum of 8 times or less if they become pain free in less treatments. The results of the Oswestry Low Back Pain Disability, Numerical Pain Rating Scale-101 and McGill Pain Questionnaires were recorded before the 1st, 5th, and after the last treatment and again at the 1 month follow up consultation, along with the BROM II and Algometer readings. The statistical tests used were the Intragroup Wilcox Signed Rank Test, the Intergroup Mann Whitney U Test and Power statistics according to the UCLA web site. Both treatments were

successful and remained that way for the readings at the one month follow up, both subjectively and objectively. The combined treatment indicated an improvement on the one month follow up readings. Statistically there was no difference between the two treatments, however Type II errors were a strong possibility.

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DEFINITIONS OF TERMS

Chiropractic:

Chiropractic is that discipline within the healing arts especially concerned with the etiology, pathogenesis, diagnostics, therapeutics and prophylaxis of functional disturbances, pathomechanical states, pain syndromes and other neurophysiologic effects related to the statics and dynamics of the neuromusculo skeletal system, particularly those related to the spine and the pelvis. (Schafer & Faye, 1990)

Manipulation:

A manipulation is a passive manual manoeuver during which a synovial joint is carried suddenly beyond the normal physiological range of movement with out exceeding the boundaries of anatomical integrity. (Sandoz R, 1976)

Adjustment:

Specific form of direct articular manipulation utilizing a short lever technique with specific contacts ,characterized by a dynamic thrust of controlled velocity, amplitude and direction. (Gatterman,MI. Chiropractic Management of Spine Related Disorders Williams Wilkens, 1982)

Fixation:

A state whereby a vertebra or pelvic bone has become temporarily immobilized in a position it may normally occupy during any phase of physiological spinal movement. (Sandoz R, 1976)

Joint Dysfunction:

Joint mechanics showing area disturbances of function without structural change. (Gatterman MI, 1982)

LBP:

Abbreviation of low back pain.

Contraindication:

Any condition, especially any disease condition, that renders one particular line of treatment improper or undesirable. (Gatterman MI, 1982)

P.S.I.S.:

Abbreviation for posterior superior iliac spine of the pelvis.

Range of motion:

The difference between the two points of physiologic extent of movement. (Schafer & Faye, 1990)

Referred Pain:

Pain felt in a part other than that in which the cause is situated. (Dorlands Illustrated Medical Dictionary, 27thEdition, WB Saunders &Co, 1988)

Acupuncture:

The insertion of needles into the body at specific points along the meridians of the body for the relief of pain and therapeutic purposes. (Dorlands Illustrated Medical Dictionary, 27thEdition, WB Saunders &Co, 1988)

Meridians:

Energy lines on the body that correspond to the energy flows within the body according to the theory and practice of classical acupuncture. (Stux & Pomeranz, 1991)

Cun:

The unit of measure along the meridians of the body, specific to that particular individual. One cun (or body inch) being the width of the individuals' thumb nail. (Stux & Pomeranz, 1991)

Needling:

The art of inserting needles in specific acupuncture points of the body. (Stux & Pomeranz, 1991)

Chapter 1: INTRODUCTION

1.1 THE PROBLEM AND ITS SETTING

Among the many modalities used by chiropractors is acupuncture. However, it has not yet been put to the test by research whether the addition of acupuncture for the treatment of lower back pain is of benefit or not to the patient. Hence this is the purpose of this clinical trial.

Manual acupuncture is known to be of benefit in the treatment of LBP (MacDonald et al (1983), Outreach (1989) and MacDonald (1983) cited Stux and Pomeranz (1991)). Therefore if it is added to another accepted treatment of LBP, namely chiropractic (Manga et al (1993), Meade et al (1990) and Farrell & Twomey (1982)), it is reasonable to expect a synergistic effect.

The Hypotheses

It is hypothesised that chiropractic adjustment is of benefit in the treatment of lower back pain.

It is hypothesised that the chiropractic adjustment and acupuncture together are of benefit in the treatment of lower back pain.

It is hypothesised that the addition of the acupuncture modality with the chiropractic adjustment will be of more benefit than the chiropractic adjustment alone.

1.2 AIMS AND OBJECTIVES OF THE STUDY

Aims

The purpose of this investigation is to evaluate the effectiveness of a chiropractic adjustment for mechanical lower back pain in chronic ambulatory patients, compared with a chiropractic adjustment, followed with acupuncture treatment, for mechanical lower back pain in chronic ambulatory patients.

Objectives

The first subproblem is to determine the effectiveness of a chiropractic adjustment to the lumbar and/or sacroiliac area of the low back to alleviate pain in the condition as defined by the diagnostic criteria outlined in the methodology, according to the patients perception thereof and clinical findings.

The second subproblem is to determine the effectiveness of acupuncture for

lower back pain as an adjunct to chiropractic treatment for the alleviation of lumbar or sacroiliac pain as defined by the diagnostic criteria outlined in the methodology, according to the patients perception thereof and the clinical findings.

The third subproblem is to integrate the patients perception and the objective clinical findings of the chiropractic treatment alone with that of the chiropractic and acupuncture treatment combined, to determine the value of the additional modality of treatment.

1.3 BENEFITS OF THIS STUDY

If it can be shown through quality research, that the extra time and effort involved in the addition of acupuncture to chiropractic treatment of low back pain is beneficial to both patient and chiropractor, it will be worth the additional modality. Furthermore, if the additional modality also leads to a more effective and efficient service, in terms of pain reduction and improved quality of life in a shorter time-span, then it will be of even further benefit to both chiropractor and patient alike.

If the final hypothesis in section 1.1 is proved correct the treatment of LBP by chiropractors will become more effective and efficient to the patient and ultimately chiropractic practice will benefit and patients with low back pain.

Chapter 2: THE REVIEW OF THE RELATED LITERATURE

2.1 LOWER BACK PAIN AND MANIPULATION

2.1.1 Introduction

As stated in a Canadian report by Manga et al (1993), lower back pain is a ubiquitous problem and there are many epidemiological and statistical studies documenting the high incidence and prevalence of it. Manga goes on to say that disability caused by low back pain has increased over the past two decades significantly. Health Researchers have shown that low back pain is one of the most costly health problems in the world today, accounting for the single largest percentage of workers' compensation benefit payments for illness and injury.

The report goes on to say there is an overwhelming body of evidence indicating that chiropractic management of low back pain is more cost-effective than medical management. They reviewed numerous studies ranging from very persuasive to convincing in support of this conclusion. That the lack of any convincing argument or evidence to the contrary must be noted and is significant to them in forming their conclusions and recommendations. The

evidence included studies showing lower chiropractic costs for the same diagnosis and episodic need for care.

The report also mentions that there is good empirical evidence that patients are very satisfied with chiropractic management of lower back pain and considerably less satisfied with physician management. There is, in fact, no clinical or case-control study that demonstrates or even implies that chiropractic spinal manipulation is unsafe in the treatment of low back pain. (Manga 1993.)

He went on to say that most of the studies suffer from one or more design shortcomings, however. Many of the studies, especially those employing workers' compensation data, are retrospective rather than prospective in design. A common problem with such retrospective analysis is non-random selection of patient cohorts treated by physicians or chiropractors.

2.1.2 Prevalence of back pain

A world renowned authority on low back pain in the U.K. stated after his retrospective studies "it is the second most common cause of physical disability after cardiovascular disease. Moreover it is increasing faster than

any form of chronic disability .... we are now facing an epidemic of lower back disability in all Western societies" (Waddell 1993, 317-8).

A similar conclusion was reached by a researcher in the field working on lower back pain in Australian adolescent males. The study involved the use of questionnaires to a randomized group of 610 12 to 19 year olds presenting with back pain at some time in their young lives. (Ebrall 1994). The study found that the point prevalence of LBP was 16.7% and the sample prevalence of 57%. The typical suffer of adolescent LBP reported chronic LBP experienced up to a few days at a time several times a month.

2.1.3 Effectiveness of manipulation for Low Back Pain

A British Medical Research Council study was published in the British Medical Journal in 1990 (Meade et al 1990). The study was a prospective randomized controlled trial in which 741 patients aged 18 - 65 were randomly assigned to chiropractic and hospital outpatient clinics in 11 centres. The characteristics of patients under hospital outpatient care and chiropractic care were very similar. The treatment alternatives were discretionary but chiropractors used manipulation on virtually all patients and the hospital staff (usually physiotherapists) used mostly Maitland mobilization or manipulation

or both. Patients were tracked for two years. The principal outcome measures were changes in the score on the Oswestry Pain Disability Questionnaire and in the results of tests of straight leg raising and lumbar flexion. Outcome measures were taken at recruitment, weekly intervals for six weeks, at six months, and then at one and two years after entry.

The results of this randomized clinical trial were as follows:

(a) chiropractic care confers significant long-term benefit in comparison with hospital outpatient treatment;

(b) the advantages of chiropractic management starts soon after treatment begins;

(c) the effects of chiropractic treatment is long-term whereas for those treated by hospital staff the benefits deteriorate after six months or a year;

(d) the longer term benefits of chiropractic care are not due to further chiropractic treatment since between year one and year two only 17% of those initially treated by chiropractors had further chiropractic care, while 24% of the hospital group had further hospital treatment;

(e) the benefit is seen mainly in those patients with chronic or severe low back pain.

Meade's study (1990) showed that for patients with low back pain in whom manipulation was not contraindicated, chiropractic almost certainly conferred worthwhile long-term benefit in comparison with hospital outpatient management, and the benefit was seen mainly in those with chronic or severe low back pain.

The above study showed the following: the changes in Oswestry disability scores for those patients treated by chiropractic was consistently greater than that for those treated in hospital; at two years the patients treated by chiropractic had improved by 7% more than those treated in hospital; the change in straight leg raising and lumbar flexion was greater in those treated by chiropractic than those treated in hospital, and patients treated by chiropractors did better than those treated in hospital for nearly all other subsidary measures; patients treated by chiropractors were not only no worse off than those treated in hospital but almost certainly fared considerably better and maintained their improvement for at least two years; and finally, chiropractic was particularly effective in those with fairly intractable pain - that is, those with a history of severe pain.

Meade restated the conclusions of this study in a Canadian Broadcasting Corporation radio interview in October 1990. He stated that their trial demonstrated that chiropractic was a very effective treatment. More effective than conventional hospital out-patient treatment for low-back pain, particularly in patients who have had back pain in the past and who had severe problems. He went on to say that it was most effective in precisely the group of patients that one would like to be able to treat. The improvements in the patients who were treated by chiropractors was between three quarters and twice as great as that for patients who had been treated in hospital and that one of the unexpected findings was the treatment difference. The benefit of chiropractic over hospital treatment - actually persisted for the entire three year period concluding that the chiropractic treatment did something that resulted in a very long-term benefit.

This study did however draw some criticism from both medical and chiropractic sources, of which the authors acknowledged those of the chiropractic profession but later refuted those raised by the medical profession. (Ward, Breen & Gurry, 1990)

One of the most highly respected multi-disciplinary research organizations in

the world, Rand Corporation of Santa Monica, California published a report in 1991 entitled "The Appropriateness of Spinal Manipulation for Low-Back pain". This report reviewed all the medical research that existed on low back pain from 1955 to 1991, comparing spinal manipulation scientifically with other methods of treatment for low back pain. The report concluded that spinal manipulation gave the most relief to patients who had a particular kind of low back pain, specifically if there were no fracture or tumour and if the pain was of a fairly short duration. They found in these patients, manipulation was better than the conventional medical treatment of bed rest and analgesics. (Shekelle et al 1991)

A New Zealand report published in 1979, and recognized internationally as by far the most thorough investigation of Chiropractic at the time, concluded that Chiropractic is better than standard medical treatment in almost all cases of low back pain. In addition the study indicated that the only individuals adequately trained in spinal manipulative therapy are chiropractors. Medical doctors and Physical Therapists would require a minimum of an additional year's training.

The Commission heard from Chiropractors, medical specialists, physiotherapist/ physical therapists and consumer experts from New Zealand,

Australia, United States, Canada and England. It heard from many patients. Beyond this formal evidence the commission made informal visits to many Chiropractic, Medical and Physiotherapy offices. It also travelled to all the above countries and met in each with representatives of government and the professions, in order to come to the conclusion mentioned above. (Hasselberg, 1979)

In a randomized, blinded, clinical study in California and reported in the Lancet, 81 patients with chronic low back pain were placed in two groups. The first group received analgesics and manipulation while the second received analgesics and 'sham' manipulation. Neither the re-assessors nor the patients knew which treatment had been given. The results demonstrated that at six months the experimental group had on average an improvement of over 50% as opposed to less than 25% in the control group. In addition, only 10% of the control group were free from disability , where as the experimental group had 38% in this category. (Ongley, M.J. et al, 1987)

In a randomized controlled clinical trial in Australia, Farrell and Twomey (1982) compared the effectiveness of passive mobilization and manipulation of the lumbar spine to that of a standard physical therapy treatment consisting of microwave diathermy, isometric abdominal exercises and ergonomic

instructions. Treatments and assessments were given by registered physiotherapists. In total, 48 patients were randomly allocated into one of the two groups and treatments were performed three times a week for up to three weeks. The effectiveness of the two treatment approaches was assessed by patients based on the severity of their back pain and by evaluating their active lumbar movements and straight leg raising. Results showed that the duration of LBP symptoms was significantly shorter for subjects receiving mobilisation and manipulation and that they achieved symptom-free status with fewer treatment sessions. The authors also concluded that "patients who received passive mobilisation and manipulation demonstrated a larger range of lumbar extension movements on the final day of treatment compared to those who had undergone an alternative conservative treatment" (Farrell and Twomey, 1982).

Nwuga (1982) conducted a clinical trial in Nigeria in order to compare the relative therapeutic efficacy of vertebral manipulation versus conventional treatment in back pain management. A total of 51 female patients with acute LBP were randomly allocated to one of the two groups. The conventional treatment consisted of shortwave diathermy followed by gently isometric exercises, and proper mechanics of lifting and postural education was part of the treatment program. Manipulative treatment consisted of lumbar oscillatory rotation and these patients also received the education. All patients were

treated by the same physical therapist. Total ranges of motion of flexion and extension, lateral flexion and rotation of the lumbar spine, and the straight-leg-raising test were used to assess the effectiveness of treatment, six weeks after the beginning of treatment. The results showed (highly) significant differences between the two groups with regards to post-treatment differences in total flexion and extension, lateral flexion, rotation and straight-leg-raising in favour of the manipulated patients. The mean treatment times between the two groups were also significantly different, in favour of the manipulated group. The manipulated group showed flexion and extension improved by 34% as opposed to 13% in the conventional treatment group and rotation in the manipulated group 7% as opposed to 2% in the conventional treatment group. Side flexion was 9% in the manipulated group and only 3% in the conventional treatment group. Straight leg raise improved 39% in the manipulated group and 4% in the conventional treatment group. The manipulated group showed an average treatment time of 120 minutes as opposed to 160 minutes for the conventional treatment group. The author concluded that "manipulation therapy as shown by this study was superior to the conventional method in the treatment of the type of patient described" (Nwuga, 1982).

The first true controlled efficacy study of chiropractic therapy for LBP was

conducted by Waagen et al in 1986. The authors stated that prior to this study "any efficacy of chiropractic therapy can only be inferred from the studies of manipulative therapy for the treatment of low-back-pain which have been performed utilizing medical, osteopathic or physiotherapy-trained practioners of manipulation" (Waagen et al 1986).

However, because chiropractors specialize in the delivery of specific spinal adjustments and receive a longer period of formal training than other manipulators, the authors of this study believe that it is not possible to extrapolate the results of previous trials in manipulative therapy directly to chiropractic. Nineteen patients undertook this trial which lasted two weeks. They were randomly allocated to one of two groups: one received a series of chiropractic adjustments (experimental), and the other received a comparable series of sham manual interventions (control), both provided by chiropractors. Double blinded assessment of treatment effects was performed after the first treatment and at the conclusion of the two-week treatment period. Eight objective tests of function and a subjective rating of pain (Visual Analogue Scale) were used. Results showed that the experimental patients had significantly more relief from pain than control patients immediately after the first treatment (+1.3 and +0.7) and after two weeks of treatment (+2.3 and +0.6). Experimental patients also showed significantly better improvement on

the objective measurements of spinal mobility than the control patients (namely +1.7 and -2.08). (These readings are all of the global index change.) Therefore, on the first occasion that chiropractic manipulation was assessed by formal trial, it was found both subjectively and objectively to be effective at relieving LBP when measured against a manual placebo treatment. A major limitation of this study was the small sample. It was a pilot for a larger trial, now completed but yet to be published (Manga 1993).

Contrary to what Meade et al (1990) found, Haldeman says in a status report, that the effectiveness of manipulation is greatest in patients who have acute back pain and no leg pain or neurological deficits (Haldeman 1983). He also suggests later in his paper that "manipulation combined with other methods of treatment may be more effective than manipulation alone". He concludes this after research by Coxhead et al (1981)which demonstrated that manipulation was better than traction, exercise and corsets, but that symptoms were significantly improved if these treatment approaches were combined with manipulation.

Paris (1983) states that "the acceptance of spinal manipulation by the medical and physical therapy professions continues to grow despite the controversies that have surrounded its practice". He observes later in his paper that the

principle purpose of manipulation is to relieve pain and promote increased function and that the effects of manipulation are mechanical, neurophysiological and psychological. He elaborates on the psychological effects "The psychological effect of the laying on of hands is well accepted in medical practice. With the addition of a skilled evaluation involving palpation for soft tissue changes and altered joint mechanics, the patient becomes convinced of the interest, concern, and manual skills of the clinician. If at the conclusion of the examination an additional manipulation is performed, resulting in an audible pop or snap, the placebo factor is undeniably high. It is no wonder that some patients report total relief within a second or two following manipulation - far too short a time for any genuine benefit to be appreciated. The astute clinician accepts and reinforces this report, recognizing that the patient is in need of all possible assistance".

In a retrospective study of 688 lower back pain patients in a Multi Disciplinary clinic of medical and chiropractic patients followed for 3 months at Friendly Hills Health Care in California, it was found that chiropractic patients are twice as likely to perceive their treatment as successful in reducing their low back pain and to have had zero days with low back pain during the week preceding the evaluation compared with medical patients. (Hurwitz 1994)

In a Canadian study undertaken by a specialist in orthopaedics, Kirkaldy-Willis, and a chiropractor, Cassidy, 283 patients with chronic low back and leg pain were treated by spinal manipulation for 2 or 3 weeks. Results showed that 81% of the patients with referred pain improved markedly and had no pain, or mild intermittent pain and no restriction for work or other activities; and 48% of patients with nerve compression experienced a similar marked improvement in their condition (Kirkaldy-Willis and Cassidy 1985).

They went on to say that in most cases of chronic back pain there is an initial increase in symptoms after manipulation, but the increase is temporary and in their opinion easily controlled with the application of ice. This principle of pain control is one item that this pilot study will be seeking to ascertain. As alluded to in section 1.1 namely that the acupuncture and chiropractic group may well not experience a perceived increase in symptoms, post adjustment in the initial stages.

2.1.4 Cost Effectiveness Of Manipulation

According to Meade's study there is economic support for the use of chiropractic in the management of low back pain, though the obvious clinical improvement in pain and disability attributable to chiropractic treatment is in itself an adequate reason for considering the use of chiropractic (Meade 1990). These conclusions were also arrived at in the Rand Report, the New Zealand report and the Californian studies referred to in 2.1.3 above.

2.2 ACUPUNCTURE AND LOW BACK PAIN

2.2.1 Introduction

In recent years most studies involving acupuncture have tended to ignore manual acupuncture for the more recent electroacupuncture and TENS treatment of pain. However this pilot study is intended to look at the effectiveness of manual acupuncture as a means of reducing LBP in a Chiropractic Practice.

It has been suggested that low back pain of mechanical origin will not respond in the long term to acupuncture until the mechanical lesion has been attended to with a mechanical therapy. But will respond with respect to pain in the short term (Liggins 1995).

2.2.2 Acupuncture and Pain

After an acupuncture needle is inserted into the body, the pain threshold slowly climbs, peaking after 20 - 30 minutes. After 30 minutes the acupuncture effect levels off and remains there for an hour or two (provided the needle is intermittently manipulated). After four hours it has dropped substantially. Han (1987) came to this conclusion after numerous studies on rats in which he found that as with ordinary analgesics, rats became tolerant of the acupuncture and perceived less effect from it the more treatment they received. He then went on to inject brain extracts from normal and tolerant rats into naive rats. When the naive rats received acupuncture having being exposed to tolerant rat brain extract they did not react to the acupuncture.

Han (1987) went on to show that dynorphin works analgesically in the spine and not in the brain. From his exhaustive research, on hundreds of people and animals, he found that 80% of people respond to acupuncture and that 20% have no response. Similarly, 85% of animals respond to acupuncture whilst there is a 15% nil response. He also postulated that acupuncture is similar to other analgesics - you get less effect each time in multiple daily treatments with acupuncture tolerance lasting about 4 hours.

Stux and Pomeranz (1991) make the statement in their book that acupuncture

analgesia works better than placebo for most pains and helps 55-85% of patients, which is a remarkable efficacy rate; morphine only helps 70% of patients with chronic pain.

2.2.3 Acupuncture and Low Back Pain - Positive

It was noted at the World Health Organisation session in Peking that low back pain, among many other conditions, could be treated effectively by acupuncture. (Outreach 1989)

Patients who require a "quick fix" and demand "miraculous" results after one treatment for a problem they have had for many years, should allow for one month of treatment for every year that the problem has existed (Vice 1993).

In a small, single-blind, randomised, placebo-controlled trial of superficial acupuncture in the treatment of low back pain carried out by comparing 8 patients treated by acupuncture with 9 patients treated by placebo. (MacDonald et al, 1983) In all five measures of efficacy chosen for study, the acupuncture group achieved better responses than the placebo group; four of the five inter-group differences were statistically significant. In addition, an overall mean for all five measures combined showed significant superiority of acupuncture over placebo.

In a clinical report (Kajdos, 1973) of lumbosacral pain and sciatica treated with acupuncture in a medical practice, 567 patients suffering from lumbosacral and sciatic pain were treated. Excellent results were obtained in 38%, and good results in 51% of those treated a total of 89% success. These results were recorded in a practice over a period of ten years. All patients in the report had previously been treated with analgesics and various physical methods prior to receiving acupuncture. "Excellent results" - were defined as being totally pain free and having full range of motion restored while "good results" - were where pain was alleviated and a range of motion improved to a certain degree.

Kim and Yount in 1974, in a clinical report of a retrospective study of acupuncture on 80 low back pain patients assessed the success of the acupuncture treatment by analysing the decrease in the use of drugs by their patients. The patients were divided into four groups of twenty patients each except the last group which only had ten. Group 1 had no operations, group 2 had one laminectomy, group 3 two or more laminectomies with or with out spinal fusions and group 4 had one or more laminectomies and one or more nerve pathways severed between peripheral origin and central termination.

The results after acupuncture were as follows: the mean reduction of all drug

intake in groups 1, 2, 3 and 4 was 85.6%, 75%, 61.6%, and 53.2% respectively and mean reduction of each individual drug intake was aspirin 69%, synthetic analgesics 67.7%, narcotics 72.2%, tranquillizers 75.2%, muscle relaxants 60% (Kim and Yount 1974).

A comparative study of acupuncture and transcutaneous electrical stimulation for low back pain by Melzack and Fox (1976), using the McGill Pain Questionnaire showed that pain relief greater than 33% was produced in 75% of the patients by acupuncture and in 66% of by electrical stimulation. Statistical analysis showed both methods to be equally effective. However the mean duration of pain relief was 40 hours after acupuncture and 23 hours after electrical stimulation. In a follow up study four months later 50% of patients questioned still reported that pain was diminished (No number given.)

2.2.4 Acupuncture and Low Back Pain - Negative

The U.S.Department of Health and Human Services in its December 1994 News Letter states that in the treatment of low back pain it can find no statistically viable documentation for the use of acupuncture, among many other modalities, for the treatment of low back pain. The guide lines they propose for low back pain of acute onset are spinal manipulation and surgery in certain severe instances (HHS News 1994).

Mendelson et al (1983), in a study of Acupuncture Treatment for Chronic Low Back Pain said that studies to date had produced conflicting results and that these contradictory results, and over enthusiastic earlier reports of acupuncture effectiveness, have appeared to restrain further clinical research in the field.

2.3 SUMMARY

From the above information the author hopes to have shown that both chiropractic and acupuncture have merit in the scientific world as a treatment for low back pain. Chiropractic has been shown to be effective from a patient's perception point of view. It is also effective when compared to other treatments and in the immediate and long term follow ups.

As there does not seem to be any specific research done as yet by way of comparing acupuncture as an additional treatment to chiropractic treatment versus chiropractic treatment it would seem useful to pursue this line of experiment. The purpose being to improve the effectiveness of chiropractic treatment as a whole by comparing the effectiveness of chiropractic adjustment for lower back pain with chiropractic adjustment followed by acupuncture for lower back pain.

Chaitow (1983) states:

> "In acute traumatic conditions such as whiplash injuries, sprained ankles, and sporting injuries, the use of acupuncture to afford pain relief would be a rational initial approach. In the treatment of early arthritic changes, acupuncture therapy would combine well with physical treatment directed at improving mobility and postural re-education. In more chronic arthritic conditions, acupuncture might afford no more than temporary relief and a more comprehensive approach to the patient would be required."

Also of interest is the statement by Kajdos in his paper cited in 2.2.3 as a foot note "in more conspicuous displacement in the area of the sacroiliac joints, I have always practiced manipulative repositioning (osteopathy) and only after fixing the static conditions did I introduce the patient to acupuncture."

This statement ties in well with the opinion expressed by Liggins "that in cases of mechanical low back pain the effects of acupuncture will be minimal unless the mechanical aspect is corrected first". (Liggins 1995).

Both these above points suggest merit in under taking the present research topic.

It would appear, from most of the papers studied and cited above that the proposed use of the short form of the McGill Pain Questionnaire and the Visual Analogue Scale in this proposed study would be suitable. "The short form McGill Pain Questionnaire appears to be a useful instrument. It correlates very highly with the major Pain Rating Index indices of the long form McGill Pain Questionnaire, and is sensitive to traditional clinical therapies." (Melzack 1987). "The McGill Pain Questionnaire provides quantitative information that can be treated statistically, and is sufficiently sensitive to detect differences among different methods to relieve pain." (Melzack 1975).

Chapter 3: THE DATA, THEIR TREATMENT AND THEIR INTERPRETATION

3.1 THE DATA

The data of this research is of two kinds namely primary and secondary.

3.1.1 The primary data

The following types of primary data were required:

3.1.1.1 Patients response to the McGill Pain Questionnaire and the Numerical Pain Rating Scale-101 on their perception of change in level of pain.

3.1.1.2 Patients response to the Oswestry Back Disability Index on their perception of change in their disability.

3.1.1.3 Clinical observation of change in their condition as observed through objective examination on the part of the researcher using the BROM II back range of motion assessment apparatus and the Algometer pain/pressure meter.

3.1.2 **The secondary data**

The secondary data came from scientific journal articles, published reports, text books and personal communications with established practitioners in the relevant fields of study.

3.2 THE CRITERIA GOVERNING THE ADMISSIBILITY OF THE DATA

The only data admitted came from the McGill Pain Questionnaire, the Oswestry Back Disability Indices and the Numerical Pain Rating Scale-101, completed by the patients under the supervision of the researcher and the researchers documented clinical observations of the patients and BROM II and Algometer readings.

3.3 THE RESEARCH METHODOLOGY

3.3.1 Patients were obtained by advertising and consecutive sampling. All prospective patients were initially screened via a full case history, physical examination (see Appendices G - J), along with the criteria as set out in 3.3.5. Those that satisfied the criteria required for this study were admitted to the

study. As the purpose of this study was to compare a chiropractic adjustment to a chiropractic adjustment followed by acupuncture the experimental method was used.

Thirty patients were selected randomly according to the guidelines above and split into two groups of 15. This allowed for patients dropping out and the required sample of 30 still being met with as required by the Research Department of this institution.

The adjustments used were those indicated after following the diagnostic protocol of Natal Technikon using the Diversified Technique of Chiropractic. The adjustments used were the Lumbar Roll, Spinous Push, Upper and Lower Sacroiliac as defined by Szaraz (1990) in part 5 adjustment procedures 9.1, 9.6, 9.2, 9.3. and in Schafer and Faye's Motion Palpation (1990). The acupuncture points used were the Urinary Bladder, 23, 25, 31, 36 and 40 and Gall Bladder 30 in all patients in the group receiving acupuncture. These points were decided on in consultation with my Co-Supervisor and by consultation with various texts to find points commonly used to treat low back pain. (Stux & Pomeranz, pg 207 ; Chaitow pg 63-65; Xinghua, pg 123; Acupuncture a Comprehensive Text, pg 655-6.)

3.3.2 Patients for the first group were taken at random as they responded to the adverts and met the criteria of entry. Patients in the first group were treated with one of the manipulative techniques as mentioned above having undergone a full physical examination and diagnostic assessment. (See Appendices G - J). After the adjustment the patient was given no further therapy until the next treatment. Patients were treated a maximum of 8 times or less if they become pain free in less treatments.

The results of the Oswestry Low Back Pain Disability, Numerical Pain Rating Scale-101 and McGill Pain Questionnaires were recorded before the 1st, 5th, and after the last treatment and again at the 1 month follow up consultation, along with the BROM II and Algometer readings.

3.3.3 The second group was selected in such a way as to match the first groups randomness as evenly as possible with respect to age and sex.

The second treatment group received the same treatment as the first but in addition received acupuncture treatment for lower back pain individually after the chiropractic treatment. The acupuncture treatment involved the Urinary Bladder, Gall Bladder meridians and tender spots as indicated by the

acupuncture diagnosis technique. The additional treatment lasted for twenty minutes from the time the last needle insertion. The needles were stimulated manually by the researcher at 5 minute intervals.

Stimulation consisted of turning the needle clockwise 180 degrees followed by another turn counterclockwise 180 degrees, using the thumb and index fingers to perform the manoeuvre.

Each patient was swabbed with a sterile swab of alcohol at each of the acupuncture points before and after treatment.

3.3.4 The history, examination and diagnosis of mechanical lower back pain or sacroiliac syndrome was according to the protocol of Natal Chiropractic Clinic (see Appendices B, F - J) and the classification of lower back pain according to Kirkaldy-Willis model:

- posterior facet syndrome
- sacroiliac syndrome
- Maigne's syndrome
- disc herniation
- facet and disc degeneration

- lateral stenosis

- central stenosis

- multilevel stenosis

- myofascial syndromes. (Kirkaldy-Willis 1988)

3.3.5. The following criteria were applied in the selection of the patients:

Only chronic ambulatory patients diagnosed as having lower back pain of mechanical origin were treated. Patients falling into the following categories were excluded:

* Patients currently receiving treatment of any kind for their pain.
* Patients who have had surgery of any type to the lumbar area.
* Patients with neurological deficit or radiculopathy.
* Patients manifesting pathologies. (eg: Osteoporosis, Rheumatoid arthritis and infections.)
* Acute disc herniations.
* Pregnancy.
* Patients in whom the required bony land marks are not readily palpable.
* Patients younger than 16 or older than 50 yrs.

* Contra-indications to spinal manipulative therapy according to Gatterman (Gatterman 1990, 67-68).

3.4 THE SPECIFIC PROJECTED TREATMENT OF EACH SUBPROBLEM

3.4.1 Subproblem one

The first subproblem was to determine the relative effectiveness of a chiropractic adjustment to the lumbar or sacroiliac area of the back to alleviate pain in the condition as defined by the diagnostic criteria outlined in the methodology, according to the patients perception thereof and clinical findings.

3.4.1.1 Data needed

The data needed for testing the hypothesis of this subproblem were obtained from the McGill Pain, the Numerical Pain Rating Scale-101, the Oswestry Back Disability Questionnaires and the BROM II and Algometer readings and objective clinical findings for each patient in group one.

3.4.1.2 How the data were secured

The patients in group one filled in the answers to the questionnaires on the respective treatments as explained in the methodology. The objective clinical findings and readings were observed and noted by the researcher at the designated treatment on the relevant documents in accordance with the protocol of examination of Natal Chiropractic Clinic. (See Appendices A, C - F).

3.4.1.3 How the data were reported and interpreted

Use was made of the following statistics:

- Intragroup Wilcox Signed Rank Test
- Intergroup Mann Whitney U Test and appropriate tables and graphs pertaining to the results of the Oswestry Back Disability, the Numerical Pain Rating Scale-101, the McGill Pain Questionnaires and BROM II and Algometer readings along with objective clinical observations.
- Power statistics according to the UCLA web site (http://www.stat.ucla.edu/calculators/powercalc/normal)

3.4.2 Subproblem two

The second subproblem was to determine the relative effectiveness of acupuncture for lower back pain as an adjunct to chiropractic treatment for the alleviation of lumbar or sacroiliac pain as defined by the diagnostic criteria outlined in the methodology, according to the patients perception thereof and the clinical findings.

3.4.2.1 Data needed

The data needed for testing the hypothesis of this subproblem were obtained from the McGill Pain, the Numerical Pain Rating Scale-101, the Oswestry Back Disability Questionnaires and the BROM II and Algometer readings and objective clinical findings for each patient in group two.

3.4.2.2 How the data were secured

The patients in group two filled in the answers to the questionnaires on the respective treatments as explained in the methodology. The objective clinical findings and readings were observed and noted by the researcher at the designated treatment on the relevant documents in accordance with the protocol of examination of Natal Chiropractic Clinic. (See Appendices A, C - F).

3.4.2.3 How the data were reported and interpreted

Use was made of the following statistics:

- Intragroup Wilcox Signed Rank Test
- Intergroup Mann Whitney U Test and appropriate tables and graphs pertaining to the results of the Oswestry Back Disability, the Numerical Pain Rating Scale-101, the McGill Pain Questionnaires and BROM II and Algometer readings along with objective clinical observations.
- Power statistics according to the UCLA web site

  (http://www.stat.ucla.edu/calculators/powercalc/normal)

3.4.3 **Subproblem three**

The third subproblem was to integrate the patients perception and the objective clinical findings of the chiropractic treatment alone with that of the chiropractic and acupuncture treatment combined. To determine the value of the additional modality of treatment.

3.4.3.1 Data needed

The data needed for testing the hypothesis of this subproblem were obtained from the McGill Pain, the Numerical Pain Rating Scale-101, the Oswestry Back Disability Questionnaires and the BROM II and Algometer readings and

objective clinical findings for each patient in groups one and two.

3.4.3.2 How the data were secured

The patients filled in the answers to the questionnaires on the respective treatments as explained in the methodology. The objective clinical findings and readings were observed and noted by the researcher at the designated treatment on the relevant documents in accordance with the protocol of examination of Natal Chiropractic Clinic. (See Appendices A, C - F).

3.4.3.3 How the data were reported and interpreted

Use was made of the following statistics:

- Intragroup Wilcox Signed Rank Test
- Intergroup Mann Whitney U Test and appropriate tables and graphs pertaining to the results of the Oswestry Back Disability, the Numerical Pain Rating Scale-101, the McGill Pain Questionnaires and BROM II and Algometer readings along with objective clinical observations.
- Power statistics according to the UCLA web site

  (http://www.stat.ucla.edu/calculators/powercalc/normal)

Chapter 4 - STATISTICS AND RESULTS

4.1 STATISTICAL METHODS OF DATA ANALYSIS USED IN THIS STUDY

The sample size of study

To take part in the study, the patient had to have low back pain of biomechanical nature. Patients at the Chiropractic Clinic were invited to be screened for the study. In view of the shortage of time and resources encountered, only the first 30 eligible patients were chosen for the study. Once this was done, the 30 patients were randomly assigned into one of two groups using the table of random numbers.

The use of non-parametric tests for statistical data analyses

The sample size per group is small (n1 = 15, n2 = 15). Hence, **non-parametric** methods were used for statistical data analyses. There were 3 consultations (beginning of treatment , end of treatment and follow-up) for each of the clinical experiments: ROM, McGill Pain Questionnaire, Numerical Pain Rating Scale 101, Oswestry Back Disability Questionnaire and Algometer readings.

Procedure 1: Comparison between groups A and B (Group A - Chiropractic treatment and Group B - Chiropractic and Acupuncture treatment)

The **Mann-Whitney unpaired two-tailed test** was used to compare groups A and B with respect to each variable of interest. In each case, the null hypothesis states that there is no significant difference between groups A and B with respect to the variable in charge, at the $\alpha = 0.05$ level of significance. The alternative hypothesis states that there is a significant difference.

Decision rule:

The null hypothesis is rejected at the α level of significance if $p \leq \alpha/2$ where p is the observed significance level or P-value. Otherwise, the null hypothesis is accepted at the same level.

Procedure 2: Comparison between related samples within group A (Group A - Chiropractic treatment)

Wilcoxon's sign ranked test was used to compare 3 related consultations in each of the 10 clinical procedures in the study. In each case, the null hypothesis states that there is no significant improvement between the 3 related samples in the

experiment, at the α level of significance. The alternative hypothesis states that there is a significant improvement.

Decision rule:

The null hypothesis is rejected at the α level of significance if $p \leq \alpha/2$ where p is the observed significance level or P-value. Otherwise, the null hypothesis is accepted at the same level.

Procedure 3: Comparison between related samples within group B

(Chiropractic and Acupuncture treatment)

Procedure 2 is repeated within group B with the same decision rule.

Procedure 4: Medians and standard deviations for each variable of study

These were calculated for the respective variables and are show in the relevant tables.

Procedure 5: Comparison using barcharts

Selected visual summaries of analytical findings will be given by use of barcharts to compare Groups A and B with respect to selected variables of interest.

Statistical packages:

The statistical package **Statgraphies** was used for data entry and analysis.

Reference book:

van den Honert, R. (1997). **Intermediate Statistical Methods for Business and Economics.**

In addition, power statistics was used.

The power of a statistical test is a measure of how sensitive the test is. The power of a test depends on the size of the sample, the accuracy of measurements involved in the study and the level of significance of the study, α. The smaller the power of a test, the larger becomes the likelihood of a Type II error (accepting a false Null Hypothesis).

This is a UCLA Web site where the power of a test can be easily computed. At http://www.stat.ucla.edu/calculators/powercalc/normal. (Portney, L.G. and Watkins, M.P. (1993): Foundations of Clinical Research: Applications to Practice. Appleton and Lange: Norwalk Connecticut, USA. ISBN: 0-83580-1065-5. P 656 - 663

4.2 INTRA GROUP (GROUP A) - OBJECTIVE MEASUREMENTS

Refer to Graphs 4.1 - 4.7.

TABLE 4.1: MANIPULATION ONLY (Group A), FIRST vs LAST CONSULTATION

	Group A								
	First Consultation					Last Consultation			
	MEAN	MEDIA	SD	SE	P- VALU	MEAN	MEDIA	SD	SE
FLEXION	26.13	25.00	8.63	2.29	0.0162	33.73	34.00	9.69	2.50
EXTENSION	11.33	10.00	6.21	1.60	0.3865	12.76	10.00	6.96	1.80
RIGHT LATERAL FLEX	26.93	30.00	8.09	2.09	0.2673	31.47	30.00	7.59	1.96
LEFT LATERAL FLEXI	25.20	29.00	8.19	2.12	0.0614	31.47	31.00	7.28	1.88
RIGHT ROTATION	21.87	21.00	9.10	2.35	0.0055	29.87	31.00	7.64	1.97
LEFT ROTATION	23.13	22.00	9.24	2.39	0.0162	29.80	30.00	7.44	1.92
ALGO	4.37	4.20	1.87	0.48	0.0003	8.53	10.00	1.79	0.46
POWER				FLEXION	0.0556				
				EXTENSION	0.0507				
				R L FLEXIO	0.0539				
				L L FLEXION	0.0578				
				R ROTATIO	0.0597				
				L ROTATIOI	0.0562				
				ALGO	0.9055				

For the objective measurements (ROM and Algometer) taken for Group A between the first consultation and the last consultation it is found that according to the hypothesis testing there is a tendency to reject the Null Hypothesis, hence finding that there was a significant difference between these two consultations. The readings of Extension, Right and Left Lateral Flexion contradict the above statement of a rejection of the Null Hypothesis (the p-value being greater than 0.025) thus accepting it - this can be seen to be valid as in Graphs 4.2, 4.3 and 4.4 there is very little or no improvement for Group A between the first and last consultation.

TABLE 4.2: MANIPULATION ONLY (Group A), LAST vs FOLLOW-UP CONSULTATION

	Group A								
	Last Consultation					Follow-up Consultation			
	MEAN	MEDIAN	SD	SE	P- VALU	MEAN	MEDIAN	SD	SE
FLEXION	33.73	34.00	9.69	2.50	0.5465	33.13	32.00	9.45	2.44
EXTENSION	12.76	10.00	6.96	1.80	0.7237	13.40	13.00	6.08	1.57
R L FLEXION	31.47	30.00	7.59	1.96	0.5465	31.47	30.00	6.71	1.73
L L FLEXION	31.47	31.00	7.28	1.88	0.0704	30.33	30.00	6.53	1.69
RIGHT ROTATIO	29.87	31.00	7.64	1.97	0.3428	29.20	30.00	7.05	1.82
LEFT ROTATION	29.80	30.00	7.44	1.92	0.0704	28.53	28.00	7.36	1.99
ALGO	8.53	10.00	1.79	0.46	1.0000	8.58	8.00	1.36	0.35
POWER				FLEXION	0.0500				
				EXTENSION	0.0502				
				R L FLEXION	0.0500				
				L L FLEXION	0.0504				
				R ROTATION	0.0501				
				L ROTATION	0.0504				
				ALGO	0.0500				

For the objective measurements (ROM and Algometer) taken for Group A between the last consultation and the follow up consultation (a month later) it is found that according to the hypothesis testing there is an outright acceptance of the Null Hypothesis, hence finding that there was no significant difference between these two consultations. This was expected as the patients did not receive any treatment for the period between these two consultations hence no improvement was anticipated.

TABLE 4.3: MANIPULATION ONLY (Group A), FIRST vs FOLLOW-UP CONSULTATION

	Group A								
	First Consultation					Follow-up Consultation			
	MEAN	MEDIAN	SD	SE	P- VALU	MEAN	MEDIAN	SD	SE
FLEXION	26.13	25.00	8.63	2.29	0.0265	33.13	32.00	9.45	2.44
EXTENSION	11.33	10.00	6.21	1.60	0.1489	13.40	13.00	6.08	1.57
R L FLEXION	26.93	30.00	8.09	2.09	0.0265	31.47	30.00	6.71	1.73
L L FLEXION	25.20	29.00	8.19	2.12	0.1213	30.33	30.00	6.53	1.69
RIGHT ROTATIO	21.87	21.00	9.10	2.35	0.0093	29.20	30.00	7.05	1.82
LEFT ROTATION	23.13	22.00	9.24	2.39	0.0961	28.53	28.00	7.36	1.99
ALGO	4.37	4.20	1.87	0.48	0.0003	8.58	8.00	1.36	0.35
POWER				FLEXION	0.0550				
				EXTENSION	0.0522				
				R L FLEXION	0.0547				
				L L FLEXION	0.0561				
				R ROTATION	0.0584				
				L ROTATION	0.0541				
				ALGO	0.9764				

For the objective measurements (ROM and Algometer) taken for Group A between the first consultation and the follow up consultation it is found that according to the hypothesis testing only the Right rotation and algometer readings reject the Null Hypothesis, hence finding that there was a significant difference between these two consultations. The remainder of the readings signal an acceptance of the Null Hypothesis (the p-value being greater than 0.025). Studying Graphs 4.1 - 4.6 a definite improvement is shown between the first and follow up of Group A (with exception Right (graph 4.3) and Left (graph 4.4) Lateral Flexion). It is possible that a type II error has occurred within the hypothesis testing as the powers for these readings indicate a strong likelihood of a Type II error.

4.3 INTRA GROUP (GROUP B) - OBJECTIVE MEASUREMENTS

Refer to Graphs 4.1 - 4.7.

TABLE 4.4: ACUPUNCTURE & MANIPULATION (Group B), FIRST vs LAST CONSULTATION

	Group B								
	First Consultation					Last Consultation			
	MEAN	MEDIAN	SD	SE	P- VALU	MEAN	MEDIAN	SD	SE
FLEXION	19.40	19.00	7.15	1.85	0.0614	25.53	27.00	7.65	1.98
EXTENSION	6.00	5.00	5.51	1.31	0.0005	12.07	10.00	7.87	2.03
R L FLEXION	24.00	20.00	10.59	2.74	0.0033	34.20	32.00	8.53	2.20
L L FLEXION	24.00	20.00	10.59	2.74	0.0033	34.20	32.00	8.53	2.20
RIGHT ROTATIC	20.27	18.00	9.82	2.53	0.0005	32.73	34.00	8.38	2.16
LEFT ROTATION	20.13	20.00	9.72	2.51	0.0003	32.60	31.00	7.99	2.06
ALGO	4.11	3.60	1.39	0.36	0.0003	8.31	9.00	1.85	0.48
POWER				FLEXION	0.0580				
				EXTENSION	0.0620				
				R L FLEXION	0.0585				
				L L FLEXION	0.0585				
				R ROTATION	0.0661				
				L ROTATION	0.0676				
				ALGO	0.9762				

For the objective measurements (ROM and Algometer) taken for Group B between the first consultation and the last consultation it is found that according to the hypothesis testing one rejects the Null Hypothesis, hence finding that there was a significant difference between these two consultations. An exception exists for Flexion and hence accepts the Null Hypothesis (the p-value being greater than 0.025) This again is possibly due to a Type II error as the power value is relatively small - consider graph 4.1 and there is an indication of an improvement for Group B from the first consultation to the last consultation.

TABLE 4.5: ACUPUNCTURE & MANIPULATION (Group B), LAST vs FOLLOW-UP CONSULTATION

	Group B								
	Last Consultation					Follow-up Consultation			
	MEAN	MEDIAN	SD	SE	P- VALU	MEAN	MEDIAN	SD	SE
FLEXION	25.53	27.00	7.65	1.98	0.0077	28.07	28.00	8.64	2.23
EXTENSION	12.07	10.00	7.87	2.03	0.5050	12.93	10.00	7.98	2.06
RIGHT LATERAL	34.20	32.00	8.53	2.20	0.2207	35.93	33.00	8.81	2.28
LEFT LATERAL	34.20	32.00	8.53	2.20	0.2207	35.93	33.00	8.81	2.28
RIGHT ROTATIC	32.73	34.00	8.38	2.16	0.3711	33.67	35.00	8.14	2.10
LEFT ROTATION	32.60	31.00	7.99	2.06	0.4497	33.53	34.00	7.67	1.98
ALGO	8.31	9.00	1.85	0.48	0.0077	9.33	10.00	1.23	0.32
POWER				FLEXION	0.0510				
				EXTENSION	0.0501				
				R L FLEXSIO	0.0504				
				L L FLEXION	0.0504				
				R ROTATION	0.0501				
				L ROTATION	0.0502				
				ALGO	0.1663				

For the objective measurements (ROM and Algometer) taken for Group B between the last consultation and the follow up consultation it is found that according to the hypothesis testing there is a tendency to accept the Null Hypothesis, hence finding that there was no significant difference between these two consultations. An exception exists for the Flexion reading and the Algometer reading, hence rejecting the Null Hypothesis (the p-value being less than 0.025).

TABLE 4.6: ACUPUNCTURE & MANIPULATION (Group B), FIRST vs FOLLOW-UP CONSULTATION

	Group B								
	First Consultation					Follow-up Consultation			
	MEAN	MEDIAN	SD	SE	P- VALU	MEAN	MEDIAN	SD	SE
FLEXION	19.40	19.00	7.15	1.85	0.0033	28.07	28.00	8.64	2.23
EXTENSION	6.00	5.00	5.51	1.31	0.0005	12.93	10.00	7.98	2.06
R L FLEXION	24.00	20.00	10.59	2.74	0.0005	35.93	33.00	8.81	2.28
L L FLEXION	24.00	20.00	10.59	2.74	0.0005	35.93	33.00	8.81	2.28
RIGHT ROTATIC	20.27	18.00	9.82	2.53	0.0005	33.67	35.00	8.14	2.10
LEFT ROTATION	20.13	20.00	9.72	2.51	0.0003	33.53	34.00	7.67	1.98
ALGO	4.11	3.60	1.39	0.36	0.0003	9.33	10.00	1.23	0.32
POWER				FLEXION	0.0622				
				EXTENSION	0.0650				
				R L FLEXION	0.0612				
				L L FLEXION	0.0612				
				R ROTATION	0.0694				
				L ROTATION	0.0714				
				ALGO	1.0000				

For the objective measurements (ROM and Algometer) taken for Group B between the first consultation and the follow up consultation it is found that according to the hypothesis testing one rejects the Null Hypothesis, hence finding that there was a significant difference between these two consultations.

4.4 INTRA GROUP (GROUP A) - SUBJECTIVE MEASUREMENTS

Refer to Graphs 4.8 - 4.10.

TABLE 4.7: MANIPULATION ONLY (Group A), FIRST vs LAST CONSULTATION

	Group A								
	First Consultation					Last Consultation			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	6.07	7.00	3.49	0.90	0.0010	2.00	1.00	1.96	0.50
NSR 101	35.67	40.00	12.08	3.12	0.0005	16.33	15.00	14.45	3.73
OSW	17.60	12.00	11.24	2.90	0.0009	6.40	6.00	8.42	2.18
POWER				McGILL	0.2114				
				NSR 101	0.0584				
				OSW	0.0587				

For the subjective measurements taken for Group A between the first consultation and the last consultation it is found that according to the hypothesis testing there is a rejection of the Null Hypothesis, hence finding that there was significant difference between these two consultations.

TABLE 4.8: MANIPULATION ONLY (Group A), LAST vs FOLLOW-UP CONSULTATION

	Group A								
	Last Consultation					Follow-up Consultation			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	2.00	1.00	1.96	0.50	0.3710	1.87	2.00	1.60	0.41
NSR 101	16.33	15.00	14.45	3.73	0.6170	17.00	15.00	14.61	3.77
OSW	6.40	6.00	8.42	2.18	0.0455	4.67	4.00	7.00	1.81
POWER				McGILL	0.0512				
				NSR 101	0.0500				
				OSW	0.0506				

For the subjective measurements taken for Group A between the last consultation and the follow up consultation it is found that according to the hypothesis testing there is a acceptance of the Null Hypothesis, hence finding that there was no significant difference between these two consultations.

TABLE 4.9: MANIPULATION ONLY (Group A), FIRST vs FOLLOW-UP CONSULTATION

	Group A								
	First Consultation					Follow-up Consultation			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	6.07	7.00	3.49	0.90	0.0009	1.87	2.00	1.60	0.41
NSR 101	35.67	40.00	12.08	3.12	0.0009	17.00	15.00	14.61	3.77
OSW	17.60	12.00	11.24	2.90	0.0003	4.67	4.00	7.00	1.81
POWER				McGILL	0.2326				
				NSR 101	0.0576				
				OSW	0.0633				

For the subjective measurements taken for Group A between the first consultation and the follow up consultation it is found that according to the hypothesis testing there is a rejection of the Null Hypothesis, hence finding that there was significant difference between these two consultations.

4.5 INTRA GROUP (GROUP B) - SUBJECTIVE MEASUREMENTS

Refer to Graphs 4.8 - 4.10.

TABLE 4.10: ACUPUNCTURE & MANIPULATION (Group B), FIRST vs LAST CONSULTATION

	Group B								
	First Consultation					Last Consultation			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	8.133	8.00	4.91	1.27	0.0003	2.67	2.00	3.13	0.81
NSR 101	47	47.50	18.35	4.74	0.0003	22.50	20.00	15.95	4.12
OSW	24.667	26.00	13.00	3.36	0.0003	10.80	10.00	10.25	2.65
POWER				McGILL	0.1174				
				NSR 101	0.0549				
				OSW	0.0571				

For the subjective measurements taken for Group B between the first consultation and the last consultation it is found that according to the hypothesis testing there is a rejection of the Null Hypothesis, hence finding that there was significant difference between these two consultations.

TABLE 4.11: ACUPUNCTURE & MANIPULATION (Group B), LAST vs FOLLOW-UP CONSULTATION

	Group B								
	Last Consultation					Follow-up Consultation			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	2.667	2.00	3.13	0.81	0.0133	1.33	1.00	1.63	0.42
NSR 101	22.5	20.00	15.95	4.12	0.0077	15.00	10.00	14.61	3.77
OSW	10.8	10.00	10.25	2.65	0.0233	6.67	4.00	6.53	1.69
POWER				McGILL	0.0755				
				NSR 101	0.0507				
				OSW	0.0519				

For the subjective measurements taken for Group B between the last consultation and the follow up consultation it is found that according to the hypothesis testing there is a rejection of the Null Hypothesis, hence finding that there was significant difference between these two consultations. (This indicates the possibility that the combination of manipulation and acupuncture continues to bring about improvement long after the treatment ceases.)

TABLE 4.12: ACUPUNCTURE & MANIPULATION (Group B), FIRST vs FOLLOW-UP CONSULTATION

	Group B								
	First Consultation					Follow-up Consultation			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	8.13	8.00	4.91	1.27	0.0003	1.33	1.00	1.63	0.42
NSR 101	47	47.50	18.35	4.72	0.0003	15.00	10.00	14.61	3.77
OSW	24.667	26.00	12.99	3.36	0.0003	6.67	4.00	6.53	1.69
POWER				McGILL	0.1738				
				NSR 101	0.0594				
				OSW	0.0657				

For the subjective measurements taken for Group B between the first consultation and the follow up consultation it is found that according to the hypothesis testing there is a rejection of the Null Hypothesis, hence finding that there was significant difference between these two consultations.

4.6 INTER GROUP - OBJECTIVE MEASUREMENTS

Refer to Graphs 4.1 - 4.7.

TABLE 4.13: FIRST CONSULTATION: GROUP A vs GROUP B

	First Consultation								
	Group A					Group B			
	MEAN	MEDIAN	SD	SE	P- VALU	MEAN	MEDIAN	SD	SE
FLEXION	26.13	25.00	8.63	2.29	0.0583	19.40	19.00	7.15	1.85
EXTENSION	11.33	10.00	6.21	1.60	0.0119	6.00	5.00	5.51	1.31
R L FLEXION	26.93	30.00	8.09	2.09	0.1753	24.00	20.00	10.59	2.74
L L FLEXION	25.20	29.00	8.19	2.12	0.3936	24.00	20.00	10.59	2.74
RIGHT ROTATIO	21.87	21.00	9.10	2.35	0.4052	20.27	18.00	9.82	2.53
LEFT ROTATION	23.13	22.00	9.24	2.39	0.2186	20.13	20.00	9.72	2.51
ALGO	4.37	4.20	1.87	0.48	0.9503	4.11	3.60	1.39	0.36
POWER				FLEXION	0.0567				
				EXTENSION	0.1165				
				R L FLEXION	0.0507				
				L L FLEXION	0.0501				
				R ROTATION	0.0502				
				L ROTATION	0.0508				
				ALGO	0.0561				

For the objective measurements taken for the first consultation it is found that according to the hypothesis testing there is an acceptance of the Null Hypothesis, hence finding that there was no significant difference between the two groups at the start of the trial. An exception exists for Extension and hence the Null Hypothesis was rejected.

TABLE 4.14: LAST CONSULTATION: GROUP A vs GROUP B

	Last Consultation								
	Group A					Group B			
	MEAN	MEDIAN	SD	SE	P- VALU	MEAN	MEDIAN	SD	SE
FLEXION	33.73	34.00	9.69	2.50	0.0246	25.53	27.00	7.65	1.98
EXTENSION	12.76	10.00	6.96	1.80	0.8353	12.07	10.00	7.87	2.03
R L FLEXION	31.47	30.00	7.59	1.96	0.4055	34.20	32.00	8.53	2.20
L L FLEXION	31.47	31.00	7.28	1.88	0.3699	34.20	32.00	8.53	2.20
RIGHT ROTATIO	29.87	31.00	7.64	1.97	0.3712	32.73	34.00	8.38	2.16
LEFT ROTATION	29.80	30.00	7.44	1.92	0.2435	32.60	31.00	7.99	2.06
ALGO	8.53	10.00	1.79	0.46	0.6617	8.31	9.00	1.85	0.48
POWER				FLEXION	0.0580				
				EXTENSION	0.0501				
				R L FLEXION	0.0513				
				L L FLEXION	0.0513				
				R ROTATION	0.0514				
				L ROTATION	0.0516				
				ALGO	0.0561				

For the objective measurements taken for the last consultation it is found that according to the hypothesis testing there is an acceptance of the Null Hypothesis, hence finding that there was no significant difference between the two groups and that statistically there was no difference between the two treatments. (An exception exists for Flexion and hence rejecting the Null Hypothesis.) This is possibly due to a Type II error as the power values are relatively small - consider graphs 4.1 and 4.3 - 4.7 which all indicate a difference between the two groups for the last consultation.

TABLE 4.15: FOLLOW-UP CONSULTATION: GROUP A vs GROUP B

	Follow up Consultation								
	Group A					Group B			
	MEAN	MEDIAN	SD	SE	P- VALU	MEAN	MEDIAN	SD	SE
FLEXION	33.13	32.00	9.45	2.44	0.1905	28.07	28.00	8.64	2.23
EXTENSION	13.40	13.00	6.08	1.57	0.7709	12.93	10.00	7.98	2.06
R L FLEXION	31.47	30.00	6.71	1.73	0.1743	35.93	33.00	8.81	2.28
L L FLEXION	30.33	30.00	6.53	1.69	0.0763	35.93	33.00	8.81	2.28
RIGHT ROTATIO	29.20	30.00	7.05	1.82	0.1191	33.67	35.00	8.14	2.10
LEFT ROTATION	28.53	28.00	7.36	1.99	0.0614	33.53	34.00	7.67	1.98
ALGO	8.58	8.00	1.36	0.35	0.1248	9.33	10.00	1.23	0.32
POWER				FLEXION	0.0527				
				EXTENSION	0.0501				
				R L FLEXION	0.0536				
				L L FLEXION	0.0558				
				R ROTATION	0.0542				
				L ROTATION	0.0582				
				ALGO	0.2090				

For the objective measurements taken for the follow up consultation it is found that according to the hypothesis testing there is an acceptance of the Null Hypothesis, hence finding that there was no significant difference between the two groups. However once again the power values are small hence, the sensitivity of the testing is very low - less than 6% accuracy - and Type II error is once again a strong possibility. (Graphs 4.1 - 4.7 are illustrative of this possibility.)

4.7 INTER GROUP - SUBJECTIVE MEASUREMENTS

Refer to Graphs 4.8 - 4.10.

TABLE 4.16: FIRST CONSULTATION: GROUP A vs GROUP B

	First Consultation								
	Group A					Group B			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	6.07	7.00	3.49	0.90	0.2517	8.133	8.00	4.91	1.27
NSR 101	35.67	40.00	12.08	3.12	0.0918	47	47.50	18.35	4.74
OSW	17.60	12.00	11.24	2.90	0.0726	24.667	26.00	13.00	3.36
POWER				McGILL	0.0585				
				NSR 101	0.0514				
				OSW	0.0516				

For the subjective measurements taken for the first consultation it is found that according to the hypothesis testing there is an acceptance of the Null Hypothesis, hence finding that there was no significant difference between the two groups. However with the low power values, Type II error is again a strong consideration when evaluating the statistical accuracy and interpretation of the information within these tables.

TABLE 4.17: LAST CONSULTATION: GROUP A vs GROUP B

	Last Consultation								
	Group A					Group B			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	2.00	1.00	1.96	0.50	0.6417	2.667	2.00	3.13	0.81
NSR 101	16.33	15.00	14.45	3.73	0.3153	22.5	20.00	15.95	4.12
OSW	6.40	6.00	8.42	2.18	0.1609	10.8	10.00	10.25	2.65
POWER				McGILL	0.0558				
				NSR 101	0.0505				
				OSW	0.0517				

For the subjective measurements taken for the last consultation it is found that according to the hypothesis testing there is an acceptance of the Null Hypothesis, hence finding that there was no significant difference between the two groups. However with the low power values, Type II error is again a strong consideration when evaluating the statistical accuracy and interpretation of the information within these tables.

TABLE 4.18: FOLLOW-UP CONSULTATION. GROUP A vs GROUP B

	Follow up								
	Group A					Group B			
	MEAN	MEDIAN	SD	SE	P- VALUE	MEAN	MEDIAN	SD	SE
McGILL	1.87	2.00	1.60	0.41	0.3040	1.33	1.00	1.63	0.42
NSR 101	17.00	15.00	14.61	3.77	0.6591	15.00	10.00	14.61	3.77
OSW	4.67	4.00	7.00	1.81	0.3609	6.67	4.00	6.53	1.69
POWER				McGILL	0.0811				
				NSR 101	0.0501				
				OSW	0.0514				

For the subjective measurements taken for the follow up consultation it is found that according to the hypothesis testing there is an acceptance of the Null Hypothesis, hence finding that there was no significant difference between the two groups. However with the low power values, Type II error is again a strong consideration when evaluating the statistical accuracy and interpretation of the information within these tables.

4.8 PREVALENCE OF AGE

TABLE 4.19: INTERGROUP COMPARISON OF AGE PREVALENCE

AGE INTERVALS	GROUP A	GROUP B
16 - 19	2 (13%)	3 (20%)
20 - 29	4 (27%)	5 (33%)
30 - 39	3 (20%)	4 (27%)
40 - 50	6 (40%)	3 (20%)

The ages of the patients from Group A and B are sufficiently similar to be comparable groups.

4.9 PREVALENCE OF SEX

TABLE 4.20: INTERGROUP COMPARISON OF SEX PREVALENCE.

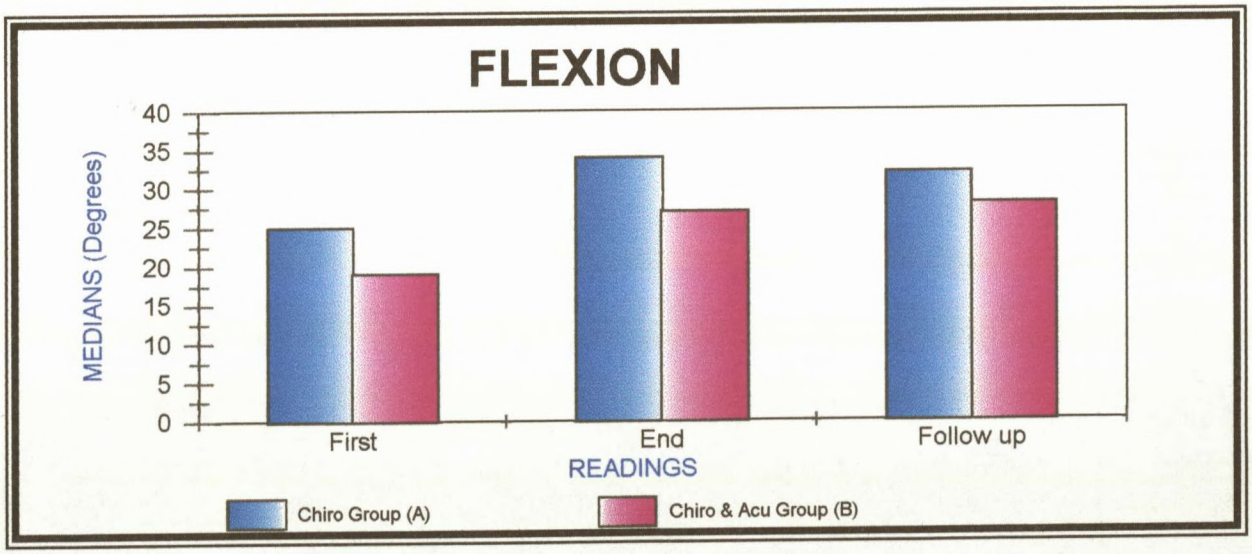
SEX	GROUP A	GROUP B
MALE	2 (13%)	5 (33%)
FEMALE	13 (87%)	10 (67%)

The ratio of male to female patients in Group A and B are sufficiently similar to be comparable groups.

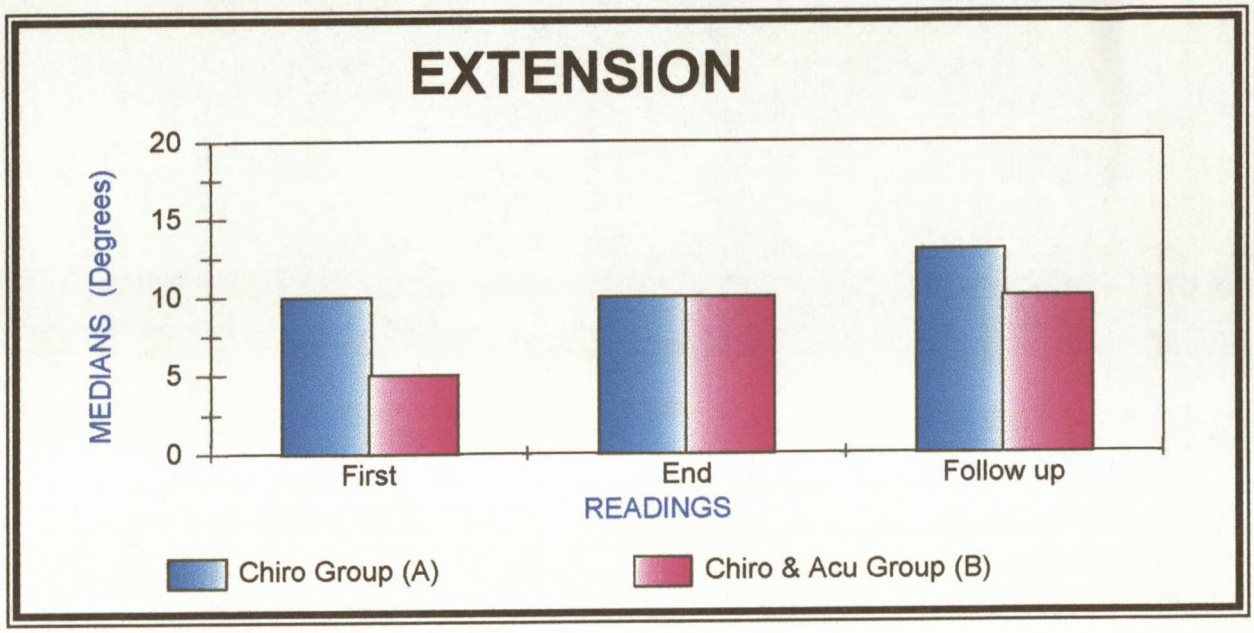
4.10 GRAPHS

Graphs 4.1 - 4.10 are graphical representations of the results of the 10 clinical procedures referred to in paragraph 4.1. References has been made to these graphs in the discussion of the relevant Tables 4.1 - 4.18.

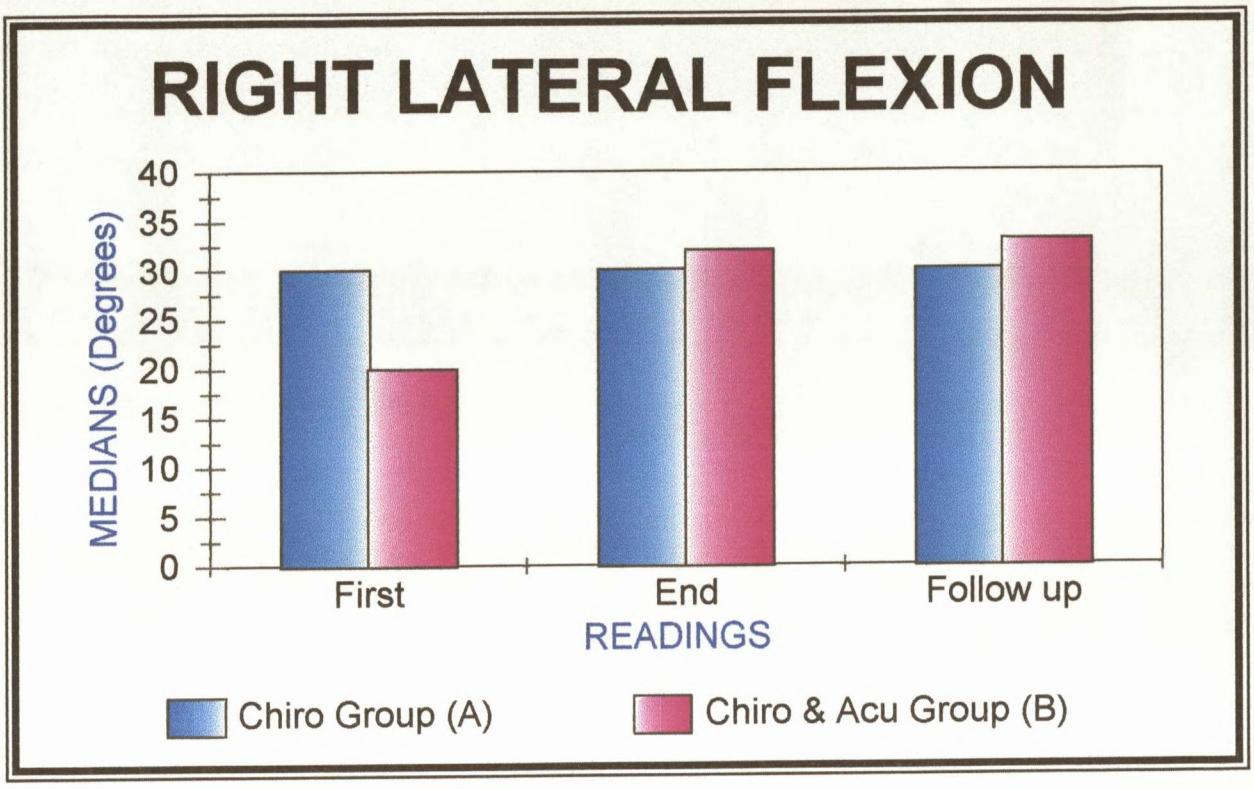
GRAPH 4.1: FLEXION



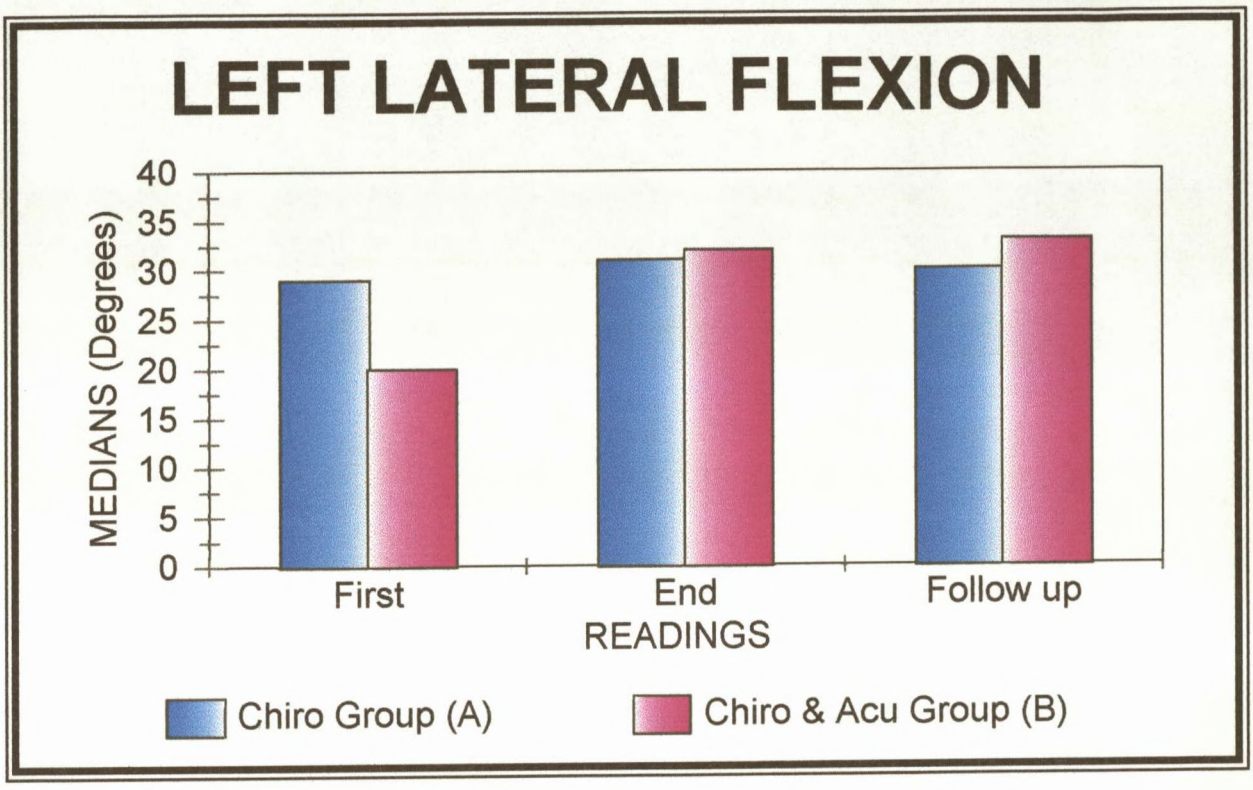
GRAPH 4.2: EXTENSION



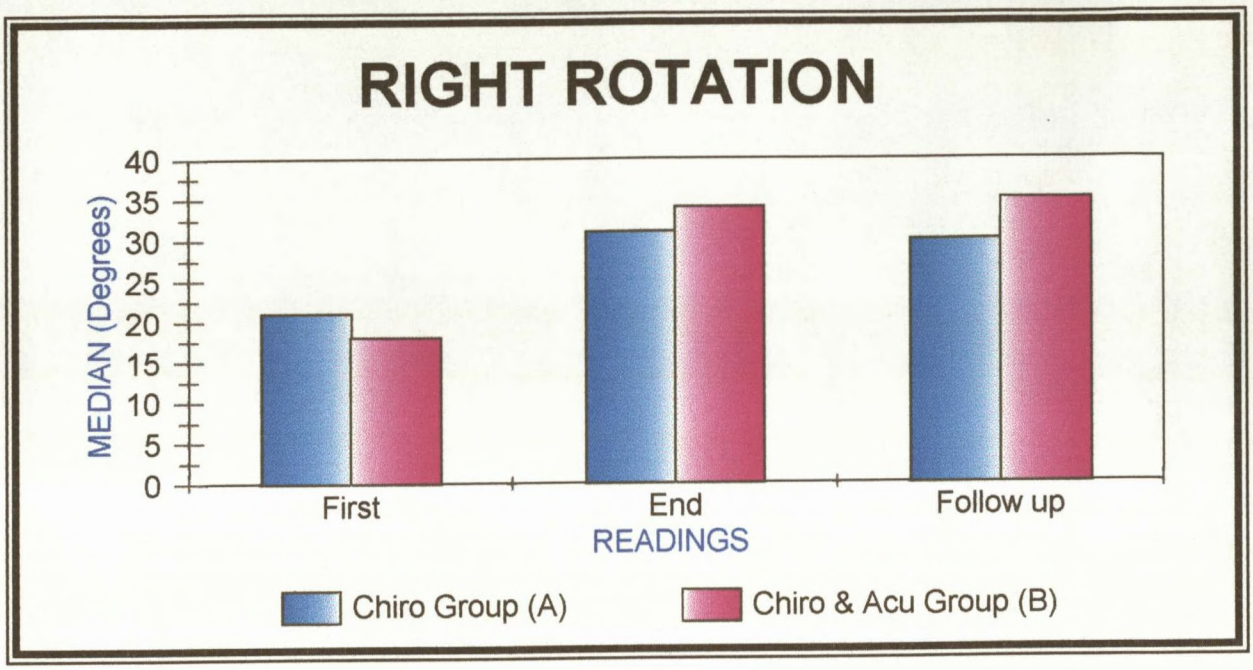
GRAPH 4.3: RIGHT LATERAL FLEXION



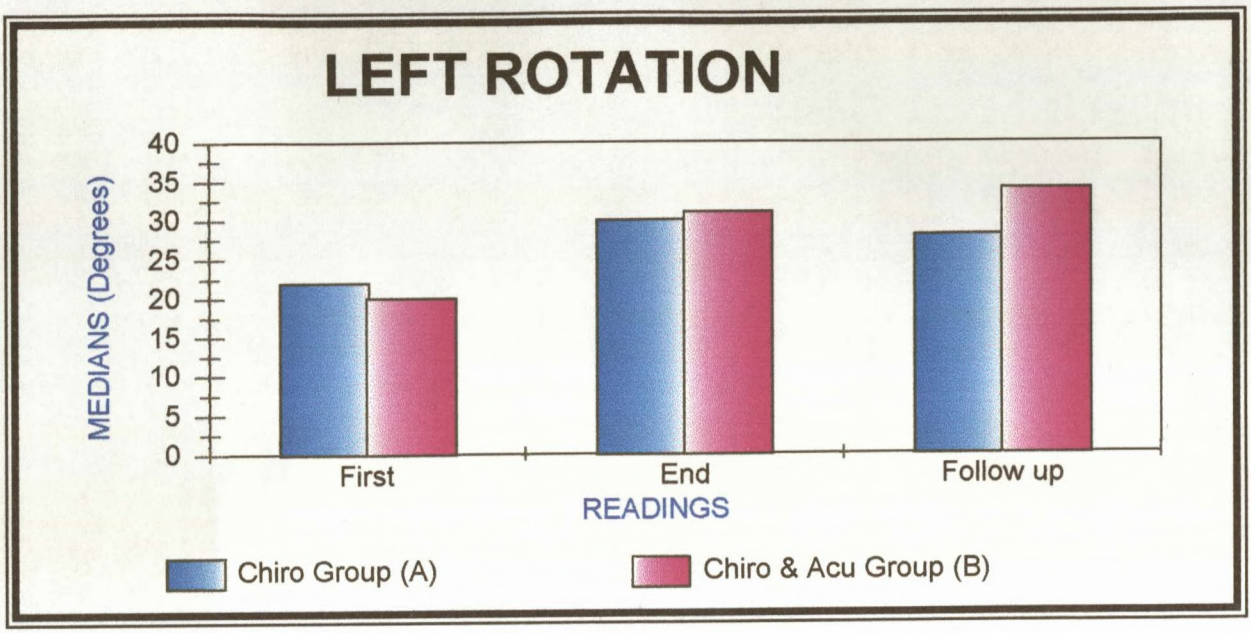
GRAPH 4.4: LEFT LATERAL FLEXION



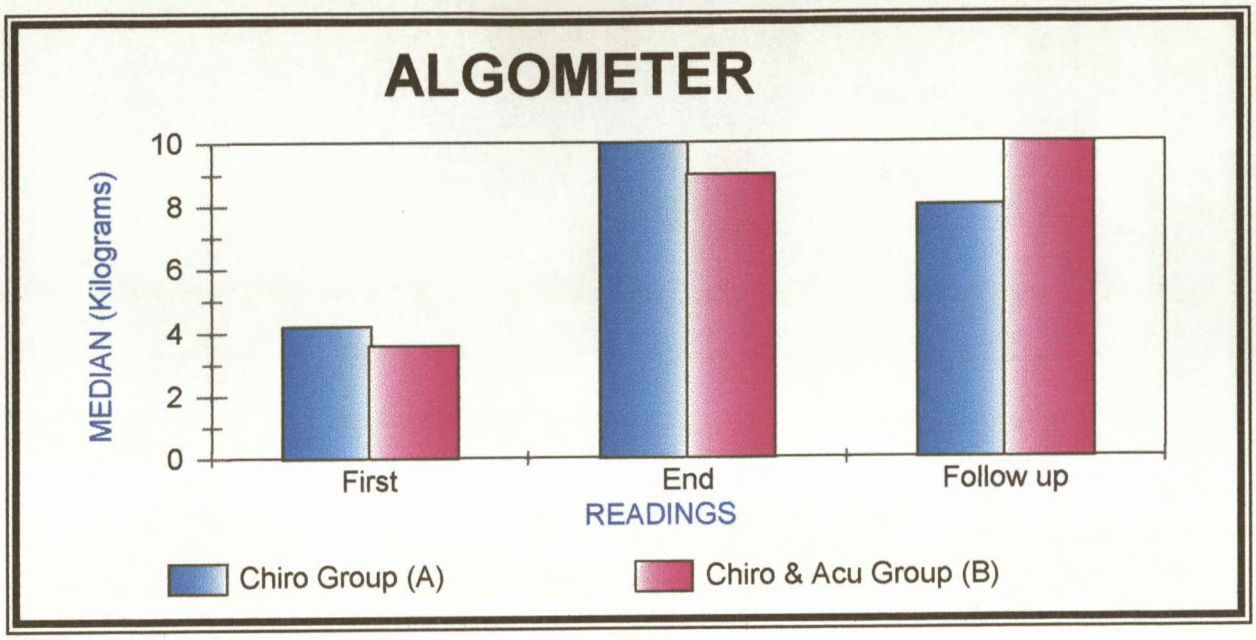
GRAPH 4.5: RIGHT ROTATION



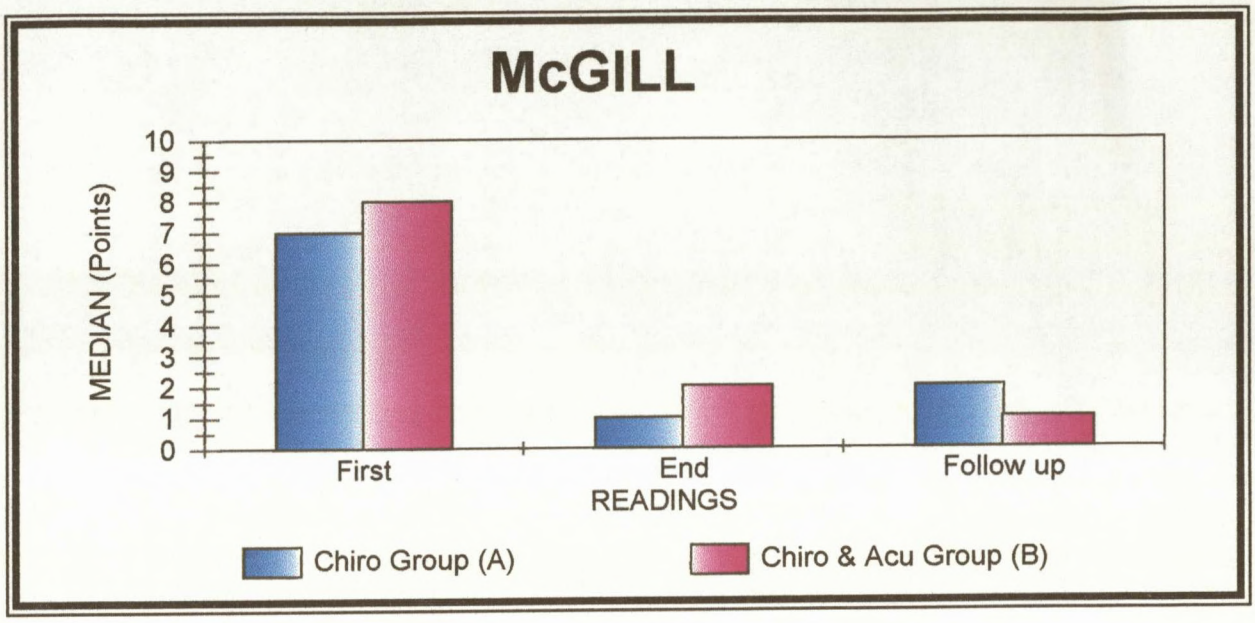
GRAPH 4.6: LEFT ROTATION



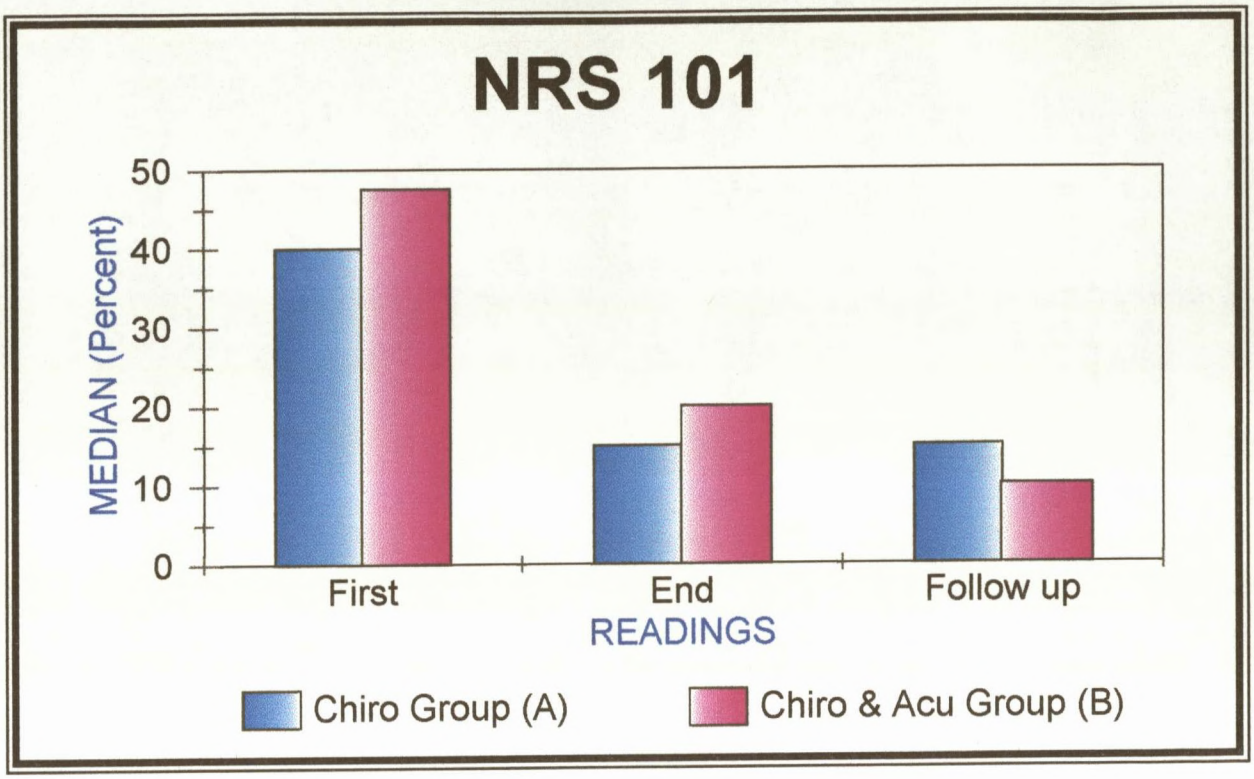
GRAPH 4.7: ALGOMETER



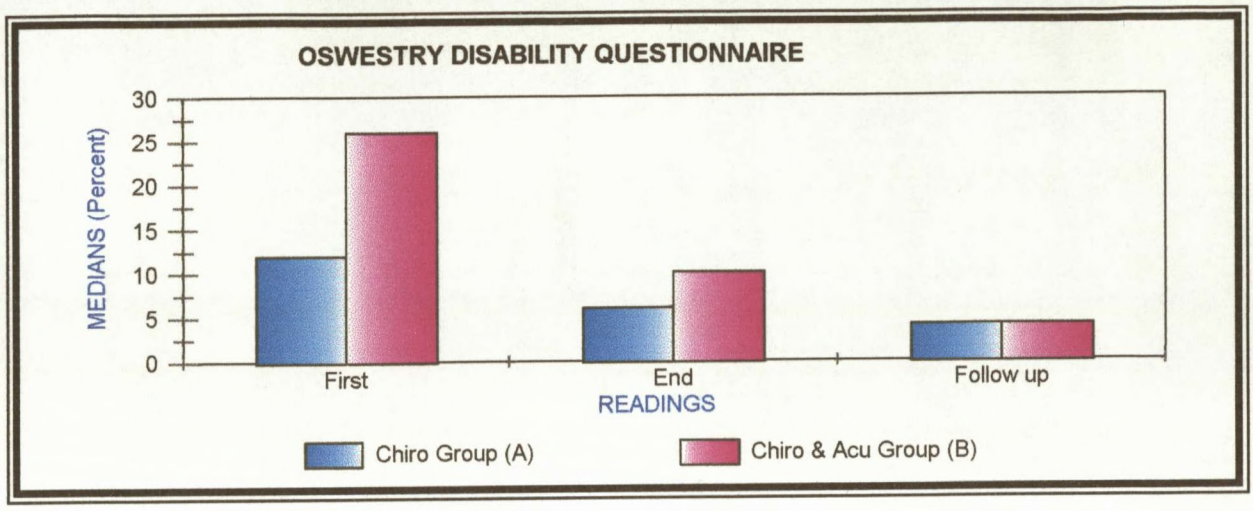
GRAPH 4.8: McGILL



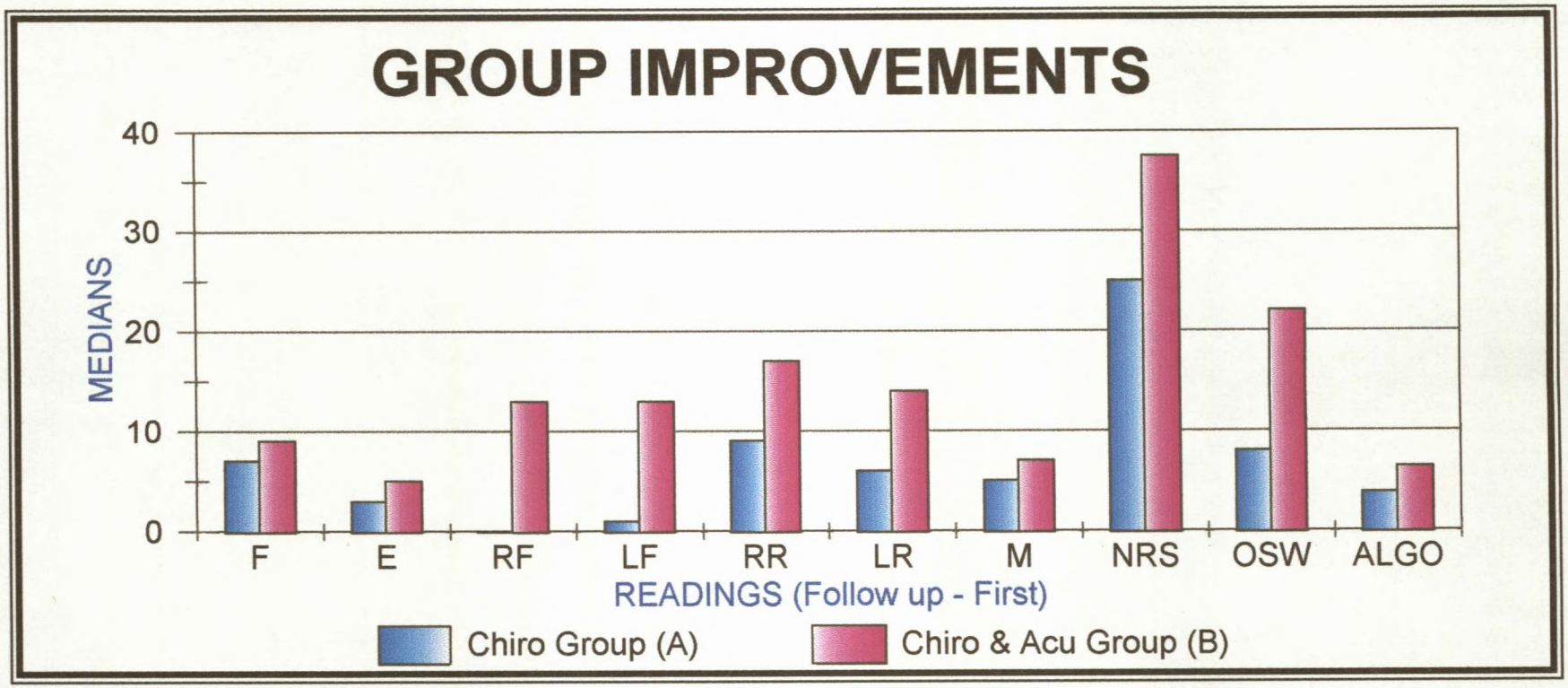
GRAPH 4.9 : NUMERICAL PAIN RATING SCALE-101



GRAPH 4.10: OSWESTRY DISABILITY QUESTIONNAIRE



GRAPH 4.11: GROUP IMPROVEMENTS (Non-statistical) - See discussion Section 5.3.3



Chapter 5 - DISCUSSION

5.1 INTRODUCTION

This chapter is a discussion of the results of the subjective and objective data in sections set out below and will focus on the author's interpretations of these results.

Graphical representations:

Blue - Chiropractic only Group (A)

Pink - Chiropractic and Acupuncture Group (Combined Treatment) (B)

5.1.1 Intra-treatment comparison

The assessment of the intra-treatment results from the first treatment to the final treatment represents the effectiveness of the treatment protocol in the treatment of low back pain. The comparison of the final treatment to the one month follow-up consultation indicates whether or not the treatment's effectiveness was maintained.

The first treatment to the one month follow-up consultation serves to indicate the relative long term effectiveness and to whether the problem has returned or not or improved further.

5.1.2 Inter-treatment comparison

The evaluation of the first treatment measurements, shows any variance in the subjective and objective findings between the two groups in terms of their original signs and symptoms. The comparison of the final treatments confirms which treatment is more effective. Appraisal of the one month follow-up treatment measurements represent which treatment method has maintained its effect more successfully.

The author has chosen to use bar graph presentation to illustrate the trends that appear in the study. The median was chosen over the mean as representative figure. As the mean is easily distorted, by extreme data values, in a study with a small sample size such a this.

5.2 INTRA-GROUP COMPARISONS

This data may be seen graphically by comparing the Blue and the Pink Graphs 4.1 - 4.10 and the Tables 4.1 - 4.12

5.2.1 Objective Intra Group Analysis. (Tables 4.1 - 4.6)

The statistical analysis of the Chiropractic only group showed a significant difference in the intra group analysis and hence an improvement between the first and last and first and follow up consultation. Except for extension and left and right lateral flexion between the first and last consultations and flexion, extension, left and right lateral flexion and left rotation between the first and follow up consultations. However, as the powers for all of these objective measurements are less than 10% with the exception of the Algometer readings (90%), the chances of Type II errors occurring is very strong. This can be seen in Graphs 4.1 - 4.7. The analysis for the combined treatment group was similar to the Chiropractic Group but with only one exception, namely, flexion, between the first and last consultation and no exceptions between the first and follow up consultation. This would indicate an even better treatment outcome than the Chiropractic only Group. The graphs illustrate this trend clearly, Graphs 4.1 - 4.7. However what was also of statistical significance

was the difference in the combined treatments group between the follow up readings and the final treatment readings which indicated the exciting possibility that during the month post treatment improvement was still occurring in the group that received acupuncture in addition to the chiropractic treatment.

This could be put down to the combined effect of acupuncture and manipulation and the theory that acupuncture releases endorphines and serotonins into the blood whose effect may well continue even after treatment. (Stux & Pomeranz, 1991). These results would also appear to support the results of Kajdos (1973) and the statement by Liggins (1995).

5.2.2 Subjective Intra Group Analysis (Tables 4.7 - 4.12)

The statistical analysis of the chiropractic only group showed a significant difference in the intra group analysis and hence an improvement between the first and last and first and follow up treatments. This scenario continued for the chiropractic and acupuncture group as well in the intra group analysis , both of which were in keeping with expectations and rejection of the Null Hypothesis in each case. However, the statistical difference in the combined

treatment group between the follow up readings one month later and the final treatment readings again indicated the exciting possibility that during the post treatment month, improvement was still occurring in the group that received the combined treatment. The possible explanation being the same as the objective intra group analysis already alluded to in 5.2.1 above. However, this analysis being of a subjective nature, the patients emotional outlook at the time of completing the questionnaires would account for the strength of this trend as indicated in the Graphs 4.8 - 4.10. What the author is tentatively proposing is with the theoretical release of serotonins and enkephalins in their blood stream the patients are in a better frame of mind and better able to bear any pain. Therefore, they possibly filled out their subjective questionnaires with a more positive outlook on life as a result of the acupuncture combined with manipulation.

5.2.3 The above two paragraphs would indicate that both treatments are successful and maintained up to one month later, however looking at the graphs and comparing the two treatments there is a statistical trend (as seen in Graphs 4.2 - 4.11) showing a continued improvement in the combined treatment group during the one month follow-up with a slight loss in the chiropractic only

treatment, indicating that the combined treatment appears to be maintained better and may even be enhanced.

5.3 INTER-GROUP COMPARISON

This data may be seen graphically by comparing the Blue and the Pink Graphs 4.1 - 4.10 and the Tables 4.13 - 4.18

5.3.1 The objective data (Tables 4.13 - 4.15)

The statistical data for the objective inter group comparisons showed no statistically significant differences, indicating acceptance of the Null Hypotheses with the exceptions of extension on the first consultation and flexion on the last consultation.

5.3.2 The subjective data (Tables 4.16 - 4.18)

The statistical data for the subjective inter group comparisons showed no statistically significant differences, indicating acceptance of the Null Hypotheses without any exceptions.

This would indicate that there is no difference between the two treatments and

that neither is superior to the other, however as the graphs indicate the combined treatment appears to produce a greater improvement in all parameters measured except extension. The lack of statistically significant difference may be put down to the small sample numbers, namely less than 30 per sample (ie: only 15), which is indicated by dismally poor powers of less than 6% in most instances. Thus indicating a 94% chance of Type II error occurring throughout this study and hence the greater improvement that can clearly be seen graphically of the combined treatment over the chiropractic only treatment has been statistically lost. On close examination of the graphs, it could be said that the combined group had more potential for improvement as in all of the first readings (both subjective and objective) these patients appear to have been worse off clinically than the other group.

5.3.3 Non-Statistical Data

In order to try and indicate this the author has taken the liberty of producing Graph 4.11 which statistically is not valid but is an attempt on the part of the author to bring out those trends which have been hidden due to the low numbers of the sample sizes and consequent insensitivity of the statistical tests applied and the Type II errors that are forthcoming.

Graph 4.11 was arrived at by subtracting the median for each parameter tested on the first consultation from the follow up reading, in order to try and illustrate the magnitude of the individual improvements of the respective treatments. The result of which the author feels would tentatively indicate that the addition of the acupuncture treatment to manipulation is of some benefit. Should these trends be shown to be valid upon further research they would fit in well with the work of MacDonald (1983) and Liggins (1995).

Chapter 6: RECOMMENDATIONS AND CONCLUSIONS

6.1 RECOMMENDATIONS

With hindsight, unlimited time and funds the author would suggest a study that could fully investigate the effectiveness, and possible superiority of the one treatment protocol over the other in the treatment of low back pain of mechanical origin. The main areas to focus on, to improve on this study, are described below.

Sample size :

Firstly, a larger sample size could be selected. Sample sizes of at least 30 per group would enable the tester to have more statistical tests at his disposal like paired and unpaired t-tests.

The β should be pre-determined (as done with α) to have the chance of Type II error limited to a set level.

Homogeneity :

The inclusion and exclusion criteria would be stricter to ensure a more homogenous population with respect to age, sex, race and history of complaint. Using matched pairs would greatly enhance the strength of the study.

Placebo group :

A placebo group would add credence to the study should sufficient numbers be available.

Blinding :

Blinding could be used. Only people who have not previous received manipulative care would be selected so that they would be blind to the treatment they would be receiving. The examiner collecting the data and collating it should be blinded as to which treatment the patient is receiving. This would decrease the chance of observer bias.

Accuracy :

The BROM II and Algometer readings could be more accurate if the same instruments could be used for each and every patient in a study and not just whichever Algometer or BROM II is available at the time of treatment. This would lead to less human and instrument error.

Follow up:

Were this research not being conducted under the auspices of a Master's thesis and it's concomitant time restraints a longer follow up period would be advisable, in determining the lasting effects of the treatments.

6.2 CONCLUSIONS

This study consisted of 30 patients who were diagnosed to have of the signs and symptoms of mechanical low back pain.

The patients were randomly placed into two groups of 15. The first group received Chiropractic treatment only and the second group

received the same with the addition of acupuncture treatment for low back pain of mechanical origin.

The patients received treatment until symptom free or up to a maximum of eight treatments over a period of up to six weeks with two to three treatments per week. A follow-up consultation for reassessment took place after one month.

The statistical analysis revealed statistically significant changes after treatment, within both groups for all the subjective measures (perceived pain and disability), however in the objective measures only the combined treatment group showed a statistically significant difference in all objective measures between the first and follow up consultations and all but in flexion in the first and last consultations. The Chiropractic only group showed significant differences in 4 of the 7 objective measures between the first and last consultations and in 2 of the 7 between the first and follow up consultations, indicating that subjectively both treatments were successful and objectively the combined treatment was the more successful.

When statistical analysis was used to compare the two groups only extension of the first consultation and flexion on the last consultation and none of the subjective measures showed any statistically significant differences. Indicating no statistical difference between the two treatments.

This would lead to the assumption that both treatment groups responded equally favorably in terms of the subjective findings and objective measures.

Therefore the results from this study suggest that Chiropractic and Chiropractic combined with Acupuncture are equally effective in treating low back pain. (That is if statistically significant equates with clinically significant.) And not withstanding the earlier discussion of Type II errors occurring. In the light of the above, the author would recommend the use of either form of treatment for the management of mechanical low back pain.

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APPENDICES

List of appendices and what their symbols represent:

Appendix A	BROM II SCORE SHEET
Appendix B	KIRKALDY-WILLIS CLASSIFICATION FOR MECHANICAL LOW BACK PAIN
Appendix C	OSWESTRY LOW BACK PAIN DISABILITY QUESTIONNAIRE
Appendix D	MCGILL SHORT FORM PAIN QUESTIONNAIRE
Appendix E	NUMERICAL PAIN RATING SCALE-101
Appendix F	SYMPTOM DIAGRAM
Appendix G	CASE HISTORY FORM
Appendix H	PHYSICAL EXAMINATION FORM
Appendix I	LOW BACK REGIONAL EXAMINATION FORM
Appendix J	PATIENT CONSENT FORM

APPENDIX A

BROM II RECORDING SHEET

Name:_____ Date of Initial Evaluation:_____

Facility:_____ Examiner:_____

	MEASUREMENT DATE							
	1	2	3	4	5	6	7	8
MEASUREMENTS								
Pelvic Tilt								
Centimeters To T12								
Flexion								
Starting Position								
Full Flexion Reading								
True Flexion								
Extension								
Starting Position								
Full Extension Reading								
True Extension								
Right Rotation								
Left Rotation								
Right Lateral Flexion								
Left Lateral Flexion								

APPENDIX B

THE KIRKALDY - WILLIS MODEL OF CLASSIFICATION FOR MECHANICAL LOW BACK PAIN.

posterior facet syndrome

sacroiliac syndrome

Maigne's syndrome

disc herniation

facet and disc degeneration

lateral stenosis

central stenosis

multilevel stenosis

myofascial syndrome : gluteus maximus

gluteus medius

gluteus minimus

quadratus lumborum

piriformis

tensor fascia latae

hamstring

Exhibit 7.3 The Oswestry Low Back Pain Disability Questionnaire

How long have you had back pain? ..... Years ..... Months ..... Weeks

How long have you had leg pain? ..... Years ..... Months ..... Weeks

Please read:
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 realise you may consid that two of the statements in any one section relate to you, but plea just *mark the box which most closely describes your problem.*

Section 1 — Pain Intensity
- ☐ I can tolerate the pain I have without having to use pain killers.
- ☐ The pain is bad but I manage without taking pain killers.
- ☐ Pain killers give complete relief from pain.
- ☐ Pain killers give moderate relief from pain.
- ☐ Pain killers give very little relief from pain.
- ☐ Pain killers have no effect on the pain and I do not use them.

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, 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, eg on a table.
- ☐ Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned.
- ☐ I can lift only very light weights.
- ☐ I cannot lift or carry anything at all.

Section 4 — Walking
- ☐ Pain does not prevent me walking any distance.
- ☐ Pain prevents me walking more than 1 mile.
- ☐ Pain prevents me walking more than ½ mile.
- ☐ Pain prevents me walking more than ¼ mile.
- ☐ 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 favourite chair as long as I like.
- ☐ Pain prevents me sitting more than 1 hour.
- ☐ Pain prevents me from sitting more than ½ hour.
- ☐ Pain prevents me from sitting more than 10 mins.
- ☐ 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 1 hour.
- ☐ Pain prevents me from standing for more than 30 mins.
- ☐ Pain prevents me from standing for more than 10 mins.
- ☐ Pain prevents me from standing at all.

Section 7 — Sleeping
- ☐ Pain does not prevent me from sleeping well.
- ☐ I can sleep well only by using tablets.
- ☐ Even when I take tablets I have less than six hours sleep.
- ☐ Even when I take tablets I have less than four hours sleep.
- ☐ Even when I take tablets I have less than two hours sleep
- ☐ Pain prevents me from sleeping at all.

Section 8 — 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 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 9 — 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 limit ing my more energetic interests, eg dancing, etc.
- ☐ 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 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 journeys over two hours.
- ☐ Pain restricts me to journeys of less than one hour.
- ☐ Pain restricts me to short necessary journeys under 30 minutes
- ☐ Pain prevents me from travelling except to the doctor o hospital.

Comments .....

.....

Scoring (not seen by patients)

For each section the total possible score is 5; if the first statement is marked the section score = 0, if the last statement is marked it = 5.

If all ten sections are completed the score is calculated as follows:

Example: $\frac{16}{50}$ (total scored) / (total possible score) x 100 = 32%

If one section is missed or not applicable the score is calculated:

Example: $\frac{16}{43}$ (total scored) / (total possible score) x 100 = 35.5%

Reproduced from Fairbank JCT, Couper J, Davies JB, O'Brien JP. The Oswestry Low Back Pain Disability Questionnaire. Ph siotherapy 1980;66:272.

APPENDIX D

Please indicate the exact nature of your pain by ticking the relevant intensity associated with each description of pain.

	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) ____
TIRING-EXHAUSTING	0) ____	1) ____	2) ____	3) ____
SICKENING	0) ____	1) ____	2) ____	3) ____
FEARFUL	0) ____	1) ____	2) ____	3) ____
PUNISHING-CRUEL	0) ____	1) ____	2) ____	3) ____

APPENDIX E

Please indicate on the line below the number between 0 and 100 that best desribes the pain of your major problem 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 of your major problem 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.

_____

APPENDIX F

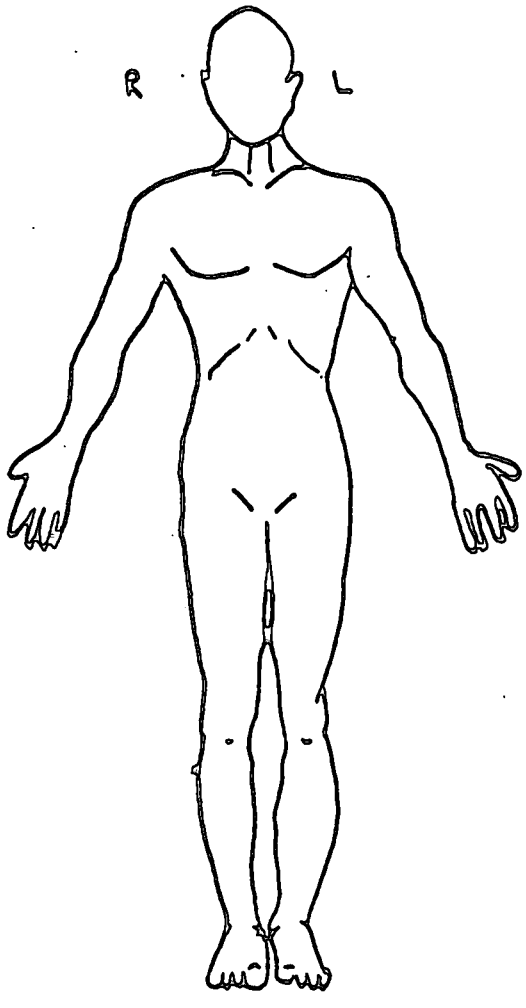
SYMPTOM DIAGRAM

PATIENT NAME: _____ **FILE #:** _____ **DATE:** _____

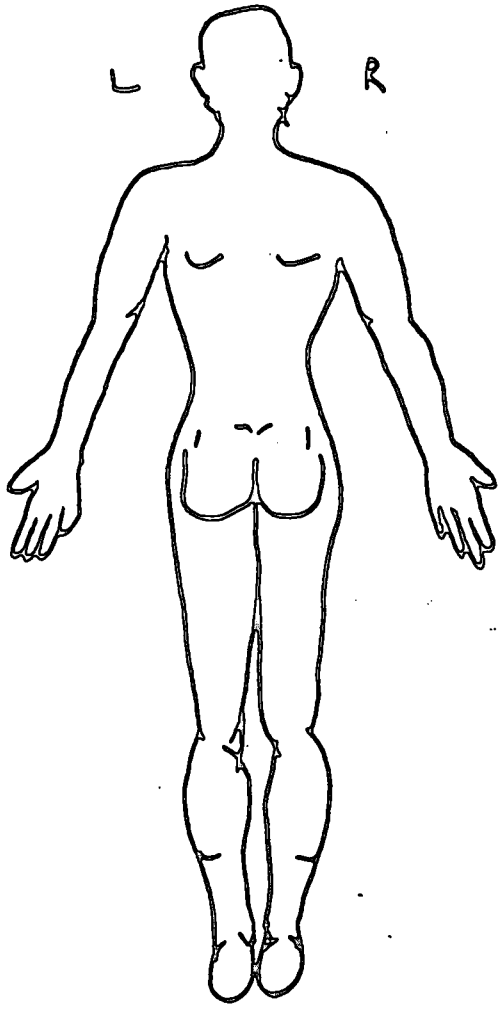
In the diagram provided below, please mark the areas on your body which you feel best represent the pain(s) or sensation(s) you are experiencing. Please include all areas. Use the symbols provided below.

SYMBOLS

numbness	=== ===	pins and needles	....
burning	XXX XXX	stabbing and sharp	//// ////
dull and aching	+++ +++	stiff and tight	ZZZ ZZZ



FRONT



BACK

APPENDIX G

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

CASE HISTORY

Patient: _____ Date # _____

File #: _____

X-ray #: _____

Age: _____ Sex: _____ Occupation: _____

Intern: _____ Signature: _____

FOR CLINICIAN'S USE ONLY

Initial visit clinician: Signature:

Case History:

Examination:
Previous: TN 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.

APPENDIX A

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

PHYSICAL EXAMINATION

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

Patient:_____ File #_____

Last name First name

Clinician:_____ Signature:_____

Intern:_____ Signature:_____

Date:_____

Height:_____ Weight:_____ Temp:_____

Rates: Heart:_____ Pulse:_____ Respiration:_____

Blood pressure: Arms: L / R /

Legs: L / R /

General appearance:

STANDING EXAMINATION.

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

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

Flex.

L.Rot. R.Rot.

L.lat flex. R.lat. flex.

Ext.

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

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

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

Chest measurement
- inspiration
- expiration

Visual acuity

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

SEATED EXAMINATION.

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

L: III IV VI R: III IV VI

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

vessels
general background
macula
vitreous
lens

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

Nose:
external
internal
septum
turbinates
olfaction

Sinuses (frontal & maxillary):
tenderness
transillumination

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

Neck:
posture
size
swelling
scars
discoloration
hair line

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)
CN V
CN VII
CN VIII (nystagmus)
CN IX
CN XI
TMJ
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 mass.

Peripheral vasculature:

Inspection:

skin
nail beds
pigmentation
hair loss

Palpation:

pulses - radial, brachial, femoral, poplitoal, post.tibial, dorsalis pedis
lymph nodes - epitrochlear, femoral (horisontal & vertical)
temperature (feet & legs)

Manual compression test
Retrograde filling (Trendelenburg) test
Arterial insufficiency test

Musculoskeletal:

ROM

hip

flex.	90/120
ext.	15
abd.	45
add.	30
int rot	40
ext rot	45

knee

flex.	130
ext.	0/15

ankle

plantar flex	45
dorsiflex	20
inversion	30
eversion	20

leg length

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

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

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

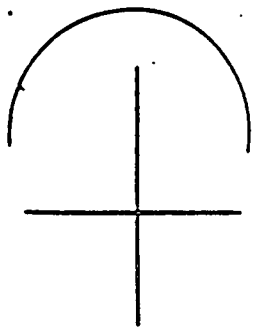
APPENDIX I

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

REGIONAL EXAMINATION - LOW BACK

Standing:

Minor's sign
posture
skin
muscle tone
spinous percussion
Schober's test (6cm)
Treadmill
R.O.M.



Flexion 15cm from floor.

Extension 30°

R. Lat flex 35° Fingers to knees
L. Lat flex 35° " " "
R. rot. 30°
L. rot. 30°

/ painless limitation
// painful limitation

Gait:

rhythm
on toes (or while standing)
on heels (or while standing)
half-squat on one leg.

Motion Palpation:

sacro-iliacs (see below for findings)

Sitting:

Posture
Dermatomes:

T12
L1
L2
L3
L4
L5
S1
S2
S3

Reflexes:

patellar
Achilles
medial hamstring

myotomes: L. R.
hip flex
hip int rot
hip ext rot
knee ext
knee flex
hip abd
hip add
ankle dorsiflex
ankle plantar flex
ankle eversion
ankle inversion
ext. hallucis long.

tripod
Kemp's

MOTION PALPATION:

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

Supine:

skin, hair, nails
observe abdomen
fasciculations
abdominal reflexes
auscultate abdomen/groin
palpate abdomen/groin
pulses (abd/ext)
SLR
Braggard's
bowstring
sciatic notch
plantar reflex
circumference (thigh, calf)

leg length:
- actual
- apparent

Patrick FABER
Gaenslen's
gluteus max 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
  - glut.med

Prone:
- gluteal skyline
- skin rolling
- iliac crest compression
- facet joint challenge
- S-I tenderness
- Erichsen's test
- Pheasant's test
- myotomes:
  - glut. max.
- trigger points:
  - QL
  - glut. med
  - glut. max
  - 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
- pin-point pain.

APPENDIX J

INFORMED CONSENT FORM

(To be completed in duplicate by patient/subject*) *Delete whichever is not applicable.

TITLE OF RESEARCH PROJECT

_____

_____

NAME OF SUPERVISOR

_____

NAME OF RESEARCH STUDENT

_____

PLEASE CIRCLE THE APPROPRIATE ANSWER

1. Have you read the research information sheet? YES/NO

2. Have you had an opportunity to ask questions regarding this study? YES/NO
3. Have you received satisfactory answers to your questions? YES/NO

4. Have you had an opportunity to discuss this study? YES/NO
5. Have you received enough information about this study? YES/NO

6. Who have you spoken to? _____

7. Do you understand the implications of your involvement in this study? YES/NO

8. Do you understand that you are free to withdraw from this study? YES/NO
   a) at any time
   b) without having to give a reason for withdrawing, and
   c) without affecting your future health care.

9. Do you agree to voluntarily participate in this study? YES/NO

PATIENT/SUBJECT* Name_____ Signature_____
(in block letters)

PARENT/GUARDIAN* Name_____ Signature_____
(in block letters)

WITNESS Name_____ Signature_____
(in block letters)

RESEARCH STUDENT Name_____ Signature_____
(in block letters)