

**THE EFFICACY OF SPINAL MANIPULATION IN THE
MANAGEMENT OF THE IRRITABLE BOWEL SYNDROME**

BY

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I, Rory Munton, do hereby declare that this dissertation represents my own work in both conception and execution.

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DEDICATION

This study is dedicated to Diane,
who is the epitome of beauty.

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I would like to thank the following people:

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The patients who participated in this study.

ABSTRACT

The aim of this placebo-controlled clinical trial was to determine the role of spinal manipulation in the management of irritable bowel syndrome (IBS), in terms of the patients' subjective response to treatment. It was hypothesized that spinal manipulation would have a greater effect than placebo in reducing the intensity of the symptoms of IBS.

Thirty subjects diagnosed with IBS were randomly divided into two groups. Each group consisted of 15 subjects, aged between 18 and 50. Patients were treated twice a week for three weeks and once in the fourth week. Thereafter, each patient returned approximately 1 month later to be assessed for any longer-term benefit to treatment.

Patients in the experimental group received spinal manipulation directed at areas of spinal fixation, as determined by motion palpation. Patients in the control group were treated using a detuned ultrasound machine over areas of spinal fixation. Treatment was performed with the same degree of enthusiasm in both groups, where possible.

The measures of efficacy used were the Short-Form McGill Pain Questionnaire (SF-MPQ), Accompanying Symptom Questionnaire (ASQ) and the Life Line Stress Questionnaire (LLSQ). Using these questionnaires, data was collected at the 1st, 7th and 8th (one month follow-up) consultation for each participant. The data was then analyzed statistically using the SPSS package. Assessment of intra-group and inter-group change was performed using the Wilcoxon Signed Rank Test and the Mann-Whitney U Test respectively. Analysis was performed at the 95% confidence level.

Patients in the control group showed a reduction in pain intensity ($p = 0.002$) and sensory pain ($p = 0.013$) between the 1st and 8th (final) consultation. No reduction in pain intensity occurred within the experimental group. However, a statistically significant reduction in stress levels was noted for the experimental group between the 1st and 7th consultation ($p = 0.011$) and the 1st and final consultations ($p = 0.012$). As regards the accompanying symptoms (ASQ) there was no statistically significant improvement in either group at any stage during the trial period.

Inter-group comparison of the data showed a higher degree of pain intensity in the control group at the 1st treatment ($P = 0.001$) and at the 7th treatment ($p = 0.008$). This difference did not persist until the final consultation.

These findings indicate that some improvement may have taken place in the control group, which could have been due to a favourable placebo response or the natural history of this disorder. Otherwise, statistical inter-group comparison showed no other significant differences between the two groups for any of the subjective measures at any stage during the trial period.

From these results, it would seem that spinal manipulation was no more effective than placebo in the management of IBS. However, in order to facilitate the clinical relevance of future trials of this nature, it is suggested that more attention be paid to the limitations of this study, some of which were sample size, definition of IBS, measures of efficacy, and blinding.

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DEFINITION OF TERMS

Adjustment: A specific form of direct articular manipulation utilizing either long or short leverage techniques with specific contacts, characterised by a dynamic thrust of controlled velocity, amplitude and direction. (Gatterman, 1990: 405).

Facet Syndrome: Pain or dysfunction arising primarily from the zygapophyseal joints and their immediately adjacent soft tissues. (Gatterman, 1990: 415).

Fixation (Dynamic Fault): The state whereby articulation has become temporarily immobilized in a position that it may normally occupy during any phase of physiological movement. The immobilisation of an articulation in a position of movement when the joint is at rest, or in a position of rest when the joint is in movement. (Sandoz, 1992: 623).

Joint Dysfunction: Joint mechanics showing area disturbances of function. (Gatterman, 1990: 409).

Manipulation: A manual procedure that involves a directed thrust to move a joint past the physiological range of motion, without exceeding the anatomic limit. (Gatterman, 1995: 415).

Spinal Manipulation: Manipulation directed at the spinal joints.

Subjective Clinical Findings: Those findings obtained from the patient as per the McGill Short-Form Pain Questionnaire, the Life Line Stress Questionnaire, and the Accompanying Symptom Questionnaire.

CHAPTER ONE

1.0 INTRODUCTION

The Irritable Bowel Syndrome (IBS) is a common disorder producing abdominal pain, bloating, and disturbed defecation, that can be associated with significant disability and health care costs (Drossman, Whitehead and Camilleri, 1997). Although numerous explanations have been advanced regarding the aetiology of this condition, none have found any degree of general acceptance. This is possibly due to the absence of any biological markers that define this disorder. (Wingate, 1990: 17).

IBS represents one of the most common conditions encountered by both gastroenterologists and general internists alike (Sandler, 1990). In an effort to assess the cost of managing IBS, Talley et al. (1995) performed a community survey in Olmsted County, Minnesota. Data was obtained for all charges incurred in terms of direct medical services (except medication) during a period of 1 year. This survey found that people with IBS incur higher charges in hospital service categories such as outpatient, inpatient/emergency, physician, laboratory and radiology when compared with control subjects (i.e. people without IBS) of similar age and sex from the community utilising these same services.

The occurrence of this condition is related to age and sex and different definitions select different populations as suffering from IBS. Consequently, these discrepancies in study populations make IBS studies difficult to compare and impede any general conclusions. (Kay, Jorgensen and Jensen, 1994).

The symptoms accompanying IBS range in severity from trivial to incapacitating and may lead to inhibition of social activities, anxiety and depression (Heaton, Ghosh and Braddon, 1991). These symptoms may not necessarily originate from the gastrointestinal tract, and the high prevalence of non-specific symptoms such as back pain and headaches, as well as gynaecological and urinary involvement suggest that the aetiology of this disorder may have a neurological or hormonal origin (Whorwell et al. 1986). Nevertheless, the pathophysiology of abdominal pain in IBS remains controversial. It could be related to bowel distension by gas or to strong gut contractions. Recently the role of visceral hypersensitivity has been postulated. (Louvel et al. 1996).

Traditionally, IBS has been a diagnosis of exclusion, made only after organic disease has been ruled out. This approach may lead to unnecessary costs and heighten the patients' anxiety. (Jones and Lydeard, 1992). In an attempt at greater precision, Manning et al. (1978) found six cardinal symptoms that might differentiate IBS from organic bowel disease.

These six symptoms are now known as the *Manning Criteria* and are widely used to positively diagnose this condition. These cardinal symptoms are:

- i. Visible abdominal distension
- ii. Pain relief with defecation
- iii. More frequent stools at pain onset
- iv. Looser stools at pain onset
- v. Mucus per rectum
- vi. A feeling of incomplete evacuation.

Consequently, the American Gastroenterological Association (1997) endorses a diagnostic strategy based on identifying the positive symptoms consistent with this condition and excluding, in a cost effective-manner, other conditions with similar clinical presentations.

Patients with IBS are treated with a wide variety of drugs, bulking agents, diets and forms of psychotherapy. This multiplicity of therapies suggests that none is strikingly effective - an observation made daily by clinicians caring for these patients. (Klein, 1988). Dalton and Drossman (1997) propose that the foundation of therapy for IBS should be confidence in diagnosis and a strong physician-patient relationship. However, whether or not physicians are meeting these physical and emotional needs is unclear due to the increasingly common use of alternative medicine by IBS patients (Smart, Mayberry and Atkinson, 1986).

These authors add that alternative medicine practitioners often have long consultation times and adopt a holistic approach, that in itself may have therapeutic advantages over orthodox medicine, particularly in a condition such as IBS.

Although there are no scientifically acceptable clinical trials documenting the effectiveness of spinal manipulation in the management of IBS, many Chiropractors believe that this intervention may play an important role in the management of this and other visceral conditions (Jamison, McEwen and Thomas, 1992). Unsubstantiated claims such as these are a maintaining factor in the dogmatic traditions that have for so long inhibited the integration of chiropractic science and clinical art (Keating, 1988).

The aim of this study was, therefore, to evaluate whether or not there is a substantial base to these claims and, if so, to determine what role spinal manipulation may play in the management of IBS.

CHAPTER TWO

2.0 REVIEW OF THE RELATED LITERATURE

2.1 INTRODUCTION

IBS is a functional disorder of the gut, characterised by symptoms of abdominal pain, abdominal distension and disturbed bowel habit that are not explained by identifiable structural or biochemical abnormalities (Dalton and Drossman, 1997). It is extremely common; affecting females more than males and remains a challenging condition to treat as there are no diagnostic markers and little is known about the underlying pathology, although recent advances in the guidelines for diagnosis have been useful in both the clinical and research setting (Francis and Whorwell, 1997).

2.2 EPIDEMIOLOGY

Functional gastrointestinal disorders rank as the most common gastrointestinal complaints, accounting for up to half of all diagnoses made by gastroenterologists (Switz, 1976). These disorders are defined as variable combinations of chronic or recurrent gastrointestinal symptoms, not explained by structural or biochemical abnormalities. They include symptoms attributed to the pharynx, oesophagus, stomach, biliary tree, small or large intestine, or anorectum. (Drossman et al. 1993).

IBS comprises a major portion of these disorders and there is a considerable overlap between disorders. For example, 56% of non-cardiac chest pain patients have symptoms of IBS. (Mayer and Raybould, 1990). In their 1993 survey, Drossman et al. (1993) found that 44% of people with functional gastrointestinal symptoms had symptoms consistent with a diagnosis of IBS. Data from several large US national surveys show that in America, nearly 5 million people (2,9% of the population) suffer from IBS. Women are more commonly affected and there is a preponderance in the white population, and in those aged between 45 – 65 years (Sandler, 1990).

These patients incur, on average, approximately \$300 (1995 dollars) more direct medical charges per year compared with control subjects of the same age and sex. Extrapolating to the white US population, these charges are estimated to be in excess of \$8 billion (1995 dollars) yearly, without taking indirect costs (i.e. lost wages) and non-medical costs (such as home care) into account. (Talley et al. 1995).

One large US householder survey found that females, in general, have a higher prevalence of functional gastrointestinal disorders. Other associations in this survey relate to more frequent symptom reporting with lower household income and significantly increased rates of work or school absenteeism and physician visits.

At the time of this survey 11,3% of IBS patients were too sick to go to work or school. An additional finding was that an average of 13,4% more days per year were missed from work or school by patients with IBS compared to the same number of matched control subjects without the symptoms. (Drossman et al. 1993).

Surveys of office-based physicians derived from 1975, 1980-1981 and 1985 showed that an average of 10.6 per thousand US population were diagnosed with IBS. Women had 2.4 times the rate of visits by men and the rate of visits peaked at middle age. It was found that IBS was the leading diagnosis made by gastroenterologists and the seventh leading diagnosis made by all physicians. (Everhart and Renault, 1991).

Jones and Lydeard (1992) found that symptoms consistent with the diagnosis of IBS are present in almost one-quarter of the general population and tend to be associated with a number of other complaints and conditions, some of which may reflect smooth muscle dysfunction.

Data on the racial prevalence of IBS are obscured by cultural influences. The few data that address the non-western prevalence of IBS suggest that this condition is rare in Uganda but common in Japan, China, South America and the Indian subcontinent. (American Gastroenterological Association, 1997). However, some reports argue that it is just as common in the Third World as in developed countries (Olubuyide, Olawuyi and Fasanmade, 1995).

Evidently, it is only just beginning to be realised how great the social and economic impact of functional gastrointestinal disorders can be. These disorders, therefore, deserve a much higher place on the list of priorities for research and development of new therapies. (Francis and Whorwell, 1997).

2.3 AETIOLOGY AND PATHOPHYSIOLOGY

2.3.1 General Considerations

Although the exact cause of IBS is unknown, it is likely that the condition is multifactorial in origin and it appears that some event is necessary to trigger the onset of symptoms. Commonly recognised exacerbating or triggering factors include abdominal surgery, antibiotic usage, gastrointestinal infections, inappropriate diet, stress and sleep deprivation. (Francis and Whorwell, 1997). The idea that IBS is a purely psychological condition is no longer supported, although psychopathology plays an important role in modifying motor and visceral responses (Francis and Whorwell, 1997).

Various studies of colonic motility in patients with this condition have led to the notion that IBS is a purely motor disorder, but it remains unclear whether these abnormalities are myogenic in origin, or whether the basic abnormalities lie in the autonomic or hormonal modulation of colonic smooth muscle activity.

These uncertainties have led to the idea that visceral hypersensitivity may play an equally important role in the aetiology of this condition. (Kellow, Eckersley and Jones, 1991).

2.3.2 Dietary Factors

In a study by Nanda et al. (1989), two hundred IBS patients were treated by dietary exclusion. These patients were advised to follow a strict exclusion diet for three weeks. Foods excluded were dairy products, cereals, citrus fruits, potatoes, tea, coffee, alcohol, additives and preservatives. At the end of three weeks, the patients were reassessed by a physician and a dietician. Improvement was defined as a reduction in the abdominal pain with a return of a more normal bowel habit, assessed by answers to a questionnaire and by the analysis of food diaries that were kept during the study. Of the 189 who completed this study, 91 (48,2%) showed symptomatic improvement. Subsequent challenge with individual foods showed that 73 of these 91 responders were able to identify one or more food intolerance and 72 remained well on a modified diet. The foods most commonly incriminated were dairy products (40,7%) and grains (39,4%). These authors conclude that dietary manipulation may be effective in about half of the patients with IBS and that there is a high probability of prolonged symptomatic benefit in those that do respond. Although a major problem with dietary exclusion is compliance, it should be considered as a possible therapeutic approach in this condition.

The role of refined carbohydrate in the aetiology of functional bowel disease was recognised by Rumessen and Gudmand-Hoyer (1988). These authors showed that pronounced gastrointestinal distress might be provoked by malabsorption of small amounts of fructose, sorbitol and fructose-sorbitol mixtures for patients with this condition. It is thought that specific food intolerance may be provoked by malabsorption of fructose and sorbitol. Symptoms arise under circumstances of an unfavourable combination of dietary intake, absorptive capacity and high colonic sensitivity or low colonic compensation.

There is some controversy as to whether some of the symptoms experienced by IBS patients may be because of a lack of dietary fibre or the consumption of fibre-depleted food. A study of the efficacy of bran was done in a double-blind, placebo-controlled, crossover trial on twenty-eight IBS patients over three months. The data from this trial suggest that any beneficial effects of bran were due to placebo response, although the small sample size used precludes any accurate assessment. (Lucey et al. 1987).

Another trial of similar design using eighty patients with IBS found that the bulking agent, ispaghula, significantly improves overall well being and favourably affects bowel habits and transit time for patients with constipation, but is no more effective than placebo in relieving abdominal pain and distension (Prior and Whorwell, 1987).

2.3.3 Motility Disturbance

Much attention has been focussed on abnormalities of colonic motility in the pathophysiology of IBS. Patients with IBS have been shown to have increased motility and abnormal gut contractions in response to stimuli such as psychologic stress and certain physiological stimuli such as intravenous cholecystokinin, balloon distension and meals (Dalton and Drossman, 1997).

Rogers, Henry and Misiewicz (1989) found increased segmental activity and intraluminal pressures in the sigmoid colon of patients with IBS. These authors propose that high intraluminal pressures in the colon may prevent blood flow and result in colonic ischaemia.

Notwithstanding the above, the fact that not all patients seem to display a motility disorder and yet still respond to antispasmodics, indicates that the actual perception of colonic motility, and not the motility itself, may be heightened in at least some patients with IBS (Kellow, Eckersley and Jones, 1991). This concept forms part of the visceral hypersensitivity hypothesis.

2.3.4 Visceral Hypersensitivity

Although motility disorders in different parts of the gastrointestinal tract have traditionally been implicated in the aetiology of various functional bowel disorders, the advent of more sophisticated diagnostic techniques (i.e. prolonged ambulatory monitoring of oesophageal and colonic function) have cast doubt on the aetiological significance of motility as a cause of symptoms in these disorders.

In contrast, it has become increasingly apparent that a decreased threshold to visceral sensory perception is a more likely candidate for many of the symptoms experienced by these patients. (Mayer and Raybould, 1990).

Anorectal manometry and rectal perception thresholds to balloon distension were determined by Mertz et al. (1995) in 100 patients with IBS and 15 control subjects. Ninety four percent of the IBS patients showed altered rectal perception in the form of lowered thresholds for discomfort, increased intensity of sensations, or altered viscerosomatic referral. These authors postulate that because altered rectal perception is present in almost all patients with IBS, altered rectal perception represents a reliable biological marker of IBS.

According to a review by Drossman, Whitehead and Camilleri (1997), the possible mechanisms for this increased visceral sensitivity may include: (1) altered receptor sensitivity in the viscus itself (2) increased excitability of the spinal cord dorsal horn neurons, and/or (3) altered central modulation of sensation, which may involve psychological influences on the interpretation of these sensations or altered central regulation of ascending signals from the dorsal horn neurons in the spinal cord. The findings of Lembo et al. (1994) suggest that the sensory abnormalities in patients with IBS involve splanchnic afferents projecting to the thoracolumbar spinal cord and not mucosal or muscular receptors in the gut wall.

Accarino, Azpiroz and Malagelada (1995) feel that peripheral hypersensitivity of mechanosensitive pathways may explain the common findings of expanded pain referral areas that are frequently found in IBS.

Evidence of a gut-sensory disturbance in various functional-type syndromes would support the hypothesis of them sharing a common pathophysiological mechanism that could arise from an amplified spinal relay of visceral reception, resulting in an unpleasant nociceptive signal to the brain (Mearin et al. 1991).

2.3.5 Psychosocial Factors

Although it is common knowledge that stress affects gastrointestinal function in health (Bennett and Piesse et al. 1998), the role of stress and psychological factors in IBS is probably overrated as only a quarter of those with symptoms of IBS present for medical care (Francis and Whorwell, 1997). Stressors strongly implicated with IBS include a history of physical or sexual abuse, major loss (e.g. divorce or death) and other trauma (Drossman, Whitehead and Camilleri, 1997). Bennett and Tennant et al. (1998) have shown that the level of chronic life stress predicts the clinical outcome in most patients with IBS, and that this finding is relevant to the clinical management of this condition.

The data from a report by Drossman et al. (1988) indicates that IBS patients report more pain and have more frequent bowel movements than non-IBS patients. These authors further state that psychosocial factors may influence whether a person with bowel symptoms perceives the condition as an illness requiring medical care or as a 'pain in the gut' not worthy of further attention or to be self-treated.

The implications are therefore that for many patients, treatment of the bowel symptoms alone may be insufficient to produce clinical improvement and that the physician should also address and attempt to modify any contributing psychosocial factors.

2.4 CLINICAL FEATURES OF IBS

According to Francis and Whorwell (1997), the most common symptoms of IBS are the following:

- Varying degrees of abdominal pain or discomfort
- Abnormal bowel habit
- Abdominal distension or bloating
- Feelings of incomplete evacuation
- Mucus per rectum

In addition, patients with IBS may experience a variety of non-colonic symptoms including the following:

- Gynaecological symptoms
- Urinary symptoms
- Non-specific symptoms such as backache, headaches, pruritus, bad breath, insomnia and constant tiredness. (Whorwell et al. 1986).

Whorwell et al. (1986) compared 100 IBS patients with 100 age, sex and social class matched control subjects. This study found that 68% of IBS patients experienced back pain compared to 28% in the control group, and 34% of IBS patients suffered from headaches compared to only 3% in the control group. When asked to rank their symptoms, it was found that 75% of IBS patients experienced backache, which was the fifth most common symptom. Headaches were experienced by 61% of patients and ranked as the ninth most common symptom. (Maxton, Morris and Whorwell, 1989).

A more recent paper by Maxton, Morris and Whorwell (1991) highlights the importance of non-colonic symptomology in IBS by suggesting that these symptoms may be used to differentiate IBS from other gastrointestinal disorders, and by implication, are therefore helpful for diagnostic purposes.

2.5 DIAGNOSIS

Since IBS is the most common reason for referral to gastroenterologists, a diagnosis based on exclusion may result in large numbers of expensive, uncomfortable and often dangerous tests (Heaton, 1990: 11). Francis and Whorwell (1997) therefore feel that general practitioners should try to diagnose IBS confidently and positively with minimal investigation. Investigation can often be initially limited to full blood count, erythrocyte sedimentation rate and sigmoidoscopy. These are indicated if there is an appreciable change in symptom pattern or if there is otherwise concern about the certainty of the diagnosis (Francis and Whorwell, 1997). Drossman, Whitehead and Camilleri (1997) state that a positive symptom-based diagnosis is only rarely associated with evidence for additional (i.e. missed) diagnosis in the future.

2.6 MEDICAL MANAGEMENT

As is the case in many other medical conditions, worry and anxiety can exacerbate the symptoms of IBS. For this reason, an effective patient-physician relationship is essential for successful management of this disorder. Realistic treatment goals should be set and the patient must understand that although a miraculous cure is unlikely, considerable symptomatic relief can be obtained. (Francis and Whorwell, 1997).

Most patients with IBS have only mild symptoms and little disability. For these patients, education and reassurance may be all that is required. (Dalton and Drossman, 1997). For the small percentage of patients with moderate or severe symptoms, pharmacological treatment may be necessary. These treatments are usually directed at the predominant symptoms and may take the form of bulking agents, antidiarrhoeals, antispasmodics or antidepressants. (Drossman, Whitehead and Camilleri, 1997).

2.6.1 **Bulking Agents**

Constipation may respond well to stool bulking agents such as ispaghula (Prior and Whorwell, 1987). Lactulose may be tried if this fails, but it may cause nausea and can sometimes exacerbate abdominal distension (Francis and Whorwell, 1997).

Bran and wheat fibre, traditionally the primary line of treatment for IBS, should be used with caution. Wheat fibre has been known to make some patients worse. Likewise, bran fibre has been shown to benefit only 10% of patients and 55% of patients claim that it may negatively affect their symptoms. (Francis and Whorwell, 1997). The role of oat bran in this condition was not mentioned in the literature.

2.6.2 Antidiarrhoeals

Loperamide and diphenoxylate may be used when urgency and incontinence are a problem. They are a safe group of drugs and can be used on a long-term basis without any serious side effects. (Francis and Whorwell, 1997). Loperamide is an opioid which decreases intestinal transit, enhances intestinal water and ion absorption and strengthens sphincter tone. Because it does not cross the blood brain barrier, it is preferred over diphenoxylate, codeine, or other narcotics for treating patients with IBS who have predominantly diarrhoea and/or incontinence. (Drossman, Whitehead and Camilleri, 1997).

In a double blind, crossover trial comparing Loperamide and placebo, 28 patients (14 in each group) were studied by Cann et al. (1984). It was found that the only symptoms that showed both a clinically and statistically significant improvement over and above that of placebo were diarrhoea and urgency. The design of this trial was well-executed as it consisted of a three-week baseline period where no treatment was given, followed by a double-blind, crossover trial comparing loperamide with an identical placebo, each taken for five weeks in random order.

2.6.3 Antispasmodics

Muscarinic antagonists relax smooth muscle and reduce gastrointestinal motility. These agents should be used only for acute exacerbation of postprandial pain as they rapidly lose efficacy in chronic treatment. (Drossman, Whitehead and Camilleri, 1997).

Anticholinergics such as prifinium bromide are another class of antispasmodics that can be used. In a six-week, randomised, double-blind, crossover study using 18 patients (9 patients in each group), Piai and Mazzacca (1979) found that prifinium bromide may be of benefit when pain is a predominant feature. However, in a more recent paper these authors state that the role of anticholinergics should be secondary to other measures, and that the short-term benefit and pill-taking psychology are attractive options for relief of bowel spasm, but do not justify expense, unwanted effects such as drug dependence and symptom exacerbation (particularly diarrhoea and constipation) or frequent lack of efficacy (Piai and Mazzacca, 1990: 63).

2.6.4 Antidepressants

Treatments with antidepressants are usually recommended for severe abdominal pain. They are often instituted for their central analgesic effects which are independent of their psychotropic influence. (American Gastroenterological Association, 1997). Greenbaum et al. (1987) conducted a study to compare the effects of the antidepressant drug desipramine with atropine and placebo. Using a total of twenty-eight IBS patients in a double-blind, crossover trial for 3 six-week test periods, it was found that desipramine may be helpful in treating IBS patients, especially those with diarrhoea-predominant symptoms.

In his review, Clouse (1994) suggests that the use of antidepressants should not be restricted in the subsets of patients with psychiatric illness, but adds that side-effects (i.e. anxiety, xerostomia and constipation) make these drugs inappropriate for initial treatment of functional gastrointestinal disorders.

2.6.5 Non-Drug Therapy

Non-drug therapy such as psychological treatment or hypnotherapy may be very useful for some patients who don't respond to the above treatments, although these therapies are very specialised and time-consuming (Francis and Whorwell, 1997).

Results from a study on the effectiveness of homoeopathic simillimum treatment on IBS sufferers suggest that this form of treatment can significantly improve the symptoms of IBS. In this double-blind, placebo-controlled study, 30 patients were randomly divided into one of 2 groups and treated with either homoeopathic remedy or placebo for a period of 3 months. A statistically significant difference was observed at the end of the research trial when homoeopathic treatment was compared to the placebo with regard to the patient's perception of their symptoms and clinical findings. (Rademan, 1997).

The treatment of functional abdominal pain using transcutaneous electrical nerve stimulation (TENS) was demonstrated by Sylvester, Kendall and Lennard-Jones (1986). After an instruction period of one hour, patients were given a TENS machine to assess its benefit over a one-month period. Pain scores using a visual analogue scale were recorded before treatment began, at two weeks and four weeks. Changes in pain intensity were calculated as the percentage alteration in the visual analogue score from the original reading. The patients were then divided into three groups: no response (<33%); moderate response (33-66% reduction); and good response (>66% reduction). The major weakness of this uncontrolled trial was that it did not include a placebo group, as the associated tingling of the apparatus would make a blinded trial difficult to design. Nevertheless, out of the 29 patients who completed this study, 21 showed a moderate to good response and, 15 patients bought their own machines. The effective sites of electrode placement in those who initially responded (n=21) were over the site of pain in 17, paraspinally in 5 and at acupuncture points in 2. Three patients responded at more than 1 site.

An osteopathic approach to IBS was documented by Masterson (1984) who theorised that the symptoms of IBS may be due to a disturbance (under-activity or over-activity) in the parasympathetic or sympathetic components of the autonomic nervous system. In this approach, treatment of the overactive parasympathetic component (mainly constipation and bloating) was directed at the upper cervical area to influence the vagus nerve and at the sacrum to affect the pelvic nerves. Steady moderate pressure was exerted over these areas to inhibit the activity of the nerve centres.

Conversely, treatment of the overactive sympathetic component (mainly diarrhoea) involved treatment applied to the lower thoracic and upper lumbar segments, particularly on the left side. Masterson (1984) does not specify why the treatment should be directed at the left side, although according to Francis and Whorwell (1997), the site of pain in IBS most commonly involves the left iliac fossa and lower abdomen. Treatment is aimed at relaxing soft tissues and correcting any diagnosed bony lesion using mobilisation or manipulation.

Masterson (1984), who highlighted the importance of patient-doctor interaction, also felt it was important to educate IBS patients about their disease and its physiology. However, no control studies testing this approach were found in the literature.

2.6.6 Summary

A review of the literature regarding treatment trials in IBS allows for the following conclusions:

- 1) No single study has been published that provides compelling evidence that any therapeutic agent or method is efficacious in the global treatment of IBS.
- 2) The nature of IBS makes the design and conduct of treatment trials for this condition difficult.

- 3) Unproven treatment agents should be avoided as such may result in needless side-effects and expense to the patient.
- 4) Successful treatment would be best accomplished by a comprehensive and individualised approach that includes patient education, support and proven symptomatic treatment directed at specific symptoms at appropriate times.
- 5) It seems feasible that a multidisciplinary approach, where different forms of treatment are directed at the different symptom components, might be better than the same agents singly.

For example, psychotherapy might be instituted in cases where stress is thought to play an important role. In this case, spinal manipulation may be aimed at alleviating symptoms such as back pain and headaches, and homoeopathy may offer constitutional benefit. Here, each treatment component may reinforce the other and so target the wide variety of symptoms experienced by these patients. However, such an approach has yet to be evaluated.

2.7 NEUROANATOMY OF THE GUT

2.7.1 Introduction

By definition, chiropractic is a discipline of the scientific healing arts concerned with the pathogenesis, diagnostics, therapeutics and prophylaxis of functional disturbances, pathomechanical states, pain syndromes and neurophysiological effects related to the statics and dynamics of the locomotor system, especially of the spine and pelvis (Haldeman, 1992: 622). According to this definition, any endeavour into the use of chiropractic and spinal manipulation as a form of treatment in IBS would necessitate a careful understanding of the related neuroanatomy.

2.7.2 Intrinsic Innervation

Gut function is modulated by both intrinsic and extrinsic pathways (Aziz and Thompson, 1998). The intrinsic nervous system, also called the enteric nervous system (ENS), lies in the gut wall and is composed mainly of two parts. The outer plexus lies between the longitudinal and circular muscle layers and is called the myenteric plexus or Auerbach's plexus. An inner plexus, also called the submucosal or Meissner's plexus, lies in the submucosa. (Guyton, 1992: 476).

Estimates of the total ENS neural population range from between 10 and 100 million neurons, which almost equal the number in the entire spinal cord (Wingate, 1990: 18).

The ENS controls gastrointestinal movement, secretion and local blood flow and is in turn influenced by extrinsic nervous and hormonal input (Guyton, 1992: 476).

2.7.3 Extrinsic Innervation

Extrinsic innervation consists of both sensory and autonomic components (Guyton, 1992: 447). The autonomic nervous system (ANS) is a system of nerves and ganglia concerned with the distribution of impulses to the heart, smooth muscle and glands. It also receives afferent impulses from these parts of the body. The ANS consists of two parts: (1) the sympathetic system and (2) the parasympathetic system. (Moore, 1992: 27).

2.7.3.1 Parasympathetic Innervation

The vagus nerves convey information between the viscera and the brain stem. They contain both afferent and efferent nerves and innervate the entire gut except the distal third of the colon. (Aziz and Thompson, 1998).

The parasympathetic supply to the distal third of the colon, rectum and anus is derived from the pelvic splanchnic nerves, which originate from neurons located in the cord segments S1 – S5 (Aziz and Thompson, 1998). In general, stimulation of the parasympathetic fibres increases the activity of the entire enteric nervous system (Guyton, 1992: 447).

2.7.3.2 Sympathetic Innervation

Sympathetic innervation of the small intestine, large intestine, rectum and anus arises from preganglionic sympathetic neurons located in the T9 - L2 segments of the spinal cord (Tan and Wong, 1990: 67). In general, stimulation of the sympathetic nervous system inhibits activity in the gastrointestinal tract (Guyton, 1992: 447).

2.7.4 Visceral Sensation and Pain

The vagal nerve trunks are composed of between 70% - 90% of unmyelinated afferent neurons with cell bodies located in the nodose ganglia, which lie just below the jugular foramen (Aziz and Thompson, 1998). This foramen is situated slightly antero-lateral to the occipital condyles (Moore, 1992: 643). Theoretically, this close proximity of the nodose ganglia to the C0/C1 facet joints could make them susceptible to any inflammation or oedema arising from dysfunction involving these articulations.

Also, according to Triano (1992: 252), the physiological consequences of aberrant segmental biomechanics in the upper cervical spine could result in disturbance of vagal function by either of the following three mechanisms:

- 1) Local tissue irritation.
- 2) Biochemical mediator activation.
- 3) Reflex moderated effects.

This forms part of the impulse-based paradigm, which holds that somatic dysfunction and joint dysfunction induces a persistent nociceptive and proprioceptive input to the spinal cord. A segmental cord response (facilitation) is then triggered by continuous aberrant input. Pathologic somatosomatic and somatovisceral reflexes may then ensue. (Triano, 1992: 252 and 253). Although unproven in IBS, impulse-based phenomena arising from segments in the upper cervical, thoracic and/or lumbar spine and sacroiliac joints could theoretically cause facilitation with consequent aberrant somatovisceral and viscerosomatic reflexes that result in IBS-type symptoms.

Traditionally, the vagal afferents were believed to mediate only non-noxious physiological sensations such as satiety and nausea. However, recent evidence suggests that these afferents also exert both inhibitory and excitatory influences on spinal nociceptive transmission. (Aziz and Thompson, 1998).

Sacral parasympathetic fibres running in the pelvic nerve carry sensory information from the distal colon and are the predominant pathway mediating physiological sensations from the rectum. In addition, supraspinal areas such as the cerebral cortex, pons and medulla also mediate a modulatory influence on colonic function by sending projections to the sacral cord (Aziz and Thompson, 1998).

Spinal visceral (sympathetic) afferents pass via prevertebral and paravertebral ganglia en route to the spinal cord. Here they have cell bodies located in the dorsal root ganglia (Aziz and Thompson, 1998). The two paravertebral ganglionated sympathetic trunks lie in close proximity to the costochondral and zygapophyseal joints in the thorax and abdomen (Tan and Wong, 1990: 53). Again, this anatomical relationship introduces the likelihood of joint dysfunction in these areas influencing these ganglia, as well as the possible influence of impulse- based phenomena.

There is a convergence of spinal and visceral afferents in the dorsal horn of the spinal cord. This convergence is thought to be the basis for the referral of visceral sensation to somatic structures. (Aziz and Thompson, 1998). Spinal and visceral afferent information is then transmitted proximally along the spinal cord via a number of tracts, of which the dorsal columns and spinothalamic tracts are the most important (Aziz and Thompson, 1998). Both the lateral fibres of the spinothalamic system and the medial fibres of the dorsal column system can be affected by the phenomena of facilitation, inhibition, convergence, divergence, synaptic after-discharge and synaptic fatigue (Leach, 1986: 94).

2.8 SPINAL MANIPULATION IN THE MANAGEMENT OF VISCERAL CONDITIONS

Manipulation may be defined as a manual procedure that involves a directed thrust to move a joint past the physiologic range of motion without exceeding the anatomic limit (Gatterman, 1995: 12). The role of spinal manipulation in the management of visceral disorders is highly controversial. There is a wealth of anecdotal evidence but few well-designed clinical trials to support these observations. (Jamison, McEwen and Thomas, 1992).

Before considering the role that spinal manipulation may play in these conditions, it is necessary to investigate some of the mechanisms whereby this intervention may be justified.

2.8.1 The Fixation/Facilitation Hypothesis

Chiropractors, osteopaths and medical doctors specialising in manipulation have come to recognise spinal fixation as a vertebral motor unit that has lessened mobility. These specialists acknowledge that vertebrae become locked within their normal range of motion. It is further hypothesised that this fixation can create the noxious or nociceptive input necessary to trigger abnormal somato-somatic and somato-autonomic reflexes, as well as pain. (Leach, 1994: 89-96).

As a result of his long-term exposure to osteopathic therapy and practice, Korr (1978: 229 & 255) advances a hypothesis on the premise whereby certain areas in the spine become fixated and the cord segments and neurons adjacent to this fixation become hyper-responsive or facilitated. In this zone, which includes anterior and lateral horn cells as well as cells of ascending pain pathways, facilitation affects motor and autonomic function and nociception (Leach, 1994: 98-99). Although largely unproven, this additional neurological traffic may thus be responsible for some of the symptoms, such as back and abdominal pain and altered bowel habits, that are features of IBS.

Korr (1978: 256) states further that effective manipulation of the fixated segment may result in the re-establishment of coherent patterns of afferent input and subsidence of sympathetic hyperactivity and its pathogenic, pain-producing influences.

It is therefore not unrealistic to propose that these hyper-responsive segments may in turn result in paraspinal muscle spasm and disordered visceral function that ultimately emerges as a symptom complex such as IBS, and that specific treatment of these fixated areas (by manipulation) may serve to restore normal visceral function. This however, remains untested theory.

2.9 SPINAL MANIPULATION AND IBS

A review of the literature has revealed no scientifically acceptable evidence that spinal manipulation may play a role in the management of IBS. However, a case study by Wagner et al. (1995) described how manipulation of observed fixations at C1, T1, T9 and L1 twice weekly for three weeks resulted in the apparent relief of IBS symptoms in a 25 year old woman. The patient then continued treatments approximately once a month to ensure that the fixations were no longer a problem. These authors did not specify the total treatment period. The treatment period is an important consideration in the design of well-controlled treatment trials for IBS (Klein, 1988). This disorder is usually a chronic, sometimes life-long condition with unpredictable periods of exacerbation and remission (Owens, Nelson and Talley, 1995). For this reason, Klein (1988) recommends a minimum treatment period of 8 weeks for a trial to be considered clinically relevant.

Notwithstanding the above, the case for spinal manipulation is further strengthened by the finding of Wiles (1980) who, using surface recording of gastric motility (electrogastrography) on four asymptomatic subjects, demonstrated that manipulation of the first cervical vertebra was associated with an increase in the basic gastric tone, as well as normalisation of wave patterns.

2.10 Summary

IBS is a common condition that is poorly understood. Although the exact aetiology remains controversial, there is a large and growing body of evidence that suggests that the cause may be of a neurological nature. Recent advances in the diagnostic criteria have been helpful in both the research and the clinic settings, but successful treatment remains largely elusive. This is probably due to the heterogeneity of symptoms in IBS, and although unsubstantiated, a multidisciplinary approach to treatment may be of benefit.

Anecdotal evidence and neurophysiological relationships suggest that chiropractic care may be of use in treating this condition, but scientific evidence is scarce. The aim of this dissertation was therefore to further explore these observations in order to help clarify the role that chiropractic may play in the management of this condition.

CHAPTER THREE

3.0 MATERIAL AND METHODS

3.1 INTRODUCTION

This single blind, placebo-controlled study compared spinal manipulation with placebo in the management of IBS over an eight-week trial period.

3.2 PATIENT SELECTION

A sample size of 30 IBS patients was used. These patients were recruited from the local community by means of advertisements, posters or referrals. Patients responding to advertising were screened telephonically to assess whether or not they fulfilled the inclusion criteria.

3.3 INCLUSION AND EXCLUSION CRITERIA

Only patients who fulfilled the inclusion criteria (Table 1) were accepted into this study. This was determined at the initial consultation by the following procedure.

- 1) A detailed case history was taken (Appendix A) and a physical examination (Appendix B) performed on each patient.

- 2) In addition, regional orthopaedic examinations of the cervical (Appendix C), thoracic (Appendix D) and lumbar spine/pelvis and sacroiliac joints (Appendix E) were performed. If clinically indicated, x-rays were used to rule out or confirm other possible pathology.
- 3) Each patient was then asked to complete the Manning Diagnostic Questionnaire (Appendix F).
- 4) The researcher then explained the nature and importance of the study and each patient was given the Patient Information sheet (Appendix G) to read.
- 5) Each patient then signed the Informed Consent form (Appendix H).

TABLE 1: INCLUSION AND EXCLUSION CRITERIA

A. INCLUSION CRITERIA	B. EXCLUSION CRITERIA
I. Subjects between the age of 18 and 50 years.	I. Vascular deficiency of the lower limbs.
II. Each patient must have 3 or more symptoms in the <i>Manning Criteria</i> .	II. Any hard neurological signs.
III. Each patient must have evidence of at least one of the following, as per regional exam:	III. Current medication or other treatments (except the contraceptive pill).
(a) A manipulable spinal lesion as determined by motion palpation;	IV. Pregnant or potentially pregnant females.
(b) Facet syndrome involving the cervical, thoracic and/or lumbar spines;	
(c) Sacroiliac syndrome.	V. Abdominal or spinal surgery.

3.4 ALLOCATION OF THE SUBJECTS

Each patient was then allocated to one of two groups by random assignment. This involved thirty pieces of paper (numbered 1-30) being placed in an envelope. Patients drawing an odd number were placed in the control group, whilst those drawing even numbers were placed in the experimental group. For blinding purposes, patients were not told to which group they were allocated.

3.5 TREATMENT INTERVENTIONS

Patients in the control group were treated using a detuned ultrasound machine over sites of spinal fixation as determined by regional orthopaedic exam (Appendices C - E).

Patients in the experimental group were treated by spinal manipulation of fixated areas, as per motion palpation finding, using the diversified technique (Szaraz, 1990). Levels of joint fixation were determined using Kemp's test, motion palpation, joint challenge and local tenderness. The most common manipulative techniques used were:

- Cervical Spine
 - Lateral Atlas (Supine) Index Contact
 - Rotary Cervical Index Contact
 - Supine Lateral Break
 - Thumb Move (T.M.)

- Thoracic Spine
 - Combination Move
 - Crossed Bilateral
 - Anterior Thoracic

- Lumbar Spine
 - Lumbar Roll (Pisiform-Mamillary)
 - Sitting Lumbar
 - Spinous Push

- Sacroiliac Joint
 - A.I. (Anterior-Inferior) Sacrum
 - P.S. (Posterior Superior) Sacrum
 - Prone Sacroiliac with Leg Lever

A more detailed discussion on the mechanics of each of these techniques is available in Szaraz (1990). For blinding purposes, treatment was performed with the same amount of enthusiasm and approximately the same duration in each group. The levels of vertebral involvement for both groups were recorded on the applicable regional examination form.

Each patient received a total of eight consultations over an eight-week trial period, which according to Klein (1988) should be the minimum treatment period length for IBS trials. All consultations took place at the Technikon Natal Chiropractic Day Clinic.

Six treatment consultations were done over a 3-week period, i.e. 2 treatments per week. This was in accordance with the number of consultations used by Wagner et al. (1995).

The seventh consultation took place approximately 1 week after the sixth consultation. The eighth consultation took place approximately one month after the seventh consultation and was to assess for any longer-term benefit from treatment. No treatment was performed at the eighth consultation.

3.6 METHOD OF MEASUREMENT

Due to the fact that there are no established objective physiological markers for IBS (Wingate, 1990: 17), only subjective measures were used.

The Short-form McGill Pain Questionnaire (SF-MPQ) (Appendix I) (Melzack, 1987), the Accompanying Symptom Questionnaire (ASQ) (Appendix J) compiled by Rademan (1997), as well as the Life Line Stress Questionnaire (LLSQ) (Appendix K 1-3) were used in this study.

3.6.1 The SF-MPQ

The SF-MPQ consists of 15 descriptors. Descriptors 1-11 represent the sensory dimension of pain experience and descriptors 12-15 represent the affective dimension. The overall pain score is represented by combining the sensory and affective dimensions of pain. Each descriptor is ranked on an intensity scale of Zero = none, 1 = mild, 2 = moderate and 3 = severe. Present pain intensity (PPI) and the visual analogue scale (VAS) are also included to provide overall intensity scores. (Melzack, 1987).

3.6.2 The LLSQ

The LLSQ was used to monitor the patients' stress levels during the study period, as stress may play an important role in exacerbating the symptoms associated with IBS (Bennett and Tennant et al. 1998). Although this questionnaire has not been tested for reliability or validity, it has been found to be very useful by the Life Line organisation, who use it extensively in their own work. This questionnaire is an adaptation of the questionnaire compiled by Burns (1988, VIII-IX).

3.6.3 The ASQ

The ASQ has been tested for clarity but not for reliability or validity. This questionnaire was used to monitor the patients' bowel symptoms over the trial period.

Each patient then completed the above questionnaires on the 1st, 7th, and 8th consultation before treatment commenced.

3.7 STATISTICAL ANALYSIS OF THE DATA

Once all the subjective data was collected it was treated as follows:

- 1) Each questionnaire was screened in order to determine if it had been completed correctly.

- 2) Scores obtained from each of the three questionnaires were expressed as percentages and recorded separately for the control and experimental groups.
- 3) The data then underwent statistical analysis.

3.7.1 Non-Parametric Paired Hypothesis Tests

Non-parametric methods were used for data analysis given that the sample size per group was small (15 per group).

The Wilcoxon Signed Rank test was used to analyse data within each group.

The percentages selected were compared as follows:

- 1) The 1st consultation (1c) and the 7th consultation (7c).
- 2) The 1st consultation (1c) and the final consultation (Fc).
- 3) The seventh consultation (7c) and the eighth consultation (Fc).

CONTROL GROUP	EXPERIMENTAL GROUP
1c ↔ 7c	1c ↔ 7c
1c ↔ Fc	1c ↔ Fc
7c ↔ Fc	7c ↔ Fc

The comparison of the figures determined the level of significance.

3.7.2 Non-Parametric Unpaired Hypothesis Tests

The Mann-Whitney U test was used to analyse data between the experimental and control groups. Measurements were taken separately from each group and compared using the mean values of the control and experimental groups as follows.

- 1) The initial consultation (1c) of the control and experimental groups.
- 2) The seventh consultation (7c) of the control and experimental groups; and
- 3) The final consultation (Fc) of the control and experimental groups.

CONTROL GROUP		EXPERIMENTAL GROUP	
1c	↔	1c	
7c	↔	7c	
Fc	↔	Fc	

The level of significance was then determined by comparing these figures.

3.7.3 Demographic Data

In addition, demographic data such as age, sex, race, occupation and previous gastrointestinal treatment and examination were collected from the patients' files and analysed.

3.7.4 Procedure 1: Inter-Group Comparisons

Twenty-one Mann-Whitney unpaired two-tailed tests were used to compare the placebo with the experimental groups, with the two groups being treated as independent of one another (unpaired). The aim was to determine whether there was any significant difference between the groups, at an $\alpha/2 = 0.025$ level of significance with respect to the three questionnaires; namely the SF-MPQ, LLSQ and the ASQ.

3.7.5 Hypothesis Testing and Decision Rule

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

$H_0: H_1 = H_2$

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

$\alpha/2 = 0.025$ level of significance of the test.

Decision Rule:

The data was analysed at the $\alpha = 0.05$ level. The decision rule for a two-tailed test states:

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

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

Now $\alpha = 0.05$. Therefore, for a two-tailed test $\alpha/2 = 0.025$. P is the observed significance level of the test.

3.7.6 Procedure 2: Intra-Group 1 Comparisons

Twenty-one Wilcoxon signed rank tests were used within the control group to determine whether there was any significant improvement between the 1st and 7th, 1st and final, and 7th and final consultations. All measurements were conducted at the $\alpha/2 = 0.025$ level of significance.

3.7.7 Hypothesis Testing and Decision Rule

The null hypothesis (H_0) stated that there was no significant improvement between consultation 1 and 7, 1st and final, and 7th and final consultation within the control group with respect to the variable of interest. The alternative hypothesis (H_1) stated the converse to the null hypothesis.

H_0 : There is no significant improvement.

H_1 : There is a significant improvement.

$\alpha/2 = 0.025$ level of significance of test.

Decision Rule:

For a two-tailed test,

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

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

P is the observed significance level of the test.

3.7.8 Procedure 3: Intra-Group 2 Comparisons

Twenty-one Wilcoxon sign ranked tests were used within the experimental group to determine whether there was any significant improvement between the 1st and 7th, 1st and final, and 7th and final consultations. All tests were done at the $\alpha/2 = 0.025$ level of significance.

3.7.9 Hypothesis Testing and Decision Rule

The null hypothesis (H0) stated that there was no significant improvement between consultation 1 and 7, 1st and final, and the 7th and final consultation within the experimental group with respect to the variable of interest. The alternative hypothesis (H1) stated the converse to the null hypothesis.

H0: There is no significant improvement.

H1: There is a significant improvement.

$\alpha/2 = 0.025$ level of significance of test.

Decision Rule:

For a two-tailed test,

Reject H0 if $P \leq \alpha/2 = 0.025$

Accept H0 if $P > \alpha/2 = 0.025$

P is the observed significance level of the test.

3.7.10 **Procedure 4: Summary Statistics**

Summary statistics such as the mean, standard deviation and standard error were computed for each variable of the study.

3.7.11 **Procedure 5: Barcharts**

Barcharts were created using the package Excel to present visual summaries of the results obtained from the demographic data and levels of vertebral dysfunction.

3.7.12 **Power Analysis**

Power analysis results of each test are presented below the relevant table, to determine the sensitivity of each test and the likelihood of a Type II error.

3.7.13 **Statistical Package**

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

CHAPTER FOUR

4.0 RESULTS

4.1 INTRODUCTION

A total number of 34 patients were recruited by newspaper and notice-board advertising. Thirty of these original 34 subjects completed the clinical trial. Two of the 4 subjects who failed to complete the trial cited work commitments as reasons. Of the remaining 2 dropouts; one patient was unwilling to allow manipulation to be performed due to the fear that it might be damaging or painful, and the other patient was relocated and so could not keep the necessary appointments.

The results and statistical analysis derived from the three questionnaires are presented in table form where each variable or pair of variables have been subjected to the Mann-Whitney unpaired two-tailed test or the Wilcoxon signed rank test. The purpose was to illustrate, using the Mann-Whitney test, whether there was any significant difference between the two treatment groups before treatment began, at the 7th treatment and at the 8th consultation. In addition, the Wilcoxon signed rank test was used to highlight any improvements between the 1st and 7th, 1st and final, and 7th and final consultation within each group.

4.2 Table Abbreviations

1 st Tx:	First Treatment/Consultation
7 th Tx:	Seventh Treatment/Consultation
F Tx:	Final Treatment/Consultation
PPI:	Present Pain Intensity
T. Sp:	Total Sensory Pain
T. Aff:	Total Affective Pain
OPS:	Overall Pain Score
T. Desc:	Total Number of Descriptors
S.E.:	Standard Error
S.D.:	Standard Deviation

4.3 WILCOXON SIGNED RANK TEST

The results of the Wilcoxon signed rank test of the two groups for the SF-MPQ, LLSQ, and the ASQ are presented in Tables 2-13.

4.3.1 THE SHORT-FORM MCGILL PAIN QUESTIONNAIRE (Tables 2-7)

TABLE 2: CONTROL GROUP - First and Final Consultation

	1 ST Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Present Pain Intensity	61.27	5.18	20.06	0.002	32.60	3.99	15.45
Total Sensory Pain	42.27	6.21	24.05	0.013	26.40	5.16	20.0
Total Affective Pain	22.13	6.14	23.81	0.933	22.06	7.00	27.11
Overall Pain Score	36.93	5.84	22.62	0.056	27.86	5.96	23.08
Total No. Descriptors	49.47	7.50	29.06	0.753	46.26	9.66	37.44
Power	PPI			0.9877			
	T. Sp			0.4672			
	T. Aff			0.0500			
	OPS			0.1740			
	T. Desc			0.0567			

When examining the above p-values, a statistically significant improvement in the categories of pain intensity and sensory pain was noted between the 1st and final consultations. Thus, the H1, which stated that there was a significant difference between these two values, was accepted.

An explanation for this significant reduction in pain may be due to the natural history of IBS, which is characterised by periods of exacerbation and remission (Klein, 1988). Alternatively, a favourable response to placebo may have occurred during this time interval.

TABLE 3: CONTROL GROUP - First and Seventh Treatment

	1 ST Tx				7 th Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Present Pain Intensity	61.27	5.18	20.06	0.041	42.73	5.47	21.17
Total Sensory Pain	42.27	6.21	24.05	0.162	31.87	5.02	19.45
Total Affective Pain	22.13	6.14	23.81	0.933	23.8	7.03	27.25
Overall Pain Score	36.93	5.84	22.62	0.056	29.73	5.22	20.21
Total No. Descriptors	49.47	7.50	29.06	0.753	53.0	8.64	33.47
Power	PPI			0.6595			
	T. Sp			0.2340			
	T. Aff			0.0532			
	OPS			0.1375			
	T. Desc			0.0593			

According to the above p-values, it was evident that no statistically significant improvement occurred in any of the above pain categories for the stated period. Thus, the null hypothesis was accepted here for all the measured categories of pain.

TABLE 4: CONTROL GROUP - Seventh and Final Consultation

	7 th Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Present Pain Intensity	42.73	5.47	21.17	0.198	32.60	3.99	15.45
Total Sensory Pain	31.87	5.02	19.45	0.442	26.40	5.16	20.0
Total Affective Pain	23.8	7.03	27.25	0.474	22.06	7.00	27.11
Overall Pain Score	29.73	5.22	20.21	0.925	27.86	5.96	23.08
Total No. Descriptors	53.0	8.64	33.47	0.583	46.26	9.66	37.44
Power	PPI			0.2997			
	T. Sp			0.1082			
	T. Aff			0.0529			
	OPS			0.0554			
	T. Desc			0.0767			

There were no significant values ($p > \alpha/2$) for the above comparisons. The null hypothesis was therefore accepted which indicated that no statistically significant improvement took place between the 7th and within the control group.

TABLE 5: EXPERIMENTAL GROUP - First and Final Consultation

	1ST Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Present Pain Intensity	35.2	5.24	20.32	0.036	21.73	3.96	15.35
Total Sensory Pain	34.07	5.99	23.19	0.035	18.80	3.99	15.48
Total Affective Pain	17.73	5.24	20.13	0.238	11.35	6.19	23.97
Overall Pain Score	25.2	4.61	17.86	0.177	16.73	3.66	14.18
Total No. Descriptors	46.13	5.84	22.65	0.116	33.53	6.71	25.99
Power	PPI			0.5083			
	T. Sp			0.5287			
	T. Aff			0.1097			
	OPS			0.2773			
	T. Desc			0.2679			

According to the above table, no significant values for the 5 categories of the SF-MPQ were detected. Thus, the null hypothesis was accepted for the experimental group, which showed that there was no statistically significant improvement from the 1st to final consultations.

TABLE 6: EXPERIMENTAL GROUP - First and Seventh Treatment

	1 ST Tx				7 th Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Present Pain Intensity	35.2	5.24	20.32	0.029	20.67	4.27	16.56
Total Sensory Pain	34.07	5.99	23.19	0.084	22.27	5.28	20.46
Total Affective Pain	17.73	5.24	20.13	0.465	16.0	8.19	31.72
Overall Pain Score	25.2	4.61	17.86	0.477	20.33	5.09	20.21
Total No. Descriptors	46.13	5.84	22.65	0.155	30.67	6.84	26.51
Power	PPI			0.5433			
	T. Sp			0.2707			
	T. Aff			0.0532			
	OPS			0.0998			
	T. Desc			0.3738			

The null hypothesis was accepted for the experimental group, which indicated that at the 0,025% level of significance no statistically significant improvement occurred between the 1st and 7th treatments with regard to the SF-MPQ.

TABLE 7: EXPERIMENTAL GROUP - Seventh and Final Consultation

	7 th Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Present Pain Intensity	20.67	4.27	16.56	0.727	21.73	3.96	15.35
Total Sensory Pain	22.27	5.28	20.46	0.693	18.80	3.99	15.48
Total Affective Pain	16.0	8.19	31.72	0.238	11.35	6.19	23.97
Overall Pain Score	20.33	5.09	20.21	0.637	16.73	3.66	14.18
Total No. Descriptors	30.67	6.84	26.51	0.798	33.53	6.71	25.99
Power	PPI			0.0532			
	T. Sp			0.0840			
	T. Aff			0.0690			
	OPS			0.0837			
	T. Desc			0.0587			

There were no significant values ($p > \alpha/2$) for the above comparisons. The null hypothesis was therefore accepted, which indicated that there was no statistically significant improvement in pain between the 7th and final consultations within the experimental group.

4.3.2 LIFE LINE STRESS QUESTIONNAIRE

TABLE 8: First and Final Consultation

	1 ST Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Control Group	52.53	4.65	18.02	0.109	45.07	4.98	19.30
Experimental Group	55.07	4.33	16.76	0.012	44.53	4.68	18.15
Power	Control Group			0.1764			
	Experimental Group			0.3480			

The null hypothesis was accepted for the control group, which indicated that at the 0,025% level of significance, no statistically significant improvement occurred between the 1st and final consultations. However, the null hypothesis was rejected for the experimental group, which showed that there was a statistically significant improvement between the 1st and final consultations.

TABLE 9: First and Seventh Treatment

	1 ST Tx				7 th Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Control Group	52.53	4.65	18.02	0.509	49.73	3.81	14.79
Experimental Group	55.07	4.33	16.76	0.011	45.07	4.44	17.20
Power	Control Group			0.0713			
	Experimental Group			0.2998			

The null hypothesis was accepted for the control group, which indicated that at the 0,025% level of significance, no statistically significant improvement occurred between the 1st and 7th treatment. However, the null hypothesis was rejected for the experimental group, which showed that there was a statistically significant improvement between the 1st and 7th treatment.

TABLE 10: Seventh and Final Consultation

	7 th Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Control Group	49.73	3.81	14.79	0.180	45.07	4.98	19.30
Experimental Group	45.07	4.44	17.20	0.932	44.53	4.68	18.15
Power	Control Group			0.1058			
	Experimental Group			0.0507			

The null hypothesis was accepted for both groups, indicating that no statistically significant improvement took place between the 7th and final consultations.

4.3.3 ACCOMPANYING SYMPTOM QUESTIONNAIRE

TABLE 11: First and Final Consultation

	1 ST Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Control Group	56.53	2.28	8.83	0.263	48.40	4.60	17.84
Experimental Group	52.40	2.27	8.78	0.073	44.93	3.16	12.24
Power	Control Group			0.3230			
	Experimental Group			0.4499			

No statistically significant improvements took place between the 1st and final consultations. Thus, the null hypothesis was accepted for both groups.

TABLE 12: First and Seventh Treatment

	1 ST Tx				7 th Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Control Group	56.53	2.28	8.83	0.108	51.40	2.80	10.87
Experimental Group	52.40	2.27	8.78	0.090	44.67	3.68	14.26
Power	Control Group			0.1539			
	Experimental Group			0.3980			

According to the above table, there was no statistically significant improvement within the control or experimental groups, between the 1st and 7th treatment. The null hypothesis was therefore accepted.

TABLE 13: Seventh and Final Consultation

	7 th Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
Control Group	51.40	2.80	10.87	1.000	48.40	4.60	17.84
Experimental Group	44.67	3.68	14.26	0.844	44.93	3.16	12.24
Power	Control Group			0.0807			
	Experimental Group			0.0503			

The null hypothesis was accepted for both groups, which indicated that at the 0,025% level of significance no statistically significant improvement took place between the 7th and final consultations.

4.4 THE MANN-WHITNEY U TEST

The results of the inter-group comparison using the Mann-Whitney U test with regard to SF-MPQ; LLSQ; and ASQ are tabulated below.

TABLE 14: Initial Consultation

	Control Group				Experimental Group		
	1 st Tx				1 st Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
SF-MPQ							
Present Pain Intensity	61.27	5.18	20.06	0.001	35.2	5.24	20.32
Total Sensory Pain	42.27	6.21	24.05	0.253	34.07	5.99	23.19
Total Affective Pain	22.13	6.14	23.81	0.815	17.73	5.24	20.13
Overall Pain Score	36.93	5.84	22.62	0.097	25.2	4.61	17.86
Total No. Descriptors	49.47	7.50	29.06	1.000	46.13	5.84	22.65
LLQ	52.53	4.65	18.02	0.755	55.07	4.33	16.76
ASQ	56.53	2.28	8.83	0.167	52.40	2.27	8.78
Power	PPI			0.9260			
	T. Sp			0.1438			
	T. Aff			0.0804			
	OPS			0.3246			
	T. Desc			0.0622			
	LLSQ			0.0656			
	ASQ			0.2271			

Data from the preceding table indicated that the control group exhibited a significantly greater intensity of pain than the experimental group at the start of treatment. This initial difference may have accounted for the improvement observed within the control group between the first and final consultations (Table 2). Nevertheless, with the exception of pain intensity, this table indicated that the two groups were well matched in terms of the other categories of measurement.

TABLE 15: Seventh Consultation

	Control Group				Experimental Group		
	7th Tx				7th Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
SF-MPQ							
Present Pain Intensity	42.73	5.47	21.17	0.008	20.67	4.27	16.56
Total Sensory Pain	31.87	5.02	19.45	0.190	22.27	5.28	20.46
Total Affective Pain	23.8	7.03	27.25	0.169	16.0	8.19	31.72
Overall Pain Score	29.73	5.22	20.21	0.164	20.33	5.09	20.21
Total No. Descriptors	53.0	8.64	33.47	0.105	30.67	6.84	26.51
LLQ	49.73	3.81	14.79	0.683	45.07	4.44	17.20
ASQ	51.40	2.80	10.87	0.211	44.67	3.68	14.26
Power	PPI			0.8711			
	T. Sp			0.2361			
	T. Aff			0.1030			
	OPS			0.2282			
	T. Desc			0.6535			
	LLSQ			0.1145			
	ASQ			0.2791			

Again, with the exception of pain intensity, there were no statistically significant differences for any of the categories of measurement. The difference in pain intensity here may have been a persistence of the difference observed at the first treatment (Table 14).

TABLE 16: Final Consultation

	Control Group				Experimental Group		
	F Tx				F Tx		
	Mean	S.E	S.D	p-Value	Mean	S.E	S.D
SF-MPQ							
Present Pain Intensity	32.60	3.99	15.45	0.036	21.73	3.96	15.35
Total Sensory Pain	26.40	5.16	20.0	0.280	18.80	3.99	15.48
Total Affective Pain	22.06	7.00	27.11	0.115	5.24	20.32	0.035
Overall Pain Score	27.86	5.96	23.08	0.157	16.73	3.66	14.18
Total No. Descriptors	46.26	9.66	37.44	0.382	33.53	6.71	25.99
LLQ	45.07	4.98	19.30	0.740	44.53	4.68	18.15
ASQ	48.40	4.60	17.84	0.479	44.93	3.16	12.24
Power	PPI			0.4547			
	T. Sp			0.1937			
	T. Aff			0.1850			
	OPS			0.5423			
	T. Desc			0.1755			
	LLSQ			0.0506			
	ASQ			0.0886			

For each of the 3 questionnaires, the null hypothesis was accepted, which indicated that at the 0,025 level of significance there was no statistically significant difference between the two groups at the final consultation.

TABLE 17: Demographic Data

	Control Group	Experimental Group	
Age Distribution			
Average Age	33	40	
Age Range	19 ↔ 50	22 ↔ 50	
Gender Distribution			TOTAL
Male	3	1	4
Female	12	14	26
Racial Distribution			
Black	0	0	0
White	13	12	25
Indian	1	3	4
Coloured	1	0	1
Previous GIT Treatment	8	7	15
Previous GIT Exam	3	7	10
Occupation			
Aerobic Instructor		1	1
Bookkeeper		1	1
Building Inspector		1	1
Chef	1		1
Consultant		1	1
Home Executive	3	2	5
Librarian	1		1
Nurse		2	2
Programmer		1	1
Quantity Surveyor	1		1
Receptionist		1	1
Secretary	1		1
Self Employed	1	1	2
Shipping Clerk	1		1
Shop Assistant	1		1
Student	5	3	8
Writer		1	1

FIGURE 1: AGE DISTRIBUTION

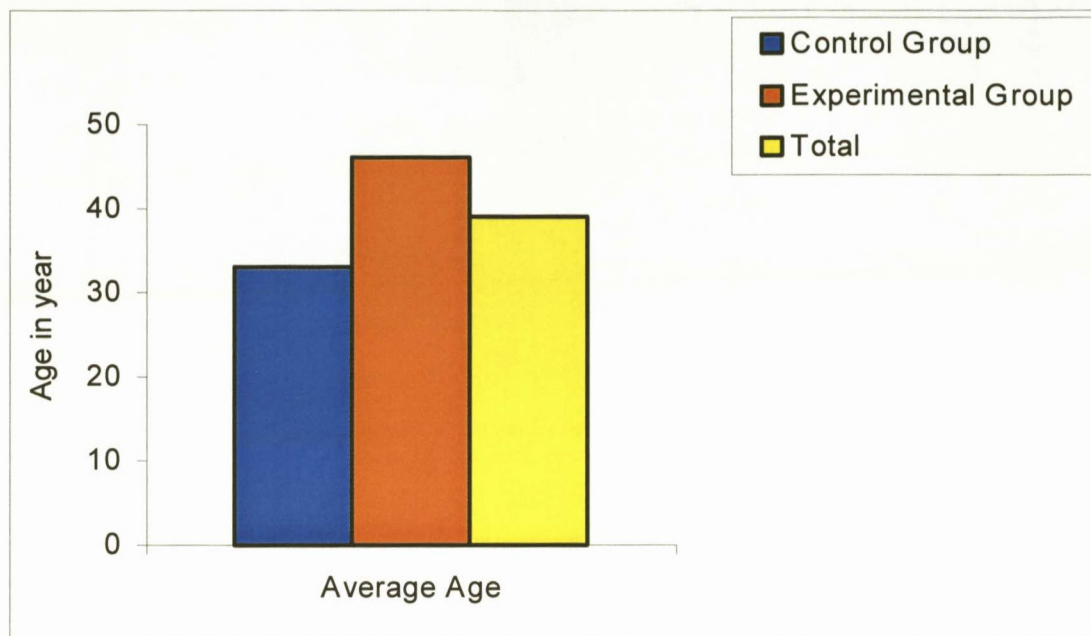


FIGURE 2: GENDER DISTRIBUTION

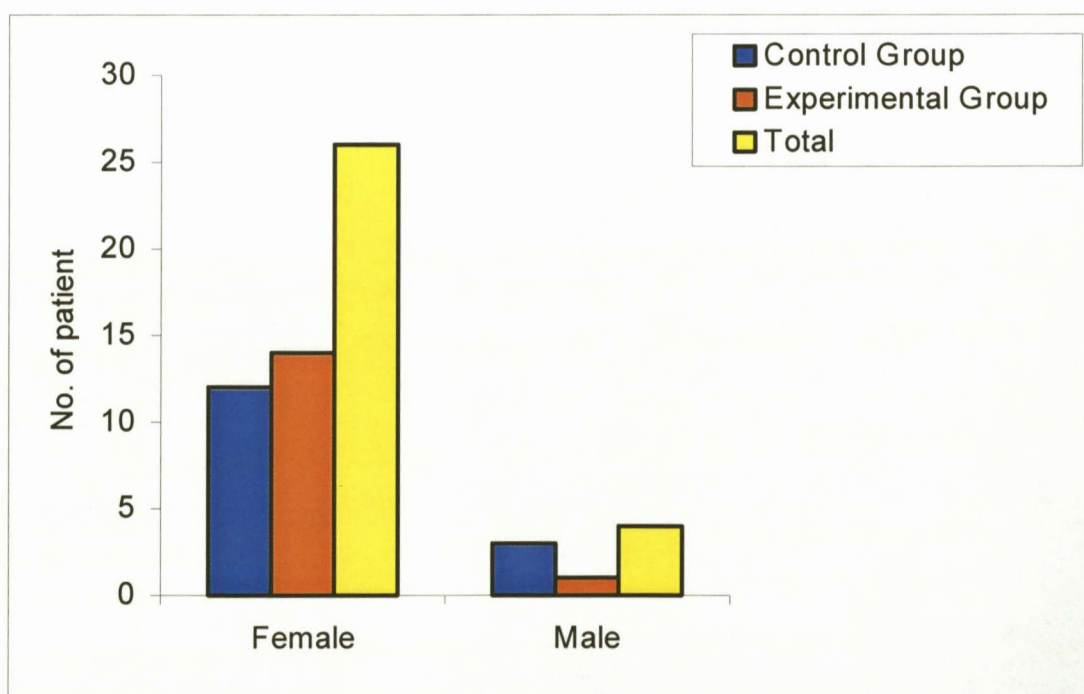


Figure 2 showed that there was a distinct preponderance of female subjects in the sample used in this study (4 male; 26 female). This finding is in keeping with the data obtained from several large national surveys in the United States, which have indicated that the prevalence of IBS is higher in women than in men (Sandler, 1990).

FIGURE 3: PREVIOUS GASTROINTESTINAL TREATMENT AND EXAMINATION

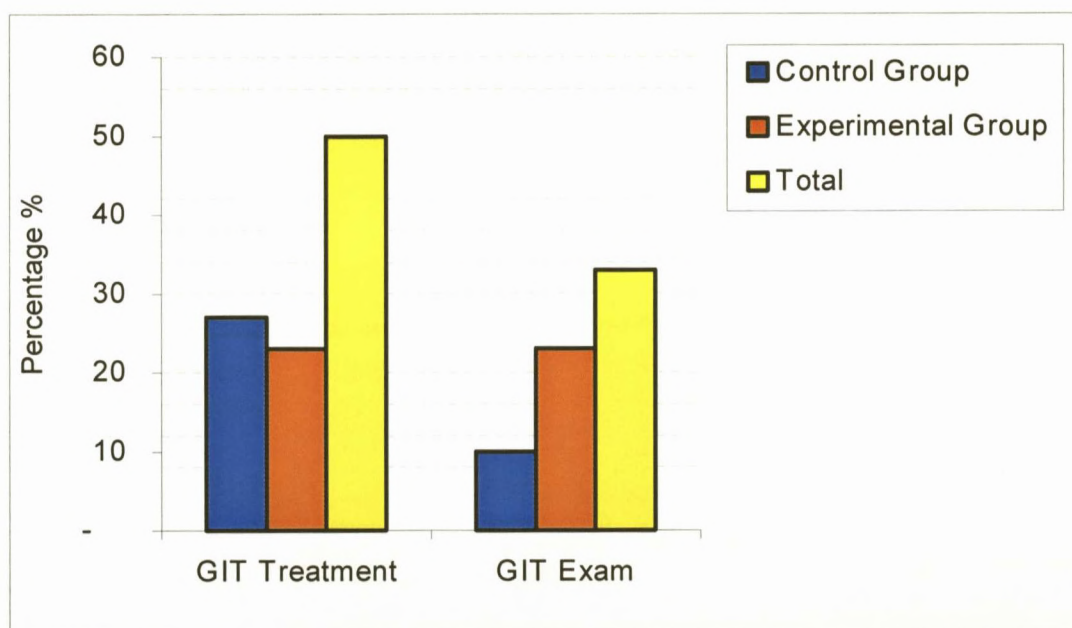


TABLE 18: Levels of Vertebral Dysfunction

Levels of dysfunction were determined as per regional examination; a positive Kemp's test, motion palpation findings, and local tenderness were used as primary indicators.

LEVEL	Control Group	Experimental Group	Total	
				%
C1	3	5	8	27
C2	4	4	8	27
C3	5	5	10	33
C4	2	0	2	7
C5	0	3	3	10
C6	2	0	2	7
C7	1	0	1	3
T1	5	6	11	37
T2	0	0	0	0
T3	1	3	4	13
T4	4	7	11	37
T5	7	9	16	53
T6	6	6	12	40
T7	5	4	9	30
T8	4	2	6	20
T9	3	1	4	13
T10	2	0	2	7
T11	3	1	4	13
T12	4	6	10	33
L1	0	0	0	0
L2	0	0	0	0
L3	0	1	1	3
L4	1	0	1	3
L5	5	3	8	27
SIJ (R)	9	7	16	53
SIJ (L)	8	6	14	47

FIGURE 4: LEVELS OF CERVICAL SPINE DYSFUNCTION

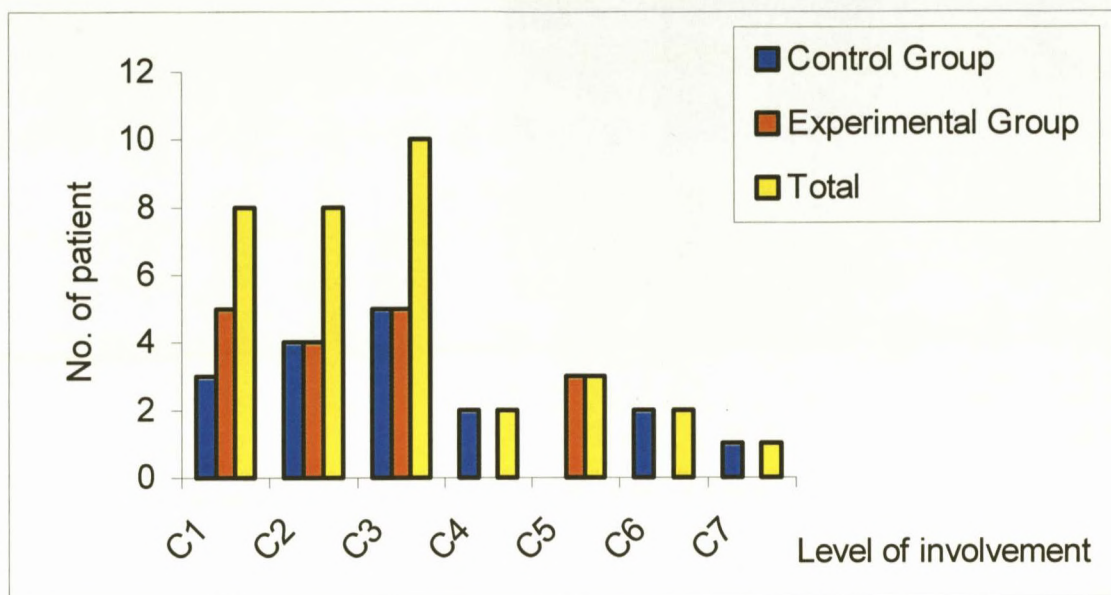


FIGURE 5: LEVELS OF THORACIC SPINE DYSFUNCTION

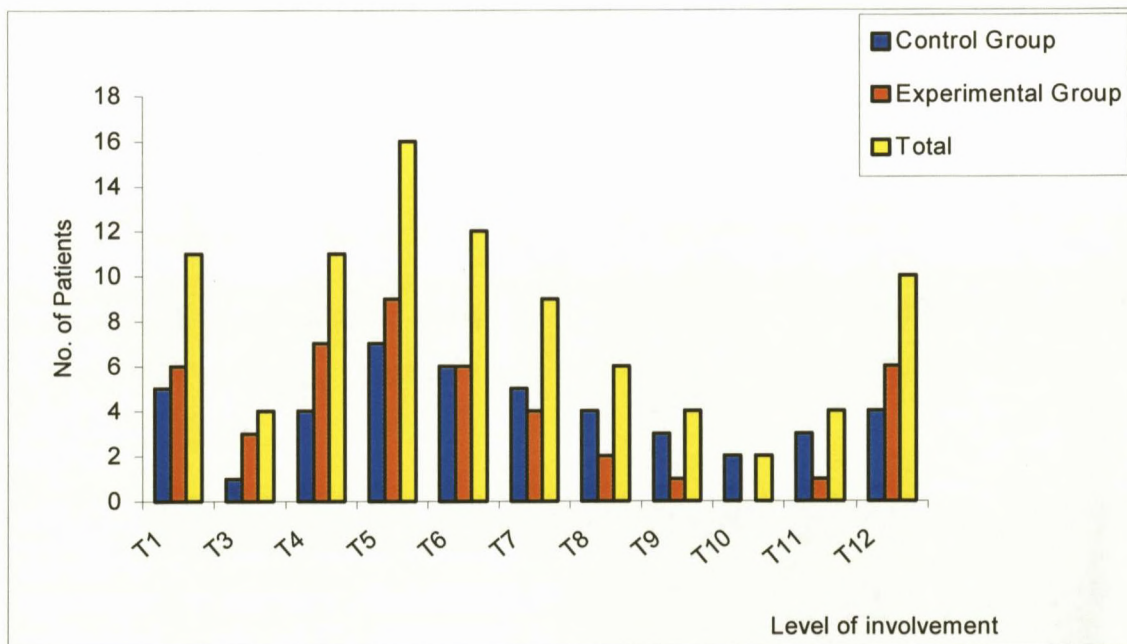
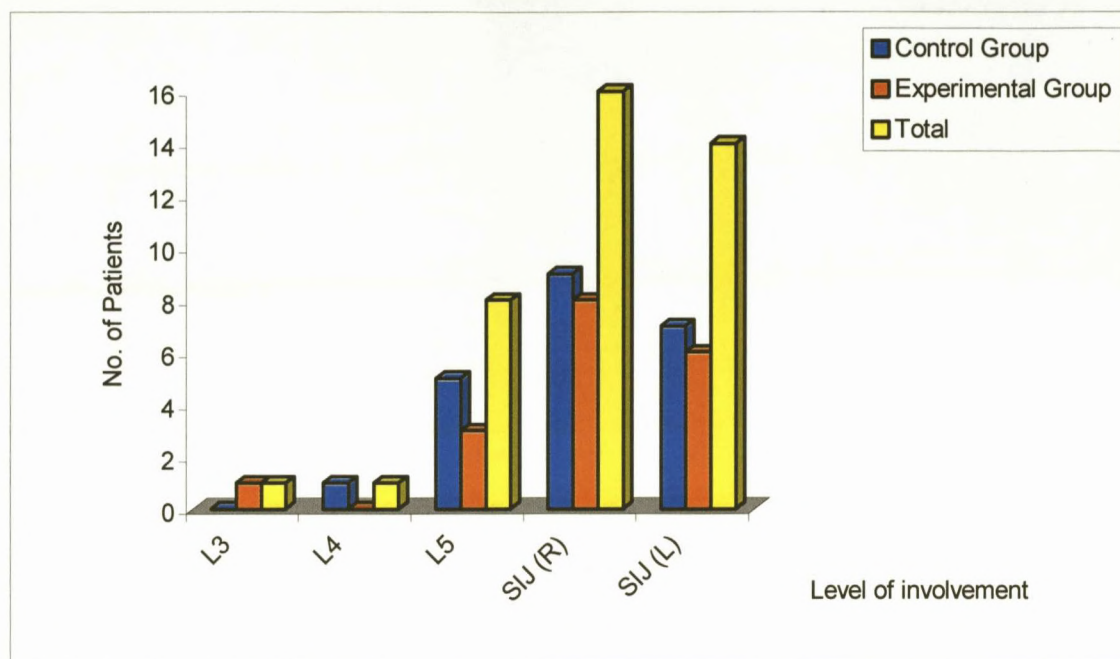


FIGURE 6: INVOLVEMENT IN THE LUMBAR SPINE AND SACROILIAC JOINTS



An assessment of the data regarding the levels of vertebral dysfunction shows an unexpectedly high incidence of sacroiliac joint involvement in both groups. This finding is interesting for the following reasons. It may signify that SIJ involvement is a characteristic feature of IBS, and by implication, has aetiological connotations in at least some cases of this condition. Alternatively, the possibility arises whereby IBS may, by some obscure mechanism, cause SIJ dysfunction. In any event, the answers to these questions of cause and effect need to be answered by future research.

CHAPTER FIVE

5.0 DISCUSSION

5.1 INTRODUCTION

The following discussion will serve to analyse the results obtained in Chapter 4. Results were obtained via three different subjective questionnaires at three separate stages during the treatment period. The aim of this approach was to investigate whether or not there would be any change in the following three symptom categories:

- 1) Abdominal pain (assessed by the SF-MPQ).
- 2) Stress levels during the study (monitored by the LLSQ).
- 3) Accompanying symptoms associated with IBS (assessed by the ASQ).

In addition, some of the difficulties and limitations within this study will be highlighted with regards to the method of investigation and the use of statistics.

5.2 INTRA-GROUP COMPARISON

Intra-group statistical data are presented in Tables 2-13.

5.2.1 Discussion of data pertaining to the SF-MPQ

An analysis of the p-values presented in Tables 5, 6 and 7 showed that for the experimental group, no significant improvement in abdominal pain occurred at any stage during the trial period. However, an unexpected improvement did occur in the control group for pain intensity and sensory pain between the first and final consultation, but not between the 1st and 7th or 7th and final consultations. An implication of this finding could be that either a Type II error was made or that a significant improvement did indeed take place, which could have been due to a placebo response or the natural history of IBS. Nevertheless, from these results it may be concluded that spinal manipulation was no more effective than placebo in the management of abdominal pain associated with IBS.

5.2.2 Discussion of data pertaining to the LLSQ

One of the primary reasons for the use of the LLSQ in this study was that stress may directly affect some of the symptoms of IBS (Bennett and Tennant et al. 1998). It was therefore deemed necessary to monitor stress levels in order to correlate these with any possible changes in the abdominal pain and/or the accompanying symptoms of IBS. The method here was to take into account the levels of stress when analysing the statistical data from the SF-MPQ and the ASQ. This would then help to place the results in a clearer perspective when making any statistical inference regarding these subjective findings.

When one examined the statistical data presented in Tables 8-10, it was apparent that there was a significant reduction in stress levels for the experimental group between consultations 1 and 7, but this improvement did not persist until the final visit. This was not so for the control group, where no significant improvement took place. Three possible interpretations of this data could be made:

- 1) It serves to signify that, even though stress levels were improved for the experimental group, this was not associated with a reduction in abdominal pain or the accompanying symptoms over the treatment period, thus confirming that spinal manipulation did no better than placebo in alleviating the said symptoms.
- 2) The suggestion also arises that spinal manipulation possibly did in fact reduce stress levels per se', but this had no bearing on either the abdominal pain or accompanying symptoms as would be expected in IBS. Furthermore, if this was the case, the reduction in stress levels would be treatment-dependent, as no longer-term benefit to spinal manipulation was noted when examining the interval between the 7th to final consultation, where no further improvement was noted; and/or
- 3) That because of the small sample size and low power of the test, a Type II error occurred and the null hypothesis was falsely rejected.

5.2.3 Discussion of data pertaining to the ASQ

The ASQ was used in this study in order to monitor any possible symptom changes other than abdominal pain. The purpose of this was to evaluate symptoms such as abdominal bloating and altered bowel habits.

When examining the statistical data presented in Tables 8-10, it is clear that there was no significant improvement with regards to the accompanying symptoms in either group at any stage during treatment. From these results, it may be concluded that spinal manipulation did not significantly alter the accompanying symptoms of IBS at any stage during the treatment period. The same was true of placebo.

In addition, if one compares these results with those of the LLSQ (Table 6) it can be seen that, even though there was a significant improvement in the experimental group between treatments 1 and 7, this had no bearing on the accompanying symptoms during the same interval. This may suggest that the accompanying symptoms of IBS are independent of any reduction in stressful influence. This finding is unlikely, since it is well established that stress may directly influence the symptoms of IBS (Bennett and Tennant et al. 1998).

Alternatively, it is also possible that a Type II error was made here and that indeed there was a clinical improvement (in either group), which remained undetected.

It is also likely that the design of this questionnaire and the way it was employed in this study did not make it sensitive enough to allow for the detection of any significant changes.

This observation holds true for all three questionnaires that were utilised in this trial.

5.3 Baseline Comparison

A concern in non-crossover trials is that before treatment begins, patients assigned to one group might by chance have important differences from those signed to the other group. This makes it important for the investigator to collect and tabulate baseline data on a variety of demographic and disease-related parameters, so that the pre-treatment comparability of the groups may be determined. (Klein, 1988).

Inter-group comparison of the data presented in Table 14 shows that at initial treatment a greater degree of pain intensity was experienced by the control group. This was again the case at the seventh treatment (Table 15) although no difference was noted at the final consultation (Table 16). These observations then raise the question of whether or not the control group actually faired better than the experimental group in terms of pain intensity, which was reduced at treatment 7 and disappeared at the final consultation, where no difference was noted between the groups.

In terms of demography (Table 17), there were no outstanding features that would suggest any striking dissimilarities between the experimental and control groups. Thus it can be assumed that, demographically, the two groups were reasonably evenly matched overall, although this was not an intention in the design of this trial, as random assignment of the patients was made on a consecutive basis.

5.4 INTER-GROUP COMPARISON

Inter-Group statistical data are represented in Tables 14-16.

Apart from a baseline difference in pain intensity at treatment 1 and a difference in pain intensity at treatment 7, a comparison of the data from the SF-MPQ, LLSQ, and ASQ revealed no statistically significant difference between the 2 groups at any stage during the trial period. However, the power for all three assessment periods is generally weak, which indicates that even if there had been a difference between the 2 groups, it may have gone undetected.

The power of a test is closely related to sample size and the smaller the sample size the greater the risk of Type II error and therefore the weaker the power. Ideally, the power of a test should be as close to 1 as possible. For example, if the power of a test were low, say 0.19, it would mean that the probability of detecting a true difference would only be 19 times out of a hundred. (Worku, 1999).

Nevertheless, from the results portrayed in Tables 14-16, it would seem that spinal manipulation was no more effective than placebo in the management of IBS.

5.5 **LIMITATIONS OF THIS STUDY**

A successful analysis and proper interpretation of data are very important when evaluating efficacy in clinical trials. For this reason a clear understanding of the limitations of the study are in order. Some of the more obvious limitations will therefore be discussed.

5.5.1 **Definition of IBS**

Problems of definition are particularly important and critical for a condition such as IBS, as there are no objective markers, and symptoms are highly variable. An attempt was made to select patients according to an 'operational' definition by using specified inclusion and exclusion criteria (Table 1).

5.5.2 **Measures of Efficacy**

There are no objective markers of improvement for IBS and so the determination of efficacy in treatment trials must be based on somewhat arbitrary rating scales (Klein, 1998).

IBS is associated with a wide variety of symptoms and alterations in gastrointestinal function. This makes it difficult to decide on which symptoms to focus in the evaluation of an experimental therapy such as spinal manipulation. An attempt has been made to address this issue by the use of three separate questionnaires; viz. SF-MPQ, LLSQ, and the ASQ. These questionnaires were used to measure each of the relevant elements of the operational definition of IBS used in this trial.

The question posed, however, is whether these questionnaires did in fact measure what they were meant to measure and did so consistently. Patients with IBS often have multiple components to their disorder and it is difficult to capture them all with discreet, specific questionnaires.

5.5.3 Blinding

The placebo response in IBS may range from $\leq 20\%$ to more than 70%. (Klein, 1988). This variability introduces the problem of an adequate placebo control. Patient blinding was done in this study by using a detuned ultrasound machine. It may be asked whether this was adequate, as a number of patients had received chiropractic treatment before taking part in this trial. This factor made the blinding difficult which could have influenced the results in either group. However, this did not appear to have been a problem in this particular trial as there were no discernible alterations in symptoms between the two groups.

Furthermore, the reduction in pain in the control group (Tables 14 & 15) may have occurred as a result of a favourable response to placebo, which would indicate that the blinding method used was well suited to this particular trial. Another limitation was that practitioner blinding was not done as it was not feasible in this study. This may have resulted in practitioner bias (conscious or unconscious) which could have skewed the results in either group.

5.5.4 Manipulation as an intervention

It is true that manipulation is a skill, and that the level of this skill differs among different practitioners. This then raises the issue of whether or not this intervention (manipulation) was performed with the necessary level of skill or whether it could have been done with more finesse. It is important to consider this issue as the researcher, at the time of this study, had only accumulated 2 years of clinical experience with which to develop this skill. A question to ask here is whether or not a more experienced and skilled researcher could have altered the results obtained in these measures, by delivering a more skilful intervention. However, other studies done by persons with similar limited experience, but in the management of back pain, have shown no less effect than those with considerable skill.

5.5.5 Crossover Design

The use of a crossover design is very important in IBS trial design. Here patients are initially randomised to receive one treatment and then, after a predetermined interval, are switched to the alternate therapy. (Klein, 1988).

A major problem with the crossover design is persistence of effects from the first treatment to the second treatment, the so-called 'carry-over' effect. Whether or not this problem may apply to trials in spinal manipulation and IBS is the subject of further study. Also, financial and time constraints precluded the use of this technique, as it would have meant that the trial would have had to run over at least a 4 month period.

5.5.6 Conclusion

From the aforementioned discussion, it would appear that spinal manipulation was no more effective than placebo in the management of IBS. However, anecdotal evidence in terms of chiropractic claims are possibly attributable to other treatment interventions concurrently used by chiropractors, such as nutritional advice, exercise and stress management. Nevertheless, it was observed in at least two patients that successful manipulation of fixations in the T12/L1 region offered remarkable ability to reduce abdominal bloating and pain, and this improvement was almost immediate. One of these patients had taught herself to self-manipulate and found this to be a valuable self-help procedure for the 'bad days'. Although a situation where patients manipulate themselves is not desirable, it is noteworthy.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

The results indicate that no statistically significant improvements took place in either group within the intra-group category for the accompanying symptoms. The control group experienced a statistically significant reduction in pain intensity and sensory pain between the 1st and final consultation, and the experimental group experienced a statistically significant reduction in stress levels between the 1st and 7th consultations. This intra-group reduction in stress levels had no influence in reducing either abdominal pain or accompanying symptoms during the same treatment interval, as would have been expected. Compared to each other, the control group exhibited a greater degree of pain intensity before treatment began. This baseline difference in pain intensity decreased further at treatment seven. No difference in pain intensity was noted at the final consultation. This indicated that the control group might have actually improved over the duration of the trial, which may have been either due to a favourable placebo response or to the natural history of this disorder. Apart from this discrepancy, it is evident that there were no other statistically significant differences between the 2 groups, which would indicate that spinal manipulation was no more effective than placebo in alleviating the global symptoms of IBS.

In conclusion, spinal manipulation was no more successful than placebo in the management of IBS. However, one must bear in mind that this data is possibly erroneous given the limitations of this study.

6.2 RECOMMENDATIONS

This study is important, as it is the first known placebo-controlled clinical trial evaluating spinal manipulation as a possible therapeutic agent in the treatment of IBS. The strength of this study is that it creates a base from which to launch future research in this field, and future research will be richer for any mistakes made here. Future studies should therefore take note of the following recommendations.

6.2.1 Homogeneity and Sample Size

Although the sample used in this study was not truly homogenous, the two groups were reasonably evenly matched demographically. Further trials should increase the homogeneity by using matched pairs, where each subject is matched with another of the same age, sex, race, etc. Unfortunately, time and financial constraints make the use of this technique difficult.

It is clear that a central weakness of this study was the small sample size (15 patients in each group). Hence, it is possible that a clinically important difference was overlooked because a Type II error was made. Larger sample sizes are needed where resources permit.

6.2.2 Measures of Efficacy

Questionnaires and methods of measurement which more accurately reflect symptom fluctuations are needed in IBS trials. It is also possible that a more frequent measurement of symptoms (say, at the 1st, 3rd, 5th, 7th and 8th consultation) would be better than just the three measurements taken at the 1st, 7th and 8th consultations, as was done in this study. It is likely that this approach would give a more accurate account of symptom patterns and therefore highlight any clinically important symptom changes occurring during the treatment period.

6.2.3 Placebo Control

The placebo response in IBS may be high, and this introduces the problem of an adequate placebo control. This has been attempted by using detuned ultrasound but other methods are available, such as placebo pills or sham manipulation. Whether other methods would have been more suitable remains the subject of further evaluation.

6.2.4 Baseline Comparison and Trial Length

A baseline comparison was done at the 1st consultation in order to highlight any important differences between the 2 groups. A run-in period of a month would be a more appropriate approach since this would increase the accuracy of the baseline before treatment commenced, which would facilitate a clearer interpretation of the results.

The 8-week trial period was chosen because of the variability of IBS symptoms over time. The length of this treatment trial could have been longer as it would seem that 2 months is a minimum length for treatment trials in IBS. Longer trials may add to the clinical relevance of the intervention.

6.2.5 Summary

IBS is a very common condition that is often associated with significant disability. It is also costly for the patient and society in terms of healthcare and work absenteeism. These are compelling reasons to identify any agents that are efficacious, cost-effective and limited in terms of side-effects.

Hence more controlled studies are needed to assess the efficacy of not only manipulation, but also acupuncture, abdominal massage, myofascial trigger point therapy, diet and exercise, or any combinations of the above. It is recommended that future trials attend more closely to problems such as sample size, definition of IBS, measures of efficacy, blinding and the accurate use of statistics. With this attention, future prospects look promising.

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APPENDIX A

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC CASE HISTORY

Patient: _____ Date: _____
file #: _____ X-Ray#: _____
Age: _____ Sex: _____ Occupation: _____
Intern: _____ Signature: _____

FOR CLINICIAN'S USE ONLY

Initial visit clinician: _____ Signature: _____

Case History:

Examination:

Previous:

Current:

X-Ray Studies:

Previous:

Current:

Clinical Path. lab:

Previous:

Current:

Case Status:

PTT: Conditional: Signed Off: Final Sign out:

Recommendations:

Intern's Case History

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

3. Present Illness:

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

4. Other Complaints:

5. Past Medical History:

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

6. Current health status and life-style:

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

7. Immediate Family Medical History:

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

8. Psychosocial history:

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

9. Review of Systems:

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

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

PHYSICAL EXAMINATION

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

1. VITALS

Pulse rate:

Respiratory rate:

Blood pressure: R L

Temperature:

Height:

Weight:

2. GENERAL EXAMINATION

General Impression:

Skin:

Jaundice:

Pallor:

Clubbing:

Cyanosis (Central/Peripheral):

Oedema:

Lymph nodes - Head and neck:

- Axillary:

- Epitrochlear:

- Inguinal:

Urinalysis:

3. CARDIOVASCULAR EXAMINATION

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

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

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

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

Percussion: - borders of heart

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

4. RESPIRATORY EXAMINATION

1) Is this patient in Respiratory Distress ?

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

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

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

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

5. ABDOMINAL EXAMINATION

1) Is this patient in Liver Failure ?

Inspection - Shape:
 - Scars:
 - Hernias:

Palpation - Superficial:
 - Deep = Organomegally:

- Masses (intra- or extramural)
- Aorta:

Percussion - Rebound tenderness:
 - Ascites:
 - Masses:

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

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

6. G.U.T EXAMINATION

External genitalia:
 Hernias:
 Masses:
 Discharges:

7. NEUROLOGICAL EXAMINATION

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

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

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

Evidence of head trauma:

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

Cranial Nerves:

I Any loss of smell/taste:
 Nose examination:

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

- Pupillary light reflexes = Direct:
 = Consensual:
- Fundoscopy findings:
- III Ocular Muscles:
 Eye opening strength:
- IV Inferior and Medial movement of eye:
- V a. Sensory - Ophthalmic:
 - Maxillary:
 - Mandibular:
 b. Motor - Masseter:
 - Jaw lateral movement:
 c. Reflexes - Corneal reflex
 - Jaw jerk
- VI Lateral movement of eyes
- VII a. Motor - Raise eyebrows:
 - Frown:
 - Close eyes against resistance:
 - Show teeth:
 - Blow out cheeks:
 b. Taste - Anterior two-thirds of tongue:
- VIII General Hearing:
 Rinnes = L: R:
 Webers lateralisation:
 Vestibular function - Nystagmus:
 - Rombergs:
 - Wallenbergs:
 Otoscope examination:
- IX & Gag reflex:
- X Uvula deviation:
 Speech quality:
- XI Shoulder lift:
 S.C.M. strength:
- XII Inspection of tongue (deviation):

Motor System:

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

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

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

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

Sensory System:

- a. Dermatomes
- Light touch:
 - Crude touch:
 - Pain:
 - Temperature:
 - Two point discrimination:
- b. Joint position sense
- Finger:
 - Toe:
- c. Vibration:
- Big toe:
 - Tibial tuberosity:
 - ASIS:
 - Interphalangeal Joint:
 - Sternum:

Cerebellar function:

Obvious signs of cerebellar dysfunction:

- = Intention Tremor:
- = Nystagmus:
- = Truncal Ataxia:

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

8. SPINAL EXAMINATION:(See Regional examination)

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

9. BREAST EXAMINATION:

Summon female chaperon.

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

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

APPENDIX C

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

Patient: _____ File: _____

Date: _____ Intern/Resident: _____

Clinician: _____ Sign: _____

OBSERVATION:

Posture
Swellings
Scars
Discolouration
Hair Line
Bony & Soft Tissue Contours

Shoulder position:

Left:

Right:

Muscle spasm

Facial expression

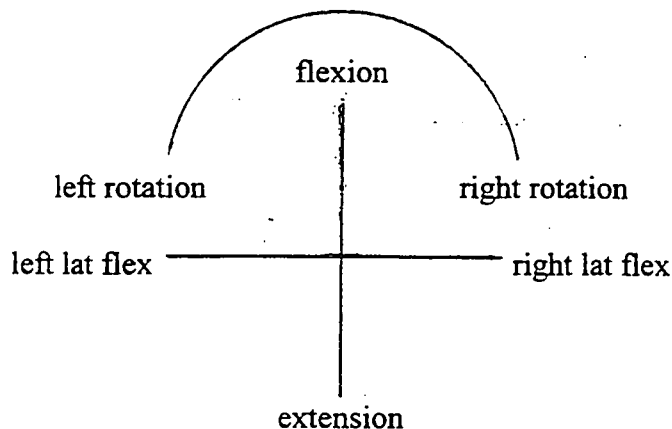
RANGE OF MOTION:

Flexion (45'):

L/R Rotation (70'):

Extension (70'):

L/R Lat Flex (45'):



PALPATION:

Lymph Nodes
Thyroid Gland

Trachea

ORTHOPAEDIC EXAMINATION:

Tenderness

Trigger Points:

SCM

Scaleni

Post Cervicals

Trapezius

Lev Scap

Doorbell sign

Kemp's test

Cervical distraction

Halstead's test

Hyperabduction test

Shoulder abduction test

Cervical compression

Lateral compression

Adson's test

Costoclavicular test

Eden's test

Shoulder depression test

Dizziness rotation test
Brachial plexus tension

Lhermitte's sign

NEUROLOGICAL EXAMINATION:

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

VASCULAR:

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

MOTION PALPATION & JOINT PLAY:

Left: Motion Palpation:
Joint Play:

Right: Motion palpation:
Joint Play:

Basic Exam: Shoulder:
Case History:

ROM: Active:
Passive:
RIM:

Orthopaedic/Neuro/

Vascular:

Observ/Palpation:

Upper T horacics:
Motion Palpation:
Joint Play:

Basic Exam: Thoracic Spine:
Case History:

ROM: Motion Palp:
Active:
Passive:

Orthopaedic/Neuro/

Vascular:

Observ/Palpation:

APPENDIX D

REGIONAL EXAMINATION - THORACIC SPINE

Patient: _____ File #: _____ Date: _____

Intern: _____ Signature: _____

Clinician: _____ Signature: _____

STANDING

Posture (incl. L/S & C/S):

Muscle Tone:

Skyline view - Scoliosis

Spinous Percussion

Breathing (quality, rate, rhythm, effort):

Deep inspiration

Scars:

Chest Deformity
(pigeon, funnel,
barrel):

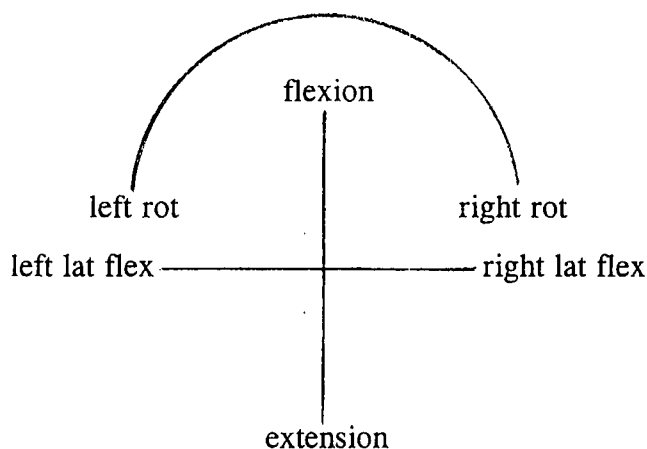
RANGE OF MOTION

Forward flexion 20 - 45 degrees (15cm from floor)

Extension 25 - 45 degrees (15cm from floor)

L/R Rotation 35 - 50 degrees (15cm from floor)

L/R Lateral Flexion 20 - 40 degrees (15cm from floor)



RESISTED ISOMETRIC MOVEMENTS: (in neutral)

Forward flexion

Extension

L/R Rotation

L/R Lateral Flexion

SEATED:

Palpate Auxillary Lymph Nodes

Palpate Ant/Post Chest Wall

Costovertebral Expansion (3 - 7cm diff. at 4th intercostal space)

Slump Test (dural stretch test)

SUPINE:

Rib Motion

Soto Hall Test (#, sprains)

SLR

Palpate Abdomen

PRONE:

Passive Scapular Approximation

Facet Joint Challenge

Vertebral Pressure (P-A central, unilateral, transverse)

Active Myofascial Trigger Points:

Rhomboid Major

Lower Trapezius

Serratus Posterior

Pectoralis Major

Quadratus Lumborum

Rhomboid Minor

Spinalis Thoracic

Serratus Superior

Pectoralis Minor

COMMENTS: _____
_____**NEUROLOGICAL EXAMINATION:****DERMATOMES**

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12
Left												
Right												

Basic LOWER LIMB neuro:**Myotomes:****Dermatomes:****Reflexes:****KEMPS TEST:****MOTION PALPATION:****Ribs: Calliper:**

Left:

Right:

Joint Play:

Bucket handle:

Left:

Right:

Joint Play:

Motion Palpation:

Left:

and Joint Play

Right:

Basic Lumbar Exam:

History:

ROM:

Neuro/Ortho:

Basic Cervical Exam:

History

ROM:

Neuro/ortho:

APPENDIX E

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC REGIONAL EXAMINATION - LUMBAR SPINE AND PELVIS.

PATIENT: _____

FILE #: _____

DATE: _____

INTERN/RESIDENT: _____

SUPERVISING CLINICIAN: _____

STANDING:

Posture
Minor's Sign
Skin
Scars
Discoloration
Muscle Tone
Bony & Soft Tissue Contours

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

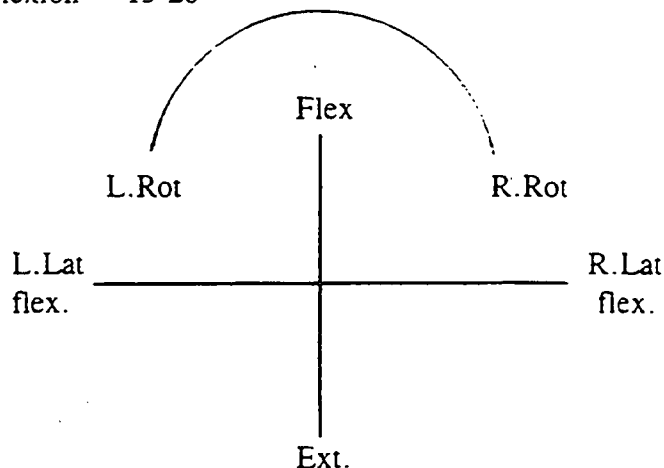
RANGE OF MOTION

Forward Flexion = 40-60° (15cm from floor)

Extension = 20-35°

L/R Rotation = 3-18°

L/R Lateral Flexion = 15-20°



SUPINE:

Skin
Hair
Nails
Palpate Abdomen/groin
Pulses (abdomen)

Observe abdomen
Fasciculations
Abdominal Reflexes

Pulses (extremities)
SLR
Bowstring
Plantar Reflex
Circumference (thigh, calf)
Leg Length:
 actual
 apparent
Sciatic Notch
Patrick FABERE
Gaenslen's Test
Gluteus Maximus Stretch
Hip Medial rotation
Psoas Test
Thomas' Test:
 hip joint
 Rectus Femoris

LATERAL RECUMBENT

S-I Compression
Ober's Test
Femoral Nerve stretch
Myotomes:
 QL
 Gluteus Medius

NON ORGANIC SIGNS

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

GAIT

Rhythm
On toes (standing)
On Heels (standing)
Half squat on one leg

PRONE

Gluteal skyline
Skin rolling
Iliac crest compression
Facet joint challenge
S-I tenderness
Erichson's Test
Pheasant's Test
Myotome:
 Glut. Max
Active MF Trigger Pts:
 QL
 Glut. Med
 Glut. Min
 Glut. Max
 Piriformis
 Hamstrings
 TFL

NEUROLOGICAL EXAMINATION

DERMATOMES			MYOTOMES			REFLEXES		
	L	R		L	R		L	R
T12			Hip Flex			Pat.		
L1			Hip int rot			Achil		
L2			Hip ext rot			H/S		
L3			Hip abd					
L4			Hip add					
L5			Knee flex					
S1			Knee ext					
S2			Dorsiflex					
S3			Plantarflex					
			Eversion					
			Ext.hal.long					

Tripod
Kemp's Test

MOTION PALPATION and JOINT PLAY:

LEFT: Upper Thoracics:
 Lumbar Spine:
 Sacroiliac Joint:

RIGHT: Upper Thoracics:
 Lumbar Spine:
 Sacroiliac Joint:

Basic Exam: Hip
Case History:

ROM: Active:
 Passive:
 RIM:

Orthopaedic/Neuro/
Vascular:

Observ/Palpation:

Basic Exam: Thoracic Spine
Case History:

ROM: Motion Palp:
 Active:
 Passive:

Orthopaedic/Neuro/
Vascular:

Observ/Palpation:

APPENDIX F

MANNING CRITERIA FOR DIAGNOSING IBS

PATIENT'S NAME:	DATE:	
SYMPTOMS:	YES	NO
1. Is the pain relieved with defecation?		
2. Is the onset of pain associated with more frequent defecation?		
3. Is the onset of pain associated with looser stools?		
4. Is there bloating of the abdomen?		
5. Is there rectal dissatisfaction, i.e. feeling of incomplete evacuation?		
6. Is there passage of mucus per rectum?		

APPENDIX G

PATIENT INFORMATION SHEET

Dear Participant

The aim of this research is to look for more effective treatment of the Irritable Bowel Syndrome (IBS).

If you think you have IBS or have been previously diagnosed with this condition, you may be elected to take part in this study, which is free of charge. Once a diagnosis has been made, you will be placed into one of two groups. One of these groups will receive a sham treatment - you will therefore stand a 50-50 chance of being allocated to this group.

The treatments used in this study have been shown to be safe and you should therefore not experience any unpleasant side-effects. If necessary, some patients may need to have x-rays taken, which are also relatively safe. These will be free of charge.

All patients will be required to return for a maximum of eight consultations over an eight-week period. Six consultations will be done over a three-week period (i.e. 2 per week). The seventh consultation will take place approximately one week after the 6th, and the 8th consultation approximately one month after the 7th.

Pregnant or potentially pregnant women will unfortunately be excluded from this study, as will patients who are on any prescription medication, other than the contraceptive pill. You are also urged to maintain your normal diet and lifestyle for the duration of the research.

All treatment will be supervised by a qualified Chiropractor and you will be free to withdraw from this research at any time or for whatever reason.

Thank you for your participation in this important research.

Yours sincerely

RORY MUNTON
(Masters Research Student)

APPENDIX H

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 _____
(in block letters)

Signature _____

PARENT/GUARDIAN* Name _____
(in block letters)

Signature _____

WITNESS Name _____
(in block letters)

Signature _____

RESEARCH STUDENT Name _____
(in block letters)

Signature _____

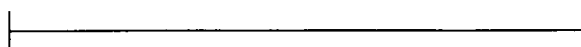
APPENDIX I

SHORT-FORM MCGILL PAIN QUESTIONNAIRE RONALD MELZACK

PATIENT'S NAME: _____ Date: _____

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

NO
PAIN



WORST
POSSIBLE
PAIN

PPI

- 0 NO PAIN _____
- 1 MILD _____
- 2 DISCOMFORTING _____
- 3 DISTRESSING _____
- 4 HORRIBLE _____
- 5 EXCRUTIATING _____

APPENDIX J

ACCOMPANYING SYMPTOM QUESTIONNAIRE

For each question, place a cross in the column that best describes how you feel.

	Always	Sometimes	Never
1. Is the stool looser with onset of pain?			
2. Is the bowel movement more frequent with onset of pain?			
3. Is the pain eased after a bowel movement?			
4. Do you experience bloating of the abdomen?			
5. Do you feel bloated?			
6. Do you pass mucus per rectum?			
7. Do you experience a feeling of incomplete emptying?			
8. Is there bowel motion before breakfast?			
9. Does the abdominal pain awake you?			
10. Does the bowel motion awake you?			
11. Do you experience urgency defecation?			
12. Is the pain eased with flatus (passing gas)			
13. Is the stool hard and small (pellet-like)?			
14. Do you experience any weight fluctuation?			
15. Do you experience any constipation?			
16. Do you experience diarrhoea?			
17. Does your constipation alternate with diarrhoea?			
18. Are your symptoms worse with periods of stress?			

APPENDIX K1

LIFE LINE PIETERMARITZBURG STRESS QUESTIONNAIRE

ARE YOU UNDER STRESS?

Find out whether you are under stress by completing the questionnaire. Respond to each statement quickly; do not think too much about each one. Your first thought about the frequency of behaviour is usually the most accurate.

NO.	YOUR BEHAVIOUR	OFTEN	A FEW TIMES A MONTH	RARELY
1.	I have indigestion	2	1	0
2.	I have difficulty finding enough time to relax	2	1	0
3.	I smoke when I feel tense	2	1	0
4.	People at work make me feel tense	2	1	0
5.	I sleep badly	2	1	0
6.	I find it difficult to concentrate on what I am doing because I worry about other things	2	1	0
7.	I feel anxious	2	1	0
8.	I eat more when anxious	2	1	0
9.	I have headaches	2	1	0
10.	People at home make me feel tense	2	1	0
11.	I have aches & pains in my neck & shoulders	2	1	0
12.	Even if I find time to relax, it is hard for me to relax	2	1	0
13.	I drink when I feel tense	2	1	0
14.	My day is made up of deadlines	2	1	0
15.	I can't turn off my thoughts for long enough at night to feel refreshed the next day	2	1	0
16.	I take tranquillisers (or drugs) to relax	2	1	0
17.	I feel my heart beats fast	2	1	0
18.	My legs feel wobbly	2	1	0
19.	I perspire without even exercising	2	1	0
20.	I get angry/irritated quickly	2	1	0
21.	I am impatient and become frustrated with others	2	1	0
22.	I do things in a hurry	2	1	0
23.	I talk quickly	2	1	0
24.	I worry that there are so many things I can do nothing about	2	1	0
25.	I cannot sit still for long	2	1	0
TOTAL				

SCORING:

- 30-50 = CONSIDERABLY ABOVE AVERAGE LEVEL OF STRESS
- 15-29 = ABOVE AVERAGE
- 10-14 = AVERAGE
- 5-9 = BELOW AVERAGE
- 0-4 = CONSIDERABLY BELOW AVERAGE

Are you under stress?

Find out whether you are under stress by completing this questionnaire. Respond to each statement quickly; do not think too much about each one. Your first thought about the frequency of the behaviour is usually the most accurate.

Your behaviour	Often	A few times a month	Rarely
1 I have indigestion	2	1	0
2 I have difficulty finding enough time to relax	2	1	0
3 I smoke when I feel tense	2	1	0
4 People at work/school make me feel tense	2	1	0
5 I sleep badly	2	1	0
6 I find it difficult to concentrate on what I am doing because of worrying about other things	2	1	0
7 I feel anxious	2	1	0
8 I eat more when anxious	2	1	0
9 I have headaches	2	1	0
10 People at home make me feel tense	2	1	0
11 I have aches and pains in my neck or shoulders	2	1	0
12 Even if I find time, it is hard for me to relax	2	1	0
13 I drink when I feel tense	2	1	0

APPENDIX K2

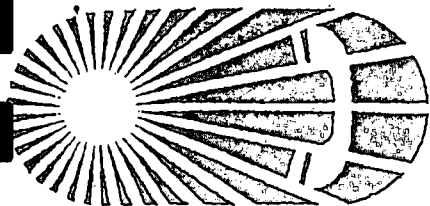
Your behaviour	Often	A few times a month	Rarely
14 My day is made up of many deadlines	2	1	0
15 I can't turn off my thoughts for long enough at night or weekends to feel relaxed/refreshed next day	2	1	0
16 I take tranquillisers (or other drugs) to relax	2	1	0
17 I feel my heart beats fast	2	1	0
18 My legs feel wobbly	2	1	0
19 I perspire without even exercising	2	1	0
20 I get angry/irritated quickly	2	1	0
21 I am impatient and become frustrated with others	2	1	0
22 I do things in a hurry	2	1	0
23 I talk quickly	2	1	0
24 I worry that there are so many things I can do nothing about	2	1	0
25 I cannot sit still for long	2	1	0

Scoring 30 - 50 = considerably above average
 15 - 29 = above average
 10 - 14 = average
 5 - 9 = below average
 0 - 4 = considerably below average

If you score more than 10, you must work through this book. It will help you to minimise the stress you are feeling, improve your health, and help you to have a more satisfying and happier life.

If you score less than 10, you will be able to maintain your low stress level by using the advice and activities in this book.

APPENDIX K3



Life Line

LIFE LINE - PIETERMARITZBURG

Fund Raising No. 06 60068 000



383 BULWER STREET
PIETERMARITZBURG 3201



944444 (Counselling)
424447 (Office)



TOL FREE AIDS HOT LINE
0800 - 012322

9 December 1998

Rory Munton
Fax: 031 3064238

Dear Rory,

Stress questionnaire

I enclose a copy of the stress questionnaire "Are you under Stress?" This was taken out of the book *Coping with stress by Robert Burns*.

We have been using an almost identical questionnaire as part of our stress management course for the past 4 years. I have used the questionnaire in conjunction with two others with great success. The other two questionnaires used are :

- 1 The stress index (rates the stressful circumstances in the persons life)
- 2 The locus of control (helps the person to identify their attitude towards the amount of control they believe have over their lives)

To date I must have used the questionnaire on about 400 people, I have experienced the questionnaire as very accurate. Most often people agree the questionnaire is a fair reflection of their stress level. However, the other two test are necessary in identifying the reasons why individuals are stressed.

I would certainly recommend the questionnaire and wish you well with your research.

Yours faithfully,

D.S.HARRISON
DIRECTOR