THE ROLE OF ESSENTIAL OILS IN THE MANAGEMENT OF MECHANICAL LOW BACK PAIN

By

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This dissertation represents my own work, both in conception and execution

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ABSTRACT

The purpose of this study was to investigate the effects of essential oils, applied by means of effleurage massage, in the treatment of mechanical low back pain, in terms of the patient's physical and psychological responses to the essential oils, in order to determine the role of essential oils in the management of mechanical low back pain.

The sample size consisted of 20 patients with mechanical low back pain, and were randomly divided into a control and experimental group. The patients were treated over 30 days, with 8 treatments in total. The control group received effleurage massage with the carrier oil (almond oil), and the experimental group received application of the essential oils (chamomile and lavender) added to the carrier oil (almond oil). One week after the final treatment, the patients were re-evaluated. Outcome measures included the recording of the patients' general well-being (by means of the General Well-being Schedule) only at the initial consultation and the final consultation. Before each treatment, the patients were required to complete the Numerical Pain Rating Scale to subjectively determine the patients' perception of pain, and the researcher recorded the patients' dorsolumbar range of motion by means of a goniometer, to objectively determine the total impairment of whole man. The results were analysed statistically within each group, as well as between the two groups, by means of the Wilcoxon Signed Rank Test and the Mann-Whitney U-test, each at a significance level of 5% .

As regards pain, both groups showed a significant decrease in pain between treatment 1 and treatment 8, with a maintenance of the significant decrease between treatment 8 and the final consultation. No significant difference was noted between the two groups.

As regards total impairment of whole man, the control group did not display a significant decrease between treatment 1 and treatment 8, whereas the experimental group did. The experimental group also displayed a maintenance of this significant decrease between treatment 8 and the final re-evaluation consultation. The experimental group, however did not have a significant difference between the final re-evaluation consultation and treatment 1 ($P = 0.050$), so indicating with the number of negative differences outweighing the number of positive differences, that the total impairment of whole man is on the border of swinging back to what it was before treatment commenced.

With regard to pain levels, both groups responded favourably. With regard to total impairment of whole man, the control group did not respond favourably, whereas the experimental group did.

Effleurage massage of patients suffering from mechanical low back pain, is significantly beneficial in the management of these patients, in terms of the patients pain levels. Effleurage massage of patients suffering from mechanical low back pain, with the essential oils of chamomile and lavender, added to almond oil, is beneficial in the management of these patients, in terms of the decrease in the total impairment of whole man and the decrease in the patients' pain levels.

UITTREKSEL

Die doel van hierdie studie was om ondersoek in te stel na die uitwerking van vlugtige olies wat aangewend is met behulp van effleurasiemassering vir die behandeling van meganiese onderrugpyn, gemeet aan die pasiënt se fisiese en psigiese reaksie op die vlugtige olies, om te bepaal watter rol vlugtige olies in die behandeling van meganiese onderrugpyn speel.

Die steekproef het bestaan uit 20 pasiënte met meganiese onderrugpyn. Die pasiënte is lukraak ingedeel in 'n kontrolegroep en proefgroep. Die pasiënte is behandel oor 'n tydperk van 30 dae, met agt behandelings altesaam. Die kontrolegroep het effleurasiemassering met die draerolie (amandelolie) ontvang, terwyl vlugtige olies (kamille en laventel) wat by die draerolie (amandelolie) gevoeg is, op die proefgroep aangewend is. Die pasiënte is 'n week na die laaste behandeling weer geëvalueer. Die resultate wat gemeet is, het die aanteken van die pasiënt se algemene welsyn ingesluit (met behulp van die Algemene Welsynsopgawe) (die aanteken van sodanige inligting het egter net tydens die eerste en laaste konsultasie geskied). Voor elke behandeling moes die pasiënte 'n Kwantitatiewe Pynevalueringskaalvorm invul om hul gewaarwording van pyn subjektief te bepaal. Voorts het die navorser die pasiënte se dorsolumbaie bewegingsreeks met behulp van 'n goniomater aangeteken om die totale verswakking van die persoon in die geheel objektief te bepaal. Die resultate is statisties met behulp van die Wilcoxon-Gerigte-Rangordetoets en die Mann-Whitney-U-toets binne elke groep, sowel as tussen die twee groepe, ontleed, elk met 'n betekenisvlak van 5%.

Wat pyn betref, het albei groepe 'n noemenswaardig afname in pyn vanaf behandeling 1 tot behandeling 8 ondervind. Die betekenisvolle afname is gehandhaaf vanaf behandeling 8 tot die laaste konsultasie. Geen noemenswaardige verskil tussen die twee groepe is gemerk nie.

Wat die totale verswakking van die persoon in die geheel betref, het die kontrolegroep nie 'n noemenswaardige afname vanaf behandling 1 to behandelilng 8 ondervind nie, terwyl dit in 'n mate by die proefgroep afgeneem het. Hierdie noemenswaardige afname vanaf behandeling 8 tot die laaste herevalueringskonsultasie is ook gehandhaaf by die proefgroep. By die proefgroep was daar nie 'n noemenswaardige verskil tussen die laaste herevalueringskonsultasie en behandeling 1 nie ($P = 0.050$), en dat die getal negatieve verskille die getal positiewe verskille oortref het, dui daarop aan dat die totale aantasting op die rand was om terug te swaai na wat dit was voordat behandeling 'n aanvang geneem het.

Wat pynvlakke betref, het albei groepe gunstig gereageer. Wat die totale veswakking van die persoon in die geheel betref, het die kontrolegroep nie gunstig gereageer nie. Die proefgroep daarenteen, het wel gunstig gereageer.

Wat die pasiënte se pynvlakke betref, is effleurasiemassering van pasiënte wat las het van meganiese onderrugpyun baie voordelig vir die behandeling van hierdie pasiënte. Effleurasiemassering van pasiënte wat las het van onderrugpyn, met behulp van vlugtige olies (kamille en laventel) wat by amandelolie gevoeg is, is voordelig vir die behandeling van hierdie pasiënte, nie net wat die afname in die totale verswakking van die persoon in die geheel betref nie, maar ook wat die afname in die pasiënte se pynvlak betref.

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1.1 STATEMENT OF THE PROBLEM

This controlled study proposes to investigate the effects of essential oils, applied by means of effleurage massage, in the treatment of mechanical low back pain, in terms of the patient's physical and psychological responses to the essential oils, in order to determine the role of essential oils in the management of mechanical low back pain.

1.2 SUBPROBLEMS

1.2.1 The First Subproblem

The first subproblem is to evaluate the effects of essential oils, applied by means of effleurage massage, in terms of the patient's physical response to the treatment, in order to determine the physical changes that may occur, in the use of essential oils in the management of mechanical low back pain.

1.2.2 The Second Subproblem

The second subproblem is to evaluate the effects of essential oils, applied by means of effleurage massage, in terms of the patient's psychological response to the treatment, in order to determine the psychological changes that may occur, in the use of essential oils in the management of mechanical low back pain.

1.2.3 The Third Subproblem

The third subproblem is to integrate the patient's physical and psychological responses to essential oils, applied by means of effleurage massage, in order to determine the role of essential oils in the management of mechanical low back pain.

1.3 HYPOTHESES

1.3.1 The First Hypothesis

It is hypothesized that the use of essential oils in the treatment of mechanical low back pain will result in a reduction in the patient's perception of pain, as well as an increase in the patient's range of motion.

1.3.2 The Second Hypothesis

It is hypothesized that the use of essential oils in the treatment of mechnical low back pain will result in an increased level of the patient's perception of well-being.

1.3.3 The Third Hypothesis

It is hypothesized that the favorable physical and psychological effects of essential oils in the treatment of mechanical low back pain, will demonstrate the efficacy of the use of essential oils in the management of mechanical low back pain.

1.3.4 The Fourth Hypothesis

It is hypothesized that the carrier oils used in this controlled study will have no significant physical or psychological effects.

1.4 DELIMITATIONS

- Patients suffering from conditions other than mechanical low back pain, the symptomatology of which could include back pain, will be excluded from this study.
- Patients who present with neurological involvement, acute inflammatory reaction or muscle guarding, will be excluded from the study.
- Patients who have had spinal surgery will be excluded from the study.
- Patients who show contraindications to any of the essential oils to be used in this study, will be excluded from the study.
- Patients who are under the age of fourteen will not be considered for the study.

1.5 ASSUMPTIONS

- The patient's recovery rate is due to the effects of the essential oils, and not due to the natural history of the patient's condition.
- The patient is compliant with any instructions, given by the practitioner.
- The patient's occupation will not be considered as having an influence on the patient's response to the

treatment received.

- Carrier oils have no physical or psychological effects in the treatment of mechanical low back pain.

1.6 DEFINITIONS

ESSENTIAL OIL

An essential oil is any of various volatile oils in plants, having the odour and flavour of the plant from which they are derived.

EFFLEURAGE MASSAGE

Effleurage massage is massage using stroking superficial movements.

MECHANICAL BACK PAIN

Mechanical back pain, is back pain not due to organic causes, but is associated with degenerative changes of the spine, as defined by Kirkaldy-Willis (1988).

PHYSICAL RESPONSE

The physical response is the patient's dorsolumbar range of motion and the patient's perception of pain.

PSYCHOLOGICAL RESPONSE

The psychological response is the patient's level of general well-being.

TREATMENT

Treatment is the application of essential oils, in a carrier oil, by means of effleurage massage, or in the case of the control group, it is the application of the carrier oil only, by means of effleurage massage.

MANAGEMENT

Management includes those treatment protocols and patient education approaches to each individual health discipline in the treatment of mechanical low back pain.

CONTROLLED STUDY

A controlled study is a study which has a control group and an experimental group, and for the purpose of this study, the control group will receive effleurage massage with the carrier oil only, and the experimental group will receive effleurage massage with the carrier oil containing essential oils.

CARRIER OIL

A carrier oil is an oil which is used as a base to which the essential oils are added.

1.7 IMPORTANCE OF THE STUDY

1.7.1 Background Of The Problem

Many forms of pain control, such as electrotherapy modalities and acupuncture, are available to the physical therapist in the treatment of mechanical low back pain. These forms of pain control have a purely physical effect on the patient. Specific essential oils, used in aromatherapy, have analgesic properties, as well as beneficial psychological effects, but their effects on mechanical low back pain, as well as their role in the management of mechanical low back pain, has not been researched. (see Appendix A and Appendix B)

1.7.2 Need For A Solution To The Problem

The role of essential oils in the management of mechanical low back pain has not been researched. As essential oils not only have a physical effect, but also a beneficial psychological effect, they could be of value as an adjunctive form of pain control, especially in cases where patients react adversely to other forms of pain control.

1.7.3 Description Of The Solution

This study proposes to investigate the use of essential oils in the management of mechanical low back pain, by application of effleurage massage, as there are specific essential oils which have analgesic properties as well as psychological properties. The patient is to be assessed in terms of their subjective perception of pain and general well-being, as well as the objective measurement of their dorsolumbar range of motion. Included in this study will be a control group,

which will not be exposed to essential oils at all, but to the base oil applied by effleurage massage. Essential oils are relatively inexpensive, and readibly available to the public.

1.7.4 Benefits

The use of essential oils, not only addresses pain relief, but also the psychological well-being of the patient. This is an advantage over other forms of pain control, which do not have psychological effects. A reduction in pain, an increase in the range of motion, as well as the beneficial psychological effects, will contribute to the patients recovery rate and their sense of well-being, and so giving the management of mechanical low back pain a wider approach. Furthermore, the reduction in pain and increased range of motion, with a faster recovery rate, will decrease the treatment costs, as treatment would be of shorter duration, and decrease the number of manhours lost due to mechanical low back pain. Patient's are also able to administer the essential oils at home, thus there being self therapy.

1.7.5 Feasibility of The Solution

- essential oils are relatively inexpensive, readibly available to the public, and easily applied by both the physician and the patient
- the chiropractic day clinic where this study is to be conducted, is on the Berea campus of Technikon Natal
- the patients may be students, staff or outsiders

- Chiropractor's employed by the Technikon, will be there to supervise the treatment applied.
- the Beauty Technology department is on campus, and teach aromatherapy, and are able to help in supplying the essential oils, as well as being able to give any assistance that may be needed.

CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1 PAIN

Lehman et al (1986), state that low back pain is one of the most common ailments in Western Society, and that 80% of all adults have significant back pain during their lifetime. Low back pain is one of the most costly ailments to society in terms of medical expenses and lost worktime.

A summary of studies, concerning the conditions seen by chiropractors, shows that 68% of all patients have spinal problems, and 35% of these suffer from low back pain. (Manipulative Therapeutics lecture to 4th year chiropractic students, 1992, by Dr. A.G. Till).

Pain is difficult to define, and the usual response to that issue, is to use a synonymous term such as hurt or unpleasant sensation. A basic factor in the development of pain is when tissue integrity is threatened. Individual sensitivity to pain varies strikingly, and variations in tolerance to pain are not only a matter of different sensory thresholds but are at least partly related to emotional attitudes. The areas of the brain especially involved in the elaboration of emotions are the limbic lobe and considerable extents of the frontal cortex (Frederick and Kerr, 1981).

A well-known mechanism in the production of pain is the tension pain mechanism. If muscles are exercised in the absence of adequate circulation, they will give rise to discomfort and even very severe pain. The common hypothesis is that inadequate removal of waste products from the tissues provides noxious stimulation which is painful. Unaccustomed exercise of almost any bodily part,

especially under conditions of emotional tension, may give rise to pain which is attributable to muscle contraction (Merskey, 1984).

Ian McDowell and Claire Newell (1987), have shown that pain is a private and internal sensation that cannot be directly observed or measured, but whose measurement depends wholly on the subjective response of the person experiencing it. The measurement represents a blend of the strength of the underlying pain and of the person's emotional response to it. The way in which pain is reported, is influenced by many factors :

i) Biologically, there is a linear relationship between pain and extent of tissue damage - minor damage may give rise to intense pain, and vice versa.

ii) Some of the cultural factors are: sex, upbringing, personality and age.

The Collins Concise Dictionary Plus (1991), defines pain as the sensation of acute physical hurt or discomfort caused by injury, and illness.

Pain impulses may refer locally to perpetuate muscle spasm. While the primary function of muscles is to produce movement, muscles can also effectively restrict motion. Muscle spasm is universally acknowledged as a factor in the genesis of back pain. Range of motion is considered as the range of translation and rotation of a joint for each of its six degrees of freedom. With range of motion testing, the patient is asked only to go as far as pain will allow. Inferences may be drawn about limits from the pain of stretching injured muscles on limits imposed by joint locking. The more serious the injury, the greater the limitation imposed on motion. Muscle spasm that accompanies simple articular blockage is commonly due to

protective muscle splinting, which reflexly protects joints adjacent to the locked joints when they are required to provide compensatory mobility for the blocked articulation. Spinal movements are limited in direct proportion to the amount of spasm present (Gatterman, 1990).

2.2 MECHANICAL BACK PAIN

Mechanical back pain, is back pain not due to organic causes, but is associated with degenerative changes of the spine, as defined by Kirkaldy-Willis (1988), and he describes the following diagnostic classification:

1. The facet syndrome
2. The sacro-iliac syndrome
3. Maigne's syndrome
4. Disc herniation
5. Lateral stenosis
6. Central stenosis
7. Myofascial pain syndromes:
   - Gluteus medius
   - Gluteus maximus
   - Piriformis
   - Tensor fascia latea
   - Quadratus lumborum

Gatterman (1990) also classifies facet joint fixation in the dorsolumbar spine, as mechanical back pain. According to her, acute lumbar strain, which is the most common diagnosis for low back pain, involves stretching and tearing of spinal muscles and their attachments, resulting from muscle contraction associated with

uncontrolled movement or direct trauma to the back. Minor muscle strain can occur with overuse following unaccustomed repetitive tasks. This results in low back pain and stiffness, through the increased demands of muscle activity. Acute lumbar strain progresses to chronicity with repeated episodes of partial tears of spinal muscles and their attachments. With time the pathological changes of degenerative joint disease begin to complicate the low back dysfunction.

Disability in low-back pain can be understood in terms of physical impairment, psychological distress, and illness behavior (Waddell et al, 1984).

2.3 THE PSYCHOLOGY OF PAIN

Kirkaldy Willis (1988) describes in the pathogenesis of mechanical back pain various contributing emotional disturbances, namely: tension, anxiety, uncertainty, depression, stress, fear and resentment. Price (1987) also comments about how the mind can affect the state of the body and various other authors also comment on the emotions that may accompany pain:

McDowell and Newell (1987) report that anxiety and fear, may often accompany pain.

France et al (1986) recognise depression as a psychopathological disorder in chronic low back pain.

Oostdam and Duivenvoorden (1987) found a relationship between psychological factors and the duration of back pain.

Egan and Betrus (1987) acknowledged psychological distress amongst individuals suffering from chronic pain syndromes.

Krishnan and France (1987) established that patients with chronic pain syndromes often have concomitant depression. When chronic pain, i.e. pain occurring for more than six months, is the major complaint, then depression is found in 10% to 80% of patients. In most patients the pain preceeds the depression, with the onset of depression often being as long as one to two years after the onset of pain.

Sternbach (1977) describes anxiety as accompanying acute pain, and depression as accompanying chronic pain.

Goldstein (1986) maintains that pain is rarely all in the mind than in the body, but rather a byproduct of a rich interaction of the two.

Emotional disturbances and marital disturbances were even found in spouses of chronic low back pain patients (Ahern, Adams and Follick 1985).

From the above reviewed literature, it is apparent that there is a correlation between pain and psychological distress.

According to McDowell and Newell (1987), treatment for pain should reflect the multiple influences (biological, social and psychological) on the pain experience.

2.4 TREATMENT OF MECHANICAL LOW BACK PAIN

The treatment modalities available to the chiropractor for the auxiliary treatment of mechanical back pain, include a host of physiological therapeutics, such as heat, cryotherapy, electrotherapy,

meridian therapy, ultrasound and spinal traction.

These modalities serve to control pain and enhance healing, however no psychological benefits/effects have been reported for these modalities (Gatterman,1990).

The purpose of treatment in acute lumbar strain, is to remove the stimulus for muscle spasm, and the patient should be palpated for facet joint locking, and manipulation should be appropriately applied. Physical therapy including ice and ultrasound reduces the pain and muscle spasm. Treatment of chronic lumbar strain must be directed to the involved muscles. The involved muscles respond to ultrasound, deep tissue massage and exercise. Manipulation of locked joints should not be used routinely to reduce reflex muscle spasm. Anything that interferes with the physiological relaxation of muscle will start a vicious cycle of spasm-pain-spasm (Gatterman, 1990).

Massage is indeed indicated to relieve certain kinds of pain. The effects of massage are not only psychological and reflexive in nature. Massage stimulates the exteroceptors of the skin and proprioceptive receptors of the underlying tissues as well as finger pressure to the acupuncture points. Relief of pain is brought about through any one of these effects, or by a combination of any of them. Mechanically, massage assists the venous flow of blood, encourages lymphatic flow, reduces certain types of oedema, provides gentle stretching of tissue and relieves subcutaneous scar tissue (Tappan, 1984).

According to MacNish, touch provides an astonishing amount of pain relief, and massage is one way of stimulating the large diameter (non-pain) nerve fibres, which close the pain gate, and so altering or

blocking pain signals.

Essential oils have been reported to have psychological as well as physical effects, but according to David Tagg (personal communication, 1992; Appendix A) and Robert Tisserand (personal communication, 1992; Appendix B), there is no information available on essential oils for musculoskeletal dysfunction of any kind, though information on the psychological effects of essential oils is vast.

2.5 ESSENTIAL OILS

2.5.1 Introduction

An essential oil is any of the various volatile oils in plants (Collin's Concise Dictionary Plus, 1989), and are also known as the hormones of plants (Price, 1987). Essential oils act upon the mind and body, and when they affect the mind, they have a spill-over effect to the body, as the limbic system has an interaction with the hypothalmus, which in turn can govern bodily functions (Beard, Aromatherapy Aide Memoire Series Number 1).

Essential oils are non-invasive to the human body as they are made of the same material, as the the aromatic chemicals found in essential oils are derived from phenylpropane, and these are the precursors of amino-acids , which link to make the proteins which provide the building blocks for just about anything in the human body from the smallest enzyme to the skeleton (Valerie Ann Worwood, 1990).

The knowledge of essential oils, and the use thereof on the body, dates back at least 2000 years before Christ, and even the Bible records the use of plant oils in the treatment of illnesses (Price,

1987). Also, the Egyptians, Chinese, Greeks and Romans made extensive use of the essential oils, and eventually the idea spread to Britain. Today the use of essntial oils is known worldwide, and many books based on experience and case histories, have been written on their uses and application.

2.5.2 Extracting Essential Oils

Essential oils are extracted from certain varieties of trees, shrubs, herbs, grasses and flowers, and depending on the plant, the essential oil is stored in specialised oil or resin cells, glandular hairs, cells or scales which have single or multi-cell pockets or tiny reservoirs, either in the roots, stems, barks, leaves and/or flowers in varying quantities.

Various methods are employed to extract the oil from the plant, depending on the particular species. The most common method is steam distillation, although other important methods are solvent extraction, expression, enfleurage and maceration. Newer methods are presrently being devised.

On average, an essential oil contains one hundred components - mainly - terpenes, alcohols, esters, aldehydes, ketones and phenols. A chemist is able to break the oils down into these components, but aromatherapists use them in their natural "mixed" state (when they are called terpenoids, because terpenes are present in the greatest quantity)(Price, 1987, Worwood, 1990).

2.5.3 Essential Oils And Back Pain

Approximately 300 essential ois are used today by professional practioners, each having its own medicinal and other properties

(Worwood, 1990). For the purpose of this project the following two essential oils were chosen:

- chamomile
- lavender

Chamomile and lavender blend well together, thus having a synergistic action (Sellar, 1992). The anti-inflammatory action of chamomile essential oil is greatly increased by adding lavender essential oil in the correct proportion (Worwood, 1990).

Chamomile

This essential oil is extracted by distillation from the dried chamomile flowers, or the herb. There are two varieties:

- Anthemis nobilis (Roman chamomile)
- Martricaria chamomile (German chamomile)

Both the German and Roman chamomile have the same properties (Sellar, 1992), although the German is mild and the Roman is strong (Jackson, 1986).

The chemical constituents of German chamomile, are aldehyde and sesquiterpene (Sellar, 1992) and it also contains azulene which has remarkable healing and antibacterial powers (Jackson, 1986). The German chamomile contains more azulene than the Roman chamomile (Price, 1987).

As this essential oil is an emmenagogue, it should be avoided in the early months of pregnancy (Sellar, 1992), however the oil has a low toxicity (Price, 1987).

Chamomile has analgesic, antidepressant, antispasmodic, carminative, sedative properties, and as it is a soothing oil, with a fruity apple-like fragrance, it eases anxiety, tension,

anger and fear. It promotes relaxation, gives patience, peace and allays worries.

Its analgesic action eases dull muscular pain, and low back pain responds well to it (Sellar, 1992).

Price (1987) also suggests the use of Chamomile for all muscular aches and pains, anxiety, depression and inflammation.

Jackson (1986), Tisserand (1977) and Beard are in agreement.

Lavender

This is a floral, light and clear essential oil with woody undertones. It is extracted via distillation from the flowers of the lavender shrub, and its Latin name is Lavendula officinalis.

Its chemical constituents are: borneol, geraniol, lavandulyl acetate, linalyl acetate (ester), cineole (ketone), caryophylene (sesquiterpene), limonene, pinene (terpenes).

Some of its properties are: analgesic, antidepressant, antispasmodic, antiviral, bacteriacidel, carminative, decongestant, detoxicant, diuretic, nervine, restorative and sedative.

As this oil too, is an emmenagogue, it should be avoided in the early months of pregnancy.

It has a positive effect on psychological disorders, and results in a calmer approach to life. It also has a balancing action on the central nervous system. Its pain relieving qualities deal effectively with muscular spasm (Sellar, 1992).

Lavender generally acts best in conjunction with another oil, and may be used for muscular aches and pains, anxiety and depression,

general debility and irritability (Price, 1987).

Jackson (1986), claims that lavender has antispasmodic properties, and relieves pain by calming the cerebrospinal area, therefore being able to treat nervous conditions.

The Aromatherapy, Aide Memoire Series, also comments that lavender may be used as a calmative for stress.

Holmes (1992), states that lavender is a harmoniser of opposites and a reconciler of contradictions. Stress that becomes counterproductive on the physiological level involves either the sympathetic or parasympathetic nervous system. Lavender essential oil has been shown to inhibit both sympathetic and parasympathetic nervous system functions. Essential oils work in concert with the individual's vitality, and so the body responds to the oil according to its needs. By selectively inhibiting either sympathetic or parasympathetic nervous excess, lavender can therefore assist our responses to unproductive stress of any kind.

A feature in The International Journal of Aromatherapy (1988), writes about aromatherapy and essential oils being a common presence in several Oxford hospitals. They use the essential oils, mainly lavender, to enhance analgesia, especially when patients suffer from arthritic pain, those who are tense, or those who have some muscle spasm. A bath or a massage with lavender, often works faster than oral analgesia.

CHAPTER THREE

MATERIALS AND METHODS

3.1 THE DATA

The data of this research was of two kinds:

- primary data
- secondary data

The nature of each of these two subtypes of data will be given briefly below.

3.1.1 The Primary Data

- patient's pain level
- patient's perception of their general well-being
- patient's dorsolumbnar range of motion

3.1.2 The Secondary Data

- recognised diagnostic and evaluative criteria pertaining to perception of pain, spinal ranges of motion and general well being

3.2 THE CRITERIA GOVERNING THE ADMISSIBILITY OF THE DATA

- Only the questionaires and numerical pain rating scales completed under the researcher's supervision, or the supervision of the chiropractor in charge, or

any other fith year chiropractic intern, were used.

- Only the range of motion meausurements taken by the researcher, the chiropractor in charge or any other fith year chiropractic intern, were used.
- Data were only used from patients if they had complied with all instructions.

3.3 LOCATION OF THE DATA

The primary data were elicited from the Numerical Pain Rating Scale and the General Well-Being Schedule, answered by the patients, as well as from the dorsolumbar ranges of motion readings, recorded in the clinic.

The secondary data were found in books and journals, available on the Berea Campus of Technikon Natal.

3.4 THE RESEARCH METHODOLOGY

Extensive advertising was undertaken to acquire patients for the study. Patients were either technikon staff, or technikon students or any other outsiders, over the age of 14.

The initial consultation included the taking of a full case history, physical examination and regional low back examination (Appendix C, Appendix D, Appendix E). The patients were then screened and examined for the manifestation of the recognised signs and symptoms of mechanical low back pain, reinforced if necessary by X-ray examination. The patients were also screened for contra-indications to lavender oil (pregnancy) and chamomile oil (pregnancy), as well as

any contra-indications to massage (acute circulatory disorders; acute inflammation; malignancy; oedema secondary to heart decompensation, kidney disease, embolus, obstruction of lymph channels, thrombus; skin conditions such as acute burns, acne, eczema, furuncles, ulcerations, and wounds; communicable disease and hyperesthesia of the skin). The initial consultation also included the recording of the patient's dorsolumbar range of motion, measured with a goniometer (American Medical Association, 1983), and the patient was also required to complete the General Well-Being Schedule (Appendix F) and the Numerical Pain Rating Scale (Appendix G).

The sample size consisted of 20 patients, and the patients who were eligible for the study, were randomly divided into:

i) control group (10 patients)

ii) experimental group (10 patients)

The duration of this project extended over 30 days per patient. The first treatment commenced as soon as possible after the initial consultation, with two to three treatments per week. There were 8 treatments in total, with a final complete re-evaluation one week after the eighth treatment.

The experimental group received application of the essential oils (Formula 1a, Appendix H) using effleurage massage (Appendix I) only.

The control group received application of the carrier oil, using effleurage massage (Formula 1b, Appendix H, and Appendix I) only.

The control group received application of the carrier oil, using effleurage massage (Formula 1b, Appendix H, and Appendix I) only.

For the duration of the three week period during which the patients received treatment, as well as during the first week after the eighth treatment, the patients were instructed to refrain from any unusual activities which may have exacerbated their condition.

Both the patients from the control group and the experimental group, were required to complete the Numerical Pain Rating Scale before each treatment and their dorsolumbar range of motion was also assessed. The final complete re-evaluation, one week after the eighth treatment, included the re-evaluation of any positive findings of the regional low back examination, and also included the recording of the dorsolumbar range of motion, and the patients were required to complete the General Well-Being Schedule as well as the Numerical Pain Rating Scale.

3.5 THE TREATMENT OF THE DATA

The level of pain (derived from the Numerical Pain Rating Scale) and the dorsolumbar ranges of motion (measured with a goniometer), were needed in order to solve the first subproblem, which is to evaluate the effects of essential oils, applied by means of effleurage massage, in terms of the patient's physical response to the treatment, in order to determine the physical changes that may occur, in the use of essential oils in the management of mechanical low back pain.

The scores obtained from the General Well-being Schedules, completed by the patients, were needed in order to solve the second subproblem, which is to evaluate the effects of essential oils, applied by means of effleurage massage, in terms of the patient's psychological response to the treatment, in order to determine the psychological changes that may occur, in the use of essential oils in the management of mechanical low back pain.

The Numerical Pain Rating Scales and the General Well-Being Schedules, completed by each patient, were screened to determine that they were correctly completed.

The units on the Numerical Pain Rating Scales, completed by each patient, were then converted into percentages, and these percentages were then recorded seperately for the control and experimental group. See Table 3.1.1 and Table 3.1.2 .

The mean percentage of the pain rating, for each consultation was calculated for both the control and experimental group, and is depicted by Figure 3.1 .

Range of motion measurements for each patient, were recorded in degrees for flexion, left and right lateral flexion, and extension. The percentage impairment for flexion, left and right lateral flexion and extension, was then calculated (Appendix J), and the total impairment of whole man for each patient was calculated, and recorded. See Table 3.2.1 and Table 3.2.2 .

Table 3.1.1

Percentage pain: Control group

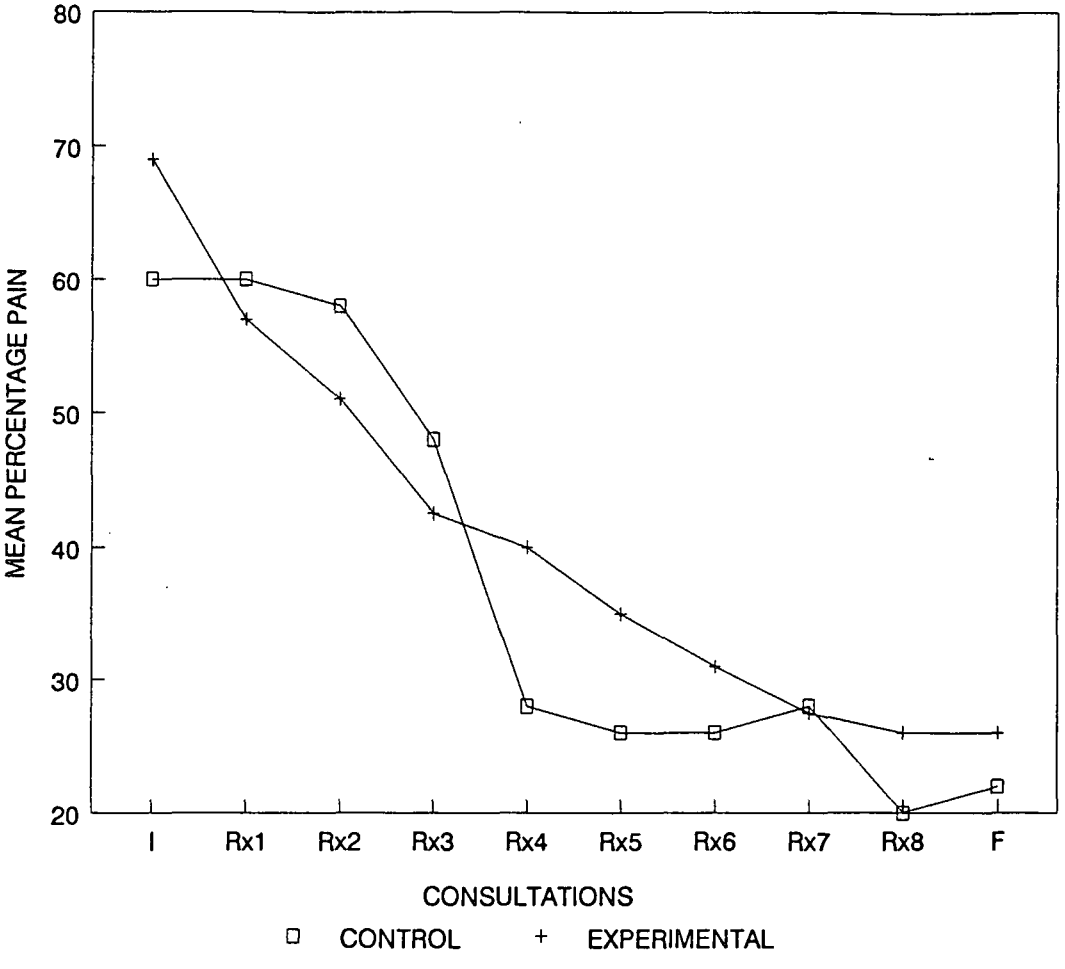
Patient	Initial	Rx 1	Rx 2	Rx 3	Rx 4	Rx 5	Rx 6	Rx 7	Rx 8	Final
1	60	70	50	50	40	40	40	30	30	30
2	70	80	70	50	20	0	10	0	0	20
3	70	80	60	90	50	70	80	90	80	80
4	80	90	90	50	20	10	30	70	10	10
5	40	40	40	30	30	20	20	20	20	20
6	50	40	30	0	0	0	0	0	0	0
7	70	40	60	60	30	30	20	10	10	10
8	40	40	70	60	40	40	40	40	40	40
9	70	40	40	20	20	20	0	0	0	0
10	50	80	70	70	30	30	20	20	10	10
Mean	60	60	58	48	28	26	26	28	20	22

Table 3.1.2

Percentage pain: Experimental group

Patient	Initial	Rx 1	Rx 2	Rx 3	Rx 4	Rx 5	Rx 6	Rx 7	Rx 8	Final
1	60	70	50	60	50	50	40	60	60	40
2	50	80	80	65	50	50	60	45	40	50
3	50	50	40	40	30	40	30	20	10	10
4	80	80	70	50	50	70	50	30	30	20
5	90	20	30	20	20	20	20	20	20	20
6	70	60	60	40	30	0	0	0	20	10
7	100	80	70	60	60	60	60	50	50	50
8	80	40	40	40	40	20	20	20	10	20
9	70	40	30	20	30	20	10	10	10	10
10	40	50	40	30	40	20	20	20	10	30
Mean	69	57	51	42.5	40	35	31	27.5	26	26

Rx = treatment



Rx= treatment I= initial F= final

Figure 3.1

MEAN PERCENTAGE OF PAIN AT EACH CONSULTATION FOR THE CONTROL GROUP AND THE EXPERIMENTAL GROUP.

Table 3.2.1

Range of motion, total impairment of whole man:
Control Group

Patient	Initial	Rx 1	Rx 2	Rx 3	Rx 4	Rx 5	Rx 6	Rx 7	Rx 8	Final
1	8	7	5	7	8	8	6	8	8	8
2	12	10	10	11	8	8	8	7	9	8
3	14	15	12	16	15	16	15	14	12	14
4	10	14	15	17	17	14	15	17	13	16
5	7	7	7	6	6	4	6	7	6	6
6	4	4	5	10	4	5	3	5	7	8
7	15	15	17	18	17	17	17	17	17	15
8	7	7	13	7	10	13	10	8	9	10
9	10	10	10	8	14	11	9	10	9	9
10	10	10	11	15	13	11	14	11	14	14
Mean	9.7	9.9	10.5	11.5	11.2	10.7	10.3	10.4	10.4	10.8

Table 3.2.2

Range of motion, total impairment of whole man:
Experimental Group

Patient	Initial	Rx 1	Rx 2	Rx 3	Rx 4	Rx 5	Rx 6	Rx 7	Rx 8	Final
1	3	5	6	5	5	6	4	2	3	5
2	6	8	9	7	4	2	6	6	8	9
3	5	5	9	8	7	7	6	7	4	8
4	5	5	5	6	5	5	6	6	2	5
5	10	8	9	11	10	10	8	9	8	6
6	7	10	4	6	2	4	2	2	4	5
7	10	10	6	1	5	6	4	4	3	4
8	9	8	9	8	10	7	7	7	5	9
9	9	9	9	9	9	8	10	8	8	8
10	12	7	7	4	2	0	1	2	0	0
Mean	7.6	7.5	7.3	6.5	5.9	5.5	5.4	5.3	4.5	5.9

Rx = treatment

The mean total impairment of whole man, was then calculated for each consultation, and is depicted respectively for the control and experimental group by Figure 3.2 .

The scores obtained from the General Well-Being Schedules were recorded for each patient, at the initial consultation and the final consultation. See Table 3.3.1 (Control group) and Table 3.3.2 (Experimental group).

3.6 STATISTICAL PROCESSING OF THE DATA

The significance of the change in pain, and the significance of the change in impairment of whole man, in each of the control and experimental groups, was analyzed by means of the Wilcoxon Signed Rank Test (at a significance level of 5%), between:

i) Initial consultation and treatment 1

ii) Initial consultation and treatment 8

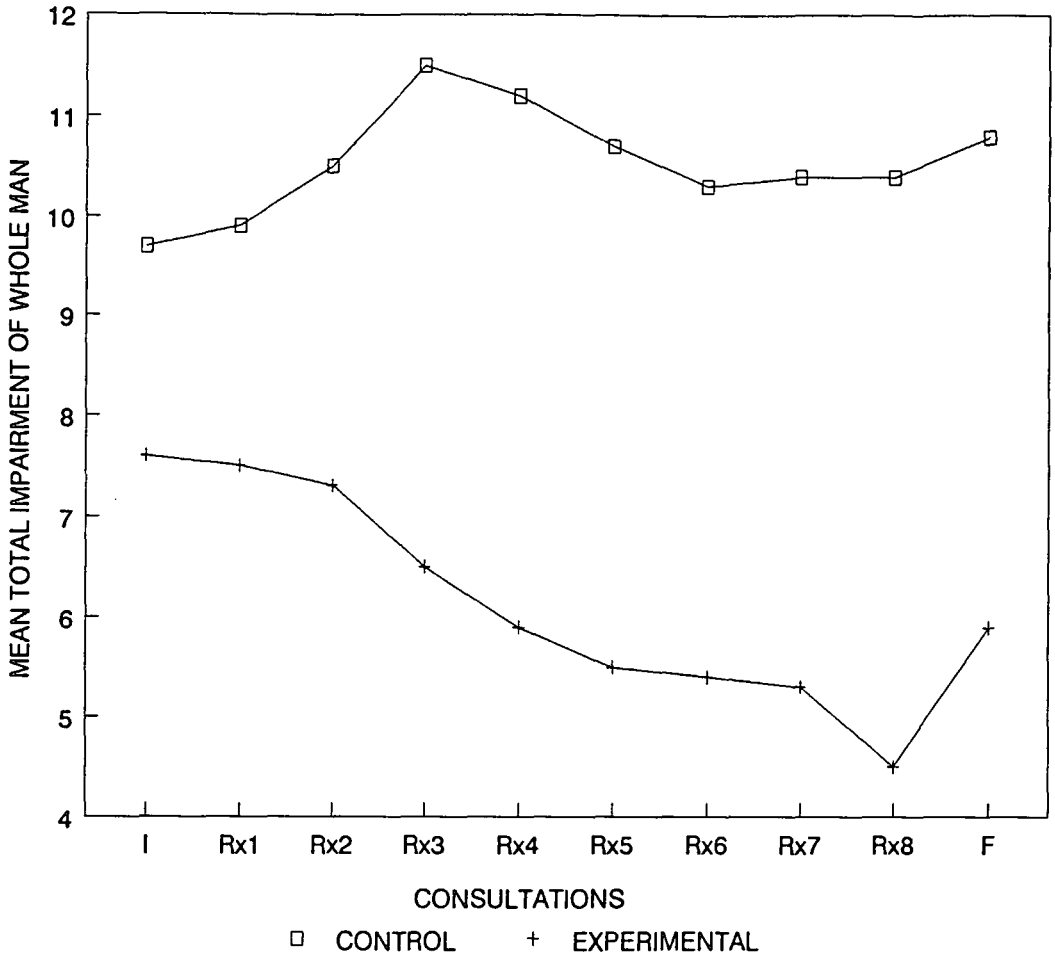
iii) Initial consultation and final consultaiton

iv) Treatment 1 and treatment 8

v) Treatment 1 and final consultation

vi) Treatment 8 and final consultation,

The significance of the change in general well-being, for each of the control and expermental groups, was analyzed by means of the Wilcoxon Signed Rank Test (at a significance level of 5%), between the initial consultation and final consultation.



Rx= treatment I= initial F= final

Figure 3.2

MEAN TOTAL IMPAIRMENT OF WHOLE MAN AT EACH CONSULTATION FOR THE CONTROL GROUP AND THE EXPERIMENTAL GROUP.

Table 3.3.1

General Well-being Scores: Control Group

Patient	Initial	Final
1	73	70
2	57	59
3	82	77
4	93	94
5	67	81
6	71	79
7	63	87
8	36	42
9	81	83
10	92	101
Mean	71.5	77.3

Table 3.3.2

General Well-being Scores: Experimental Group

Patient	Initial	Final
1	55	69
2	47	34
3	61	65
4	86	87
5	87	88.5
6	50	84
7	66	63
8	83	78
9	54	89
10	86	85
Mean	67.5	74.25

The Wilcoxon Signed Rank Test was chosen because of its less restrictive assumptions and near equivalence in sensitivity to the t-test (Siegel, 1956).

The significance of the change in pain, and the significance of the change in total impairment of whole man, between the control and experimental groups, was analyzed by means of the Mann-Whitney U-Test (at a significance level of 5%), at:

i) initial consultation

ii) treatment 1

iii) treatment 8

iv) final consultation,

The significance of the change in general well-being, between the control and experimental group, was analyzed by means of the Mann-Whitney U-Test (at a significance level of 5%), at the initial consultation and the final consultation.

The Mann-Whitney U-test was chosen as it does not have the restrictive assumptions and requirements associated with the t-test, and is the most powerful non-parametric test (Siegel, 1956).

All statistical analysis was executed using the Statgraphics Plus Version 6, supplied by Manugistics, Inc., at the Berea Campus of Technikon Natal.

CHAPTER FOUR

RESULTS

4.1 PAIN

4.1.1 Wilcoxon Signed Rank Test

a) Control Group:

i) Initial consultation and treatment 1, P = 0.834, thus no significant difference;

3 positive differences

5 negative differences

Note: 10 total pairs, 2 tied pairs ignored

ii) Initial consultation and treatment 8, P = 0.009, thus a significant difference;

8 positive differences

1 negative difference

Note: 10 total pairs, 1 tied pairs ignored

iii) Initial consultation and final consultation, P = 0.009, thus a significant difference;

8 positive differences

1 negative difference

Note: 10 total pairs, 1 tied pairs ignored

iv) Treatment 1 and treatment 8, P = 0.010, thus a significant difference;

8 positive differences

0 negative differences

Note: 10 total pairs, 2 tied pairs ignored

v) Treatment 1 and final consultation, P = 0.010, thus a significant difference;

8 positive differences

0 negative differences

Note: 10 total pairs, 2 tied pairs ignored

vi) Treatment 8 and final consultation, P = 0.050, thus no significant difference;

0 positive differences

1 negative difference

Note: 10 total pairs, 9 tied pairs ignored

b) Experimental Group:

i) Initial consultation and treatment 1, P = 0.210, thus no significant difference;

5 positive differences

3 negative differences

Note: 10 total pairs, 2 tied pairs ignored

ii) Initial consultation and treatment 8, P = 0.006, thus a significant difference;

9 positive differences

0 negative differences

Note: 10 total pairs, 1 tied pairs ignored

iii) Initial consultation and final consultation, P = 0.006, thus a significant difference;

9 positive differences

0 negative differences

Note: 10 total pairs, 1 tied pairs ignored

iv) Treatment 1 and treatment 8, P = 0.006, thus a significant difference;

9 positive differences

0 negative differences

Note: 10 total pairs, 1 tied pairs ignored

v) Treatment 1 and final consultation, P = 0.006, thus a significant difference;

9 positive differences

0 negative differences

Note: 10 total pairs, 1 tied pairs ignored

vi) Treatment 8 and final consultation, P = 0.920, thus no significant difference;

3 positive differences

3 negative differences

Note: 10 total pairs, 4 tied pairs ignored

4.1.2 Mann-Whitney U-test

Control Group : Experimental Group

i) Initial consultation, P = 0.280, thus no significant difference

ii) Treatment 1, P = 0.906, thus no significant difference

iii) Treatment 8, P = 0.261, thus no significant difference

iv) Final consultation, P = 0.353, thus no significant difference

4.2 TOTAL IMPAIRMENT OF WHOLE MAN

4.2.1 Wilcoxon Signed Rank Test

a) Control Group:

i) Initial consultation and treatment 1, P = 0.715, thus no significant difference;

2 positive differences

2 negative differences

Note: 10 total pairs, 6 tied pairs ignored

ii) Initial consultation and treatment 8, P = 0.286, thus no significant difference;

4 positive differences

5 negative differences

Note: 10 total pairs, 1 tied pairs ignored

iii) Initial consultation and final consultation, P = 0.272, thus no significant difference;

3 positive differences

4 negative differences

Note: 10 total pairs, 3 tied pairs ignored

iv) Treatment 1 and treatment 8, P = 0.445, thus no significant difference;

5 positive differences

5 negative differences

Note: 10 total pairs, 0 tied pairs ignored

v) Treatment 1 and final consultation, P = 0.236, thus no significant difference;

4 positive differences

5 negative differences

Note: 10 total pairs, 1 tied pairs ignored

vi) Treatment 8 and final consultation, P = 0.345, thus no significant difference;

2 positive differences

4 negative differeneces

Note: 10 total pairs, 4 tied pairs ignored

b) Experimental Group:

i) Initial consultation and treatment 1, P = 0.834, thus no significant difference;

3 positive differences

3 negative differences

Note: 10 total pairs, 4 tied pairs ignored

ii) Initial consultation and treatment 8, P = 0.021, thus a significant difference;

8 positive differences

1 negative difference

Note: 10 total pairs, 1 tied pairs ignored

iii) Initial consultation and final consulataion, P = 0.327, thus no significant difference;

5 positive differences

3 negative differences

Note: 10 total pairs, 2 tied pairs ignored

iv) Treatment 1 and treatment 8, P = 0.010, thus a significant difference;

8 positive differences

0 negative differences

Note: 10 total pairs, 2 tied pairs ignored

v) Treatment 1 and final consultation, P = 0.183, thus no significant difference;

5 positive differences

3 negative differences

Note: 10 total pairs, 2 tied pairs ignored

vi) Treatment 8 and final consultation, P = 0.050, thus no significant difference;

1 positive difference

7 negative differences

Note: 10 total pairs, 2 tied pairs ignored

4.2.2 Mann-Whitney U-test

Control Group : Experimental Group

i) Initial consultation, P = 0.169, thus no significant difference

ii) Treatment 1, P = 0.192, thus no significant difference

iii) Treatment 8, P = 001, thus a significant difference

Average rank of control group = 14.75 based on 10 values

Average rank of experimental group = 6.25 based on 10 values

iv) Final consultation, P = 0.007, thus a significant difference

Average rank of control group = 14.05 based on 10 values

Average rank of experimental group = 6.95 based on 10 values

4.3 GENERAL WELL-BEING

4.3.1 Wilcoxon Signed Rank Test

a) Control Group:

i) Initial consultation and final consultation, P = 0.053, thus no significant difference

b) Experimental Group:

i) Initial consultation and final consultation, P = 0.333, thus no significant difference

4.3.2 Mann-Whitney U-test

Control Group : Experimental Group

i) Initial consultation, P = 0.520, thus no significant difference

Average rank of control group = 11.4

Average rank of experimental group = 9.6

ii) Final consultation, P = 0.880, thus no significant difference

Average rank of control group = 10.75 based on 10 values

Average rank of experimental group = 10.25 based on 10 values

CHAPTER FIVE

DISCUSSION

5.1 PAIN

5.1.1 Wilcoxon Signed Rank Test

a) Control Group:

Between the initial consultation and treatment 1, there is no significant difference, thus the level of pain remained constant until treatment commenced. Between the initial consultation and treatment 8, and treatment 1 and treatment 8, there is a significant difference, and as in both cases the number of positive differences outnumber the number of negative differences, there has been a significant decrease in pain, during the period of treatment. Between the initial consultation and the final consultation, and treatment 1 and the final consultation, there is also a significant decrease in pain. Between treatment 8 and the final consultation, there is no significant difference, thus the significant decrease in pain achieved during the period of treatment, was maintained for approximately 1 week after the last treatment (treatment 8).

b) Experimental Group:

Between the initial consultation and treatment 1 there is no significant difference, thus indicating that the level of pain remained constant until treatment commenced. Between the initial consultation and treatment 8, and treatment 1 and treatment 8, there is a significant difference, with the number of positive differences outweighing the number of negative differences, thus there being a significant decrease in pain during the period of treatment. Between the initial consultation and the final consultation, and treatment 1 and the final consultation, there has been a significant decrease in pain. Between treatment 8 and the final consultation there is no significant difference, and thus the significant decrease in pain achieved during the period of treatment was maintained between the final treatment (treatment 8) and the final consultation.

5.1.2 Mann-Whitney U-Test

Control Group : Experimental Group

At the initial consultation there is no significant difference and at treatment 1 there is no significant difference, indicating that both groups were experiencing a similar level of pain before treatment commenced. At treatment 8 there is no significant difference, and at the final consultation there is no significant difference, indicating that both groups were experiencing a

similar level of pain at the conclusion of treatment.

5.2 TOTAL IMPAIRMENT OF WHOLE MAN

5.2.1 Wilcoxon Signed Rank Test

a) Control Group:

Between the initial consultation and treatment 1 there is no significant difference, thus indicating that the total impairment of whole man remained constant until treatment commenced. Between the initial consultation and treatment 8, and treatment 1 and treatment 8, there is no significant difference, indicating that the total impairment of whole man was not reduced signifcantly with treatment. Between the initial consultation and the final consultation, and treatment 1 and the final consultation there is no significant difference. Between treatment 8 and the final consultation there is no significant difference.

b) Experimental Group:

Between the initial consultation and treatment 1 there is no significant difference, indicating that the total impairment of whole man remained constant until treatment commenced. Between the initial consultation and treatment 8, and treatrment 1 and treatment 8, there is a significant difference, with the number of positive differences outweighing the number of negative

differences, thus indicating a significant decrease in the total impairment of whole man during the period of treatment. Between the initial consultation and the final consultation, and treatment 1 and the final consultation there is no significant difference, thus indicating that the overall effect of treatment was not maintained during the week after the last treatment (treatment 8). However, between treatment 8 and the final consultation, there is no significant difference, which would indicate that the decrease in total impairment of whole man was maintained during the week after the final treatment. The P value is 0.050, and the number of negative differences outweigh the number of positive differences, indicating that the total impairment of whole man is on the border of swinging back to what it was before treatment commenced.

5.2.2 Mann-Whitney U-Test

Control Group : Experimental Group

At the initial consultation and at treatment 1, there is no significant difference, indicating that both groups had a similar total impairment of whole man before treatment commenced. At treatment 8 however, there is a significant difference, with the average rank of the control group being higher than that of the experimental group, indicating that at treatment 8, the experimental group had a smaller total impairment of whole man, than the control group. At the final consultation a significant difference is noted, with the average rank of the control group

being higher than the average rank of the experimental group, indicating that at the final consultation, the experimental group had a smaller total impairment of whole man than the control group.

5.3 GENERAL WELL-BEING

5.3.1 Wilcoxon Signed Rank Test

Between the initial consultation and the final consultation in both the control and experimental group, no significant difference is noted, thus indicating that treatment employed in both the control and experimental group did not change the patient's general well-being significantly.

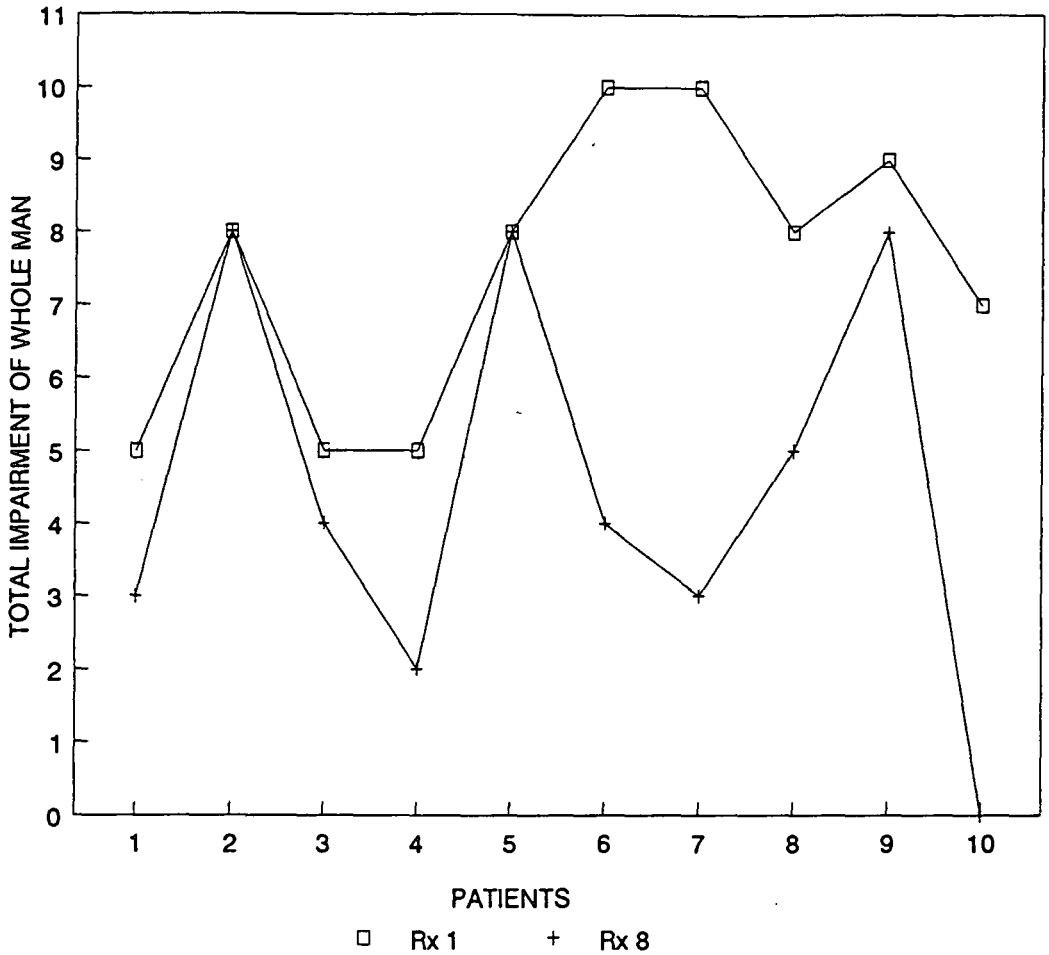
5.3.2 Mann-Whitney U-Test

At the initial consultation, no significant difference is noted, thus the patients of both groups, had a similar level of general well-being before treatment commenced. At the final consultation, no significant difference is noted, thus indicating that both groups had a similar level of general well-being 1 week after the final treatment (treatment 8).

5.4 SUMMARY OF THE DISCUSSION OF THE RESULTS

With regard to the level of pain, both the control and experimental group displayed a significant decrease in pain between the initial consultation and treatment 8, and treatment 1 and treatment 8, and both maintained the significant decrease between treatment 8 and the final consultation. However, no significant difference between the control and experimental group is observed in response to the respective treatments. This partly supports Hypothesis 1.3.1, which states that it is hypothesized that the use of essential oils in the treatment of mechanical low back pain will result in a reduction in the patient's perception of pain, as well as an increase in the patient's range of motion. This does not support Hypothesis 1.3.4, which states that the carrier oils used in this controlled study will have no significant physical effects.

With regard to the total impairment of whole man, the control group did not display a significant decrease between the initial consultation and treatment 8, and treatment 1 and treatment 8; whereas the experimental group did (see Figure 4.1), and also between treatment 8 and the final consultation no statistical significant difference was noted in the experimental group, indicating that the significant decrease of total impairment was maintained during the week after treatment 8, although no statistical significant difference was displayed between treatment 1 and the final consultation. This further indicates that the total impairment of



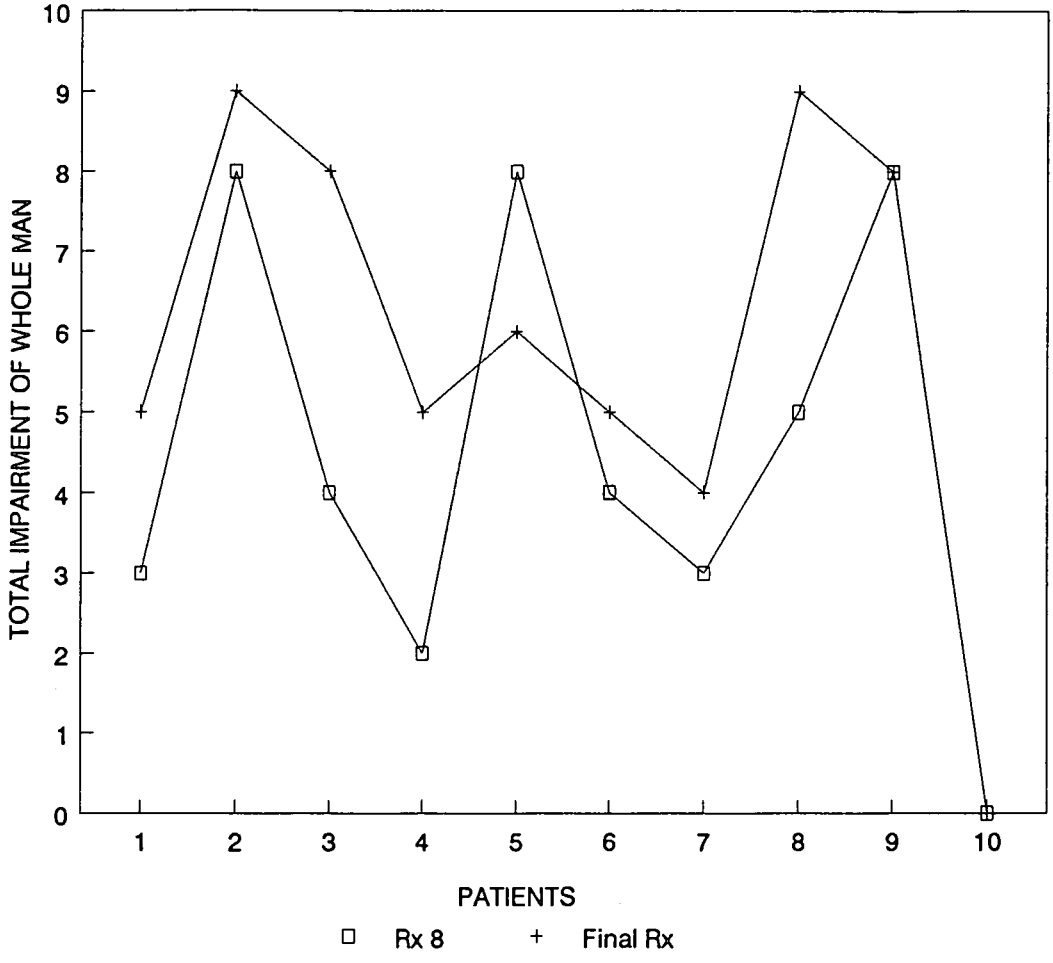
Rx= treatment

Figure 4.1

MULTIPLE X-Y PLOT OF THE TOTAL IMPAIRMENT OF WHOLE MAN AT TREATMENT 1 AND TREATMENT 8 FOR THE EXPERIMENTAL GROUP.

whole man is on the border of swinging back to what it was before treatment commenced. This is displayed by Figure 4.2 and Figure 4.3 . No significant change was noted between the control and experimental group at the initial consultation (see Figure 4.4) and treatment 1, however, a significant change was observed between the control and experimental group at treatment 8 (see Figure 4.5) and also at the final consultation (see Figure 4.6). This partly supports Hypothesis 1.3.1 which states that it is hypothesized that the use of essential oils in the treatment of mechanical low back pain will result in a reduction in the patient's perception of pain, as well as an increase in the patient's range of motion. This also partly supports Hypothesis 1.3.4 which states that it is hypothesized that the carrier oils used in this controlled study will have no significant physical or psychological effects.

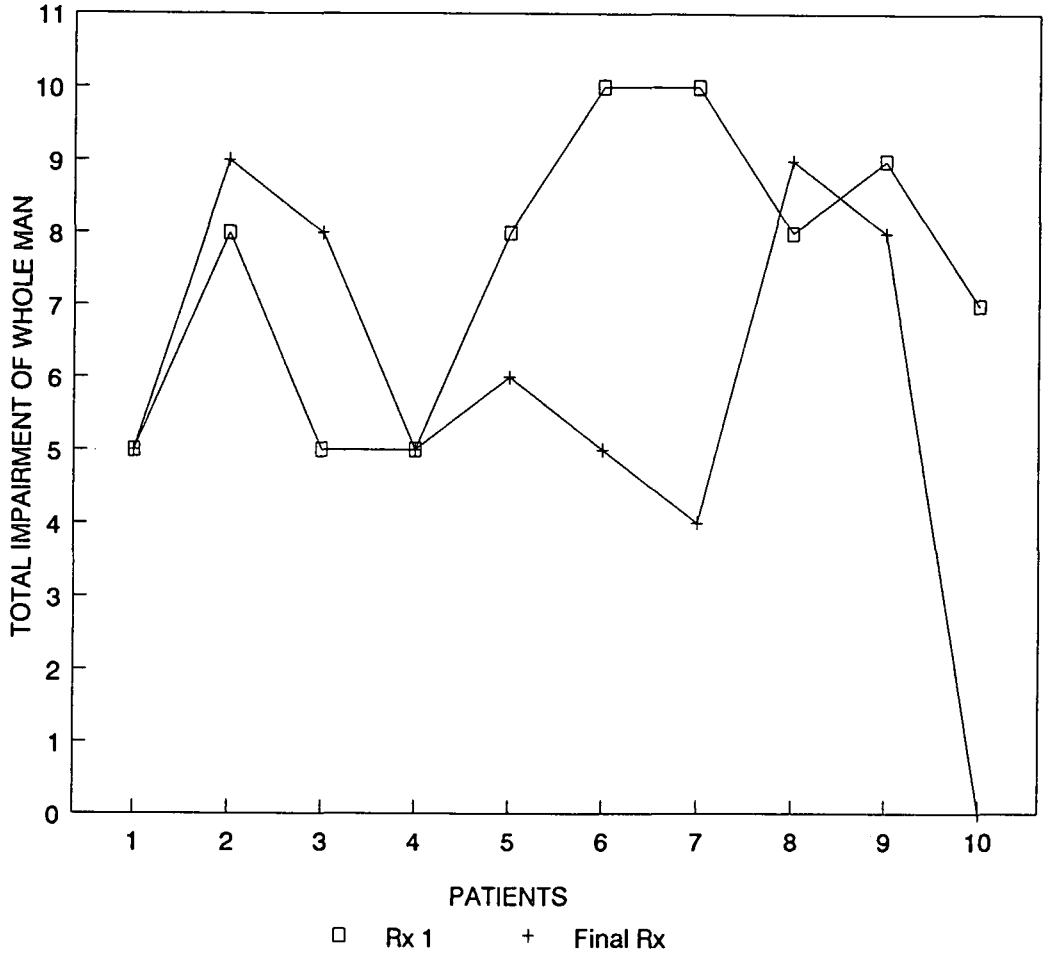
With regard to the general well-being scores, no significant change is noted between the initial and the final consultation in both the control and the experimental groups. Also, no significant change is noted between the groups at the initial and the final consultation. This partly supports Hypothesis 1.3.4 which states that it is hypothesized that the carrier oils used in this controlled study will have no significant physical or psychological effects; but does not support Hypothsis 1.3.2 which states that it is hypothesized that the use of essential oils in the treatment of mechanical low back pain will result in an increased level of the patient's perception of well- being.



Rx= treatment

Figure 4.2

MULTIPLE X-Y PLOT OF THE TOTAL IMPAIRMENT OF WHOLE MAN AT TREATMENT 8 AND THE FINAL CONSULTATION FOR THE EXPERIMENTAL GROUP.



Rx= treatment

Figure 4.3

MULTIPLE X-Y PLOT OF THE TOTAL IMPAIRMENT OF WHOLE MAN AT TREATMENT 1 AND THE FINAL CONSULTATION FOR THE EXPERIMENTAL GROUP .

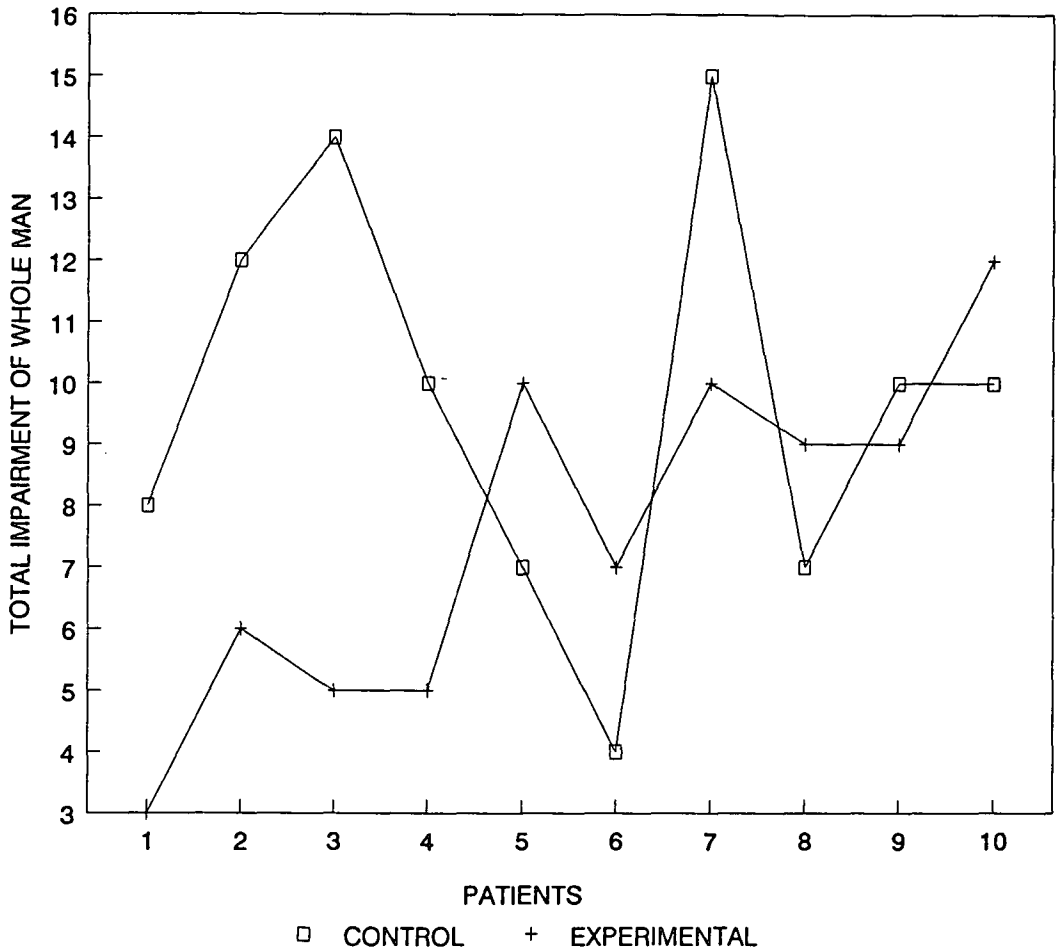


Figure 4.4

MULTIPLE X-Y PLOT OF THE TOTAL IMPAIRMENT OF WHOLE MAN AT THE INITIAL CONSULTATION , BETWEEN THE CONTROL GROUP AND THE EXPERIMENTAL GROUP .

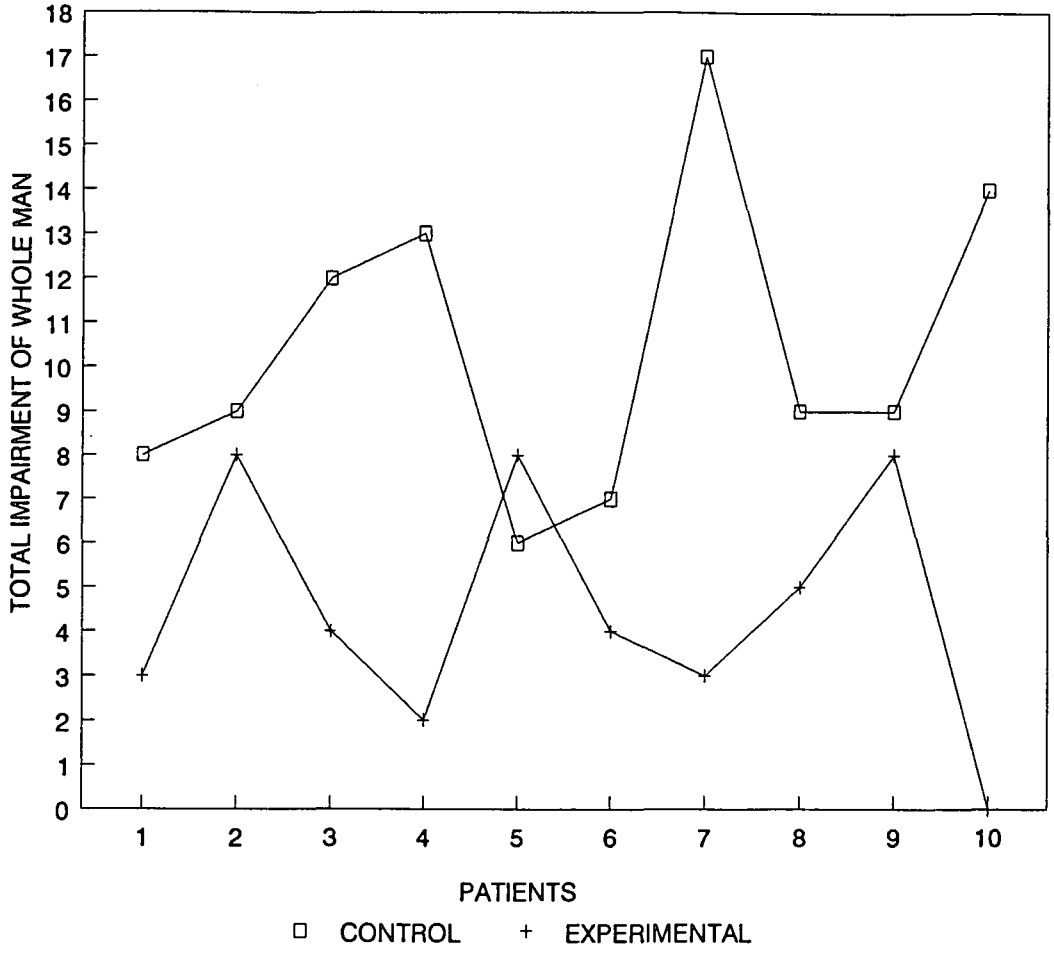


Figure 4.5

MULTIPLE X-Y PLOT OF THE TOTAL IMPAIRMENT OF WHOLE MAN AT TREATMENT 8 , BETWEEN THE CONTROL GROUP AND THE EXPERIMENTAL GROUP .

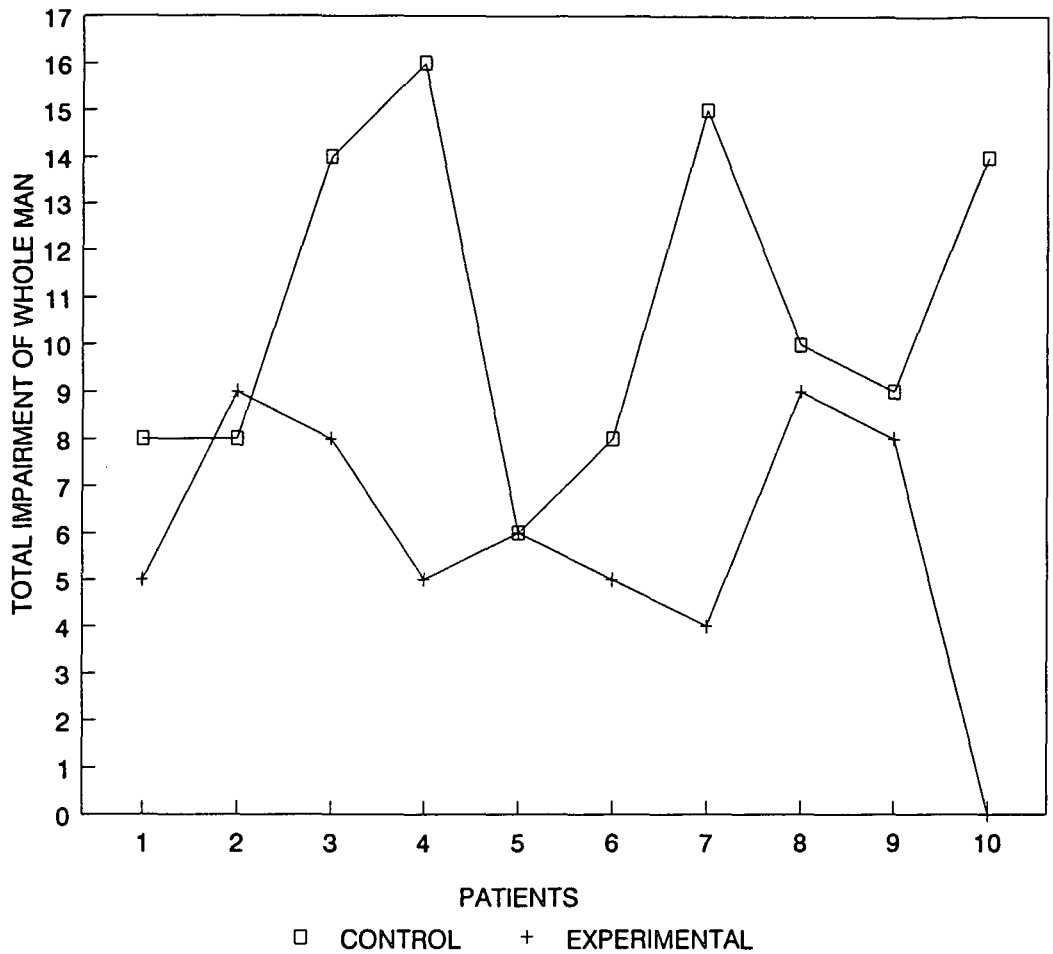


Figure 4.6

MULTIPLE X-Y PLOT OF THE TOTAL IMPAIRMENT OF WHOLE MAN AT THE FINAL CONSULTATION , BETWEEN THE CONTROL GROUP AND THE EXPERIMENTAL GROUP .

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

The results of this controlled study show that essential oils applied by means of effleurage massage, are effective in the management of mechanical low back pain, in terms of the significant decrease in total impairment of whole man, as demonstrated by the increase in the patient's dorsolumbar range of motion, and a significant decrease in the patient's level of pain; and thus supporting hypothesis 1.3.1 .

The control group also experienced a significant decrease in pain, and it is thus concluded that effleurage massage with the carrier oil, almond oil, is also an effective form of pain reduction in the management of mechanical low back pain.

It appears that the reduction in pain in the control group is most likely due to the benefical effects of massage, as massage is indeed indicated to relieve certain kinds of pain (Tappan, 1984). The relief of pain in the experimental group is also most likely due to the effects of massage. The essential oils chamomile and lavender, however did not have strong enough analgesic properties to cause a significant change in the level of pain between the two groups. It is recommended that further studies be conducted to determine whether other essential oils have greater analgesic properties in the management of mechanical low back pain, than a combination of lavender oil and chamomile oil.

The reduction of total impairment of whole man in the experimental group, which was not demonstrated in the control group, is most likely attributed to the antispasmodic properties of chamomile and lavender essential oils (Sellar, 1992). These could have resulted in a decrease in muscle spasm, thus increasing the range of motion, and so decreasing the total impairment of whole man.

General well-being in both the control and experimental group was recorded only for the initial consultation and the final consultation. No significant difference between these two consultations was noted in either of the groups. It is recommended that future studies evaluate the general well-being at the final treatment, in addition to at the initial consultation and the final consultation (i.e. re-evaluation after 1 week).

Effleurage massage of patients suffering from mechanical low back pain, with or without the use of the essential oils of chamomile or lavender, is definitely beneficial in the management of these patients, as regards pain levels, when the chiropractic adjustment does not form part of the treatment. Effleurage massage with the essential oils of chamomile and lavender, however significantly decreased the total impairment of whole man. Effleurage massage with these essential oils could play a significant role in the rehabilitation of patients with mechanical low back pain, when the chiropractic adjustment does not form part of the treatment programme.

It is recommended that future studies be conducted with an increased time span between the final treatment and the final re-evaluation

consultation, so as to determine the long term effects of the essential oils chamomile and lavender, in the management of patients with mechanical low back pain. Future studies could also be conducted to determine whether effleurage massage with the essential oils of chamomile and lavender, enhances the management of patients with mechanical low back pain, where the chiropractic adjustment forms part of the treatment.

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APPENDIX A:

BACK TO WORK

PREVENTIVE AND CURATIVE THERAPIES EDUCATION AND BACK CAR

P.O. BOX 67, BASINGSTOKE, HAMPSHIRE, RG24 0YG. Tel: (0256) 51080
V.A.T. Registration No. 570 0661 61

26th August 1992

Ms Regina Luders
9 Graell
38 Gordon Rd
Morningside
4001, Durban
Republic of South Africa

Dear Regina,

Your letter has been passed to me by Sylvia Baker of Shirley Price Aromatherapy Ltd. Although we have had successes with Aromatherapy, where other treatments have failed, we have not carried out any specific trials to identify what caused the "cure". Is it the oils or just our healing hands? As you are probably very aware, every sufferer is an individual and dependant on which structures generate pain, and why, different responses are gained if the same approach is made in every case.

At the present time I am not aware of any properly controlled research specifically into the effects of essential oils on low back pain, although there are many case histories of relief after a course of Aromatherapy treatments. One of the best sources of information on essential oils is the book by Dr Jean Valnet, 'The Practice of Aromatherapy' published by The C W Daniel Company Ltd.

I am sorry that we are unable to source you more scientific data, unfortunately, Aromatherapists believe and know, but have little scientific proof to support their knowledge. It is coming, the antibacterial properties of essential oils is proven, and psychiatric hospitals are reporting benefits of inhaled oils over night medication. The International Federation of Aromatherapists is researching the effects on Rheumatoid Arthritis, Shirley Price Aromatherapy Ltd in co operation with the Parkinson's Disease Society is researching in that direction.

With some 'leading authorities' believing all back pain stems from just one of the structures of the spine in all cases, research results may be confusing, who knows?

We wish you well in your project.

Yours sincerely,

David Tagg

APPENDIX B:

8th September 1992

The
TISSERAND
Institute

Regina G. Luders
9 Graeli
38 Gordon Road
Morningside
4001 Durban
Republic of South Africa

Dear Ms. Luders,

Thank you for your letter dated 2nd August which arrived while I was on holiday.

I regret to say that there is no information available on musculo-skeletal dysfunction of any kind. However the literature on the psychological effects of essential oils is vast. Please tell me more specifically which psychological effects you are interested in.

We would certainly be able to help, for example on the sedative/ anxiety relieving effects of essential oils.

For your interest I have also enclosed our mail order catalogue with particular reference to books, the International Journal of Aromatherapy and Aroma'93.

Yours sincerely,

Robert Tisserand

65 Church Road
Hove
East Sussex
BN3 2BD

TELEPHONE
0273-206640
FAX
0273-29811

Tisserand Aromatherapy Ltd. Registered in England No. 2207935
Medical Consultant: Dr. Richard James BSC, MBBS, LICAC, DHP, FCO(HON).
Registered Office: 65 Church Road, Hove, E. Sussex, BN3 2BD
V.A.T. Reg. No. 475790991

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

CASE HISTORY

Patient:_____ Date # _____

File #:_____

X-ray #:_____

Age: _____ Sex:_____ Occupation: _____

Intern: _____ Signature: _____

FOR CLINICIAN'S USE ONLY

Initial visit clinician: Signature:

Case History:

Examination:

Previous:	TN	Current:	TN
	Other		Other

X-ray Studies:

Previous:	TN	Current:	TN
	Other		Other

Clinical path. lab.:

Previous:	TN	Current:	TN
	Other		Other

Case status:

PTT: Conditional: Signed off: Final sign out:

Recommendations:

Intern's case history

1. Source of history:

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

3. Present illness:

   Location

   Onset

   Duration

   Frequency

   Pain (character)

   Progression

   Aggravating factors

   Relieving factors

   Associated S & S

   Previous occurrences

   Past treatment and outcome

4. Other complaints:

5. Past history:

General health status

Childhood illnesses

Adult illnesses

Psychiatric illnesses

Accidents/injuries

Surgery

Hospitalizations

6. Current health status and life-style:
   - Allergies
   - Immunizations
   - Screening tests
   - Environmental hazards
     (home, school, work)
   - Safety measures
     (seat belts, condoms)
   - Exercise and leisure
   - Sleep patterns
   - Diet
   - Current medication
   - Tobacco
   - Alcohol
   - Social drugs

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

8. Psychosocial history:

   Home situation

   Daily life

   Important experiences

   Religious beliefs

9. Review of systems:

   General

   Skin

   Head

   Eyes

   Ears

   Nose/sinuses

   Mouth/throat

   Neck

   Breasts

   Respiratory

   Cardiac

   Gastro-intestinal

   Urinary

Genital

Vascular

Musculoskeletal

Neurologic

Haematologic

Endocrine

Psychiatric.

TECHNIKON NATAL CHIROPRACTIC DAY CLINIC

PHYSICAL EXAMINATION

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

Patient:_____ File #_____

Last name First name

Clinician:_____ Signature:_____

Intern:_____ Signature:_____

Date:_____

Height:_____ Weight:_____ Temp:_____

Rates: Heart:_____ Pulse:_____ Respiration:_____

Blood pressure: Arms: L / R /

Legs: L / R /

General appearance:

STANDING EXAMINATION.

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

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

Flex.

L.Rot. R.Rot.

L.lat flex. R.lat. flex.

Ext.

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

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

Shoulder:
  skin
  symmetry
  ROM - glenohumeral
        scapulo-thoracic
        acromioclavicular
        elbow
        wrist
Chest measurement
  inspiration
  expiration
Visual acuity

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

SEATED EXAMINATION.

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

L			R		
III	IV	VI	III	IV	VI

      visual fields
      accomodation
      iris
      pupils
      red reflex
      optic disc

vessels
general background
macula
vitreous
lens

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

Nose:
external
internal
septum
turbinates
olfaction

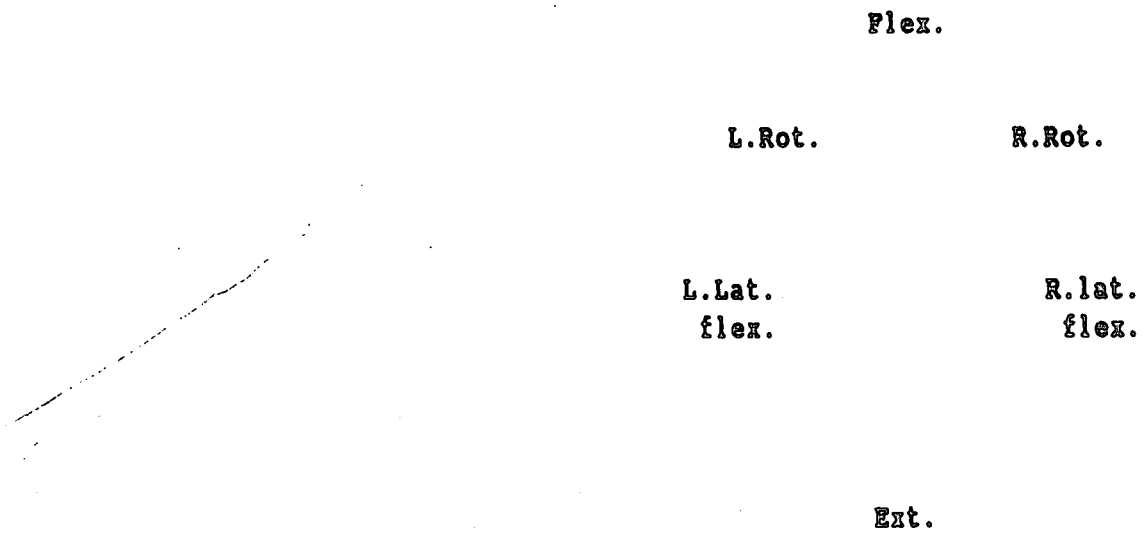
Sinuses (frontal & maxillary):
tenderness
transillumination

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

Neck:
posture
size
swelling
scars
discoloration
hair line

ROM:

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



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

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

Cardiovascular:
auscultation (aortic murmurs)
Allen's test

SUPINE EXAMINATION

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

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

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

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

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

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

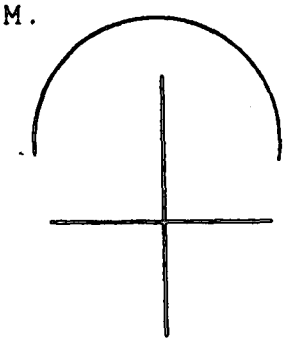
APPENDIX E:

TECHNIKON NATAL CHIROPRACTIC DAY CLIN

REGIONAL EXAMINATION - LOW BACK

Standing:

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



Flexion 15cm from floor.

Extension 30°

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

/ painless limitation
// painful limitation

Gait:

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

Motion Palpation:

sacro-iliacs (see below for findings)

Sitting:

Posture
Dermatomes:

T12
L1
L2
L3
L4
L5
S1
S2
S3

Reflexes:

patellar
Achilles
medial hamstring

Reflexes: myotomes: L. R.

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

tripod
Kemp's

MOTION PALPATION:

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

Supine:

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

leg length:
- actual
- apparent

Patrick FABER
Gaenslen's
gluteus max stretch
hip medial rotation
psoas test
Thomas'test:
- hip joint
- rectus femoris.

Lateral recumbent:
- S-I compression
- Ober's test
- femoral nerve stretch
- myotomes:
  - QL
  - glut.med

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

Non-organic signs:
- pin-point pain
- axial compression
- trunk rotation
- Burn's bench test
- flip test
- Hoover's test
- ankle dorsiflexion test
- pin-point pain.

GENERAL WELL-BEING SCHEDULE:

Dupuy (in McDowell and Newey, 1987), used a total score running from Ø to 11Ø and for this, 14 is subtracted from the score derived from the codes shown in Appendix 2.2.1 below.

Ø - 6Ø : severe distress
61 - 72 : moderate distress
73 - 11Ø: positive well being

THE GENERAL WELL-BEING SCHEDULE

PATIENT: FILE No.: DATE:

For each question, mark (X) the answer which best applies to you.

I. How have you been feeling in general during the past month?	a)	In excellent spirits
	b)	In very good spirits
	c)	I have been up and down in spirits a lot
	d)	In low spirits mostly
	e)	In very low spirits
2. Have you been bothered by nervousness or your nerves during the past month?	a)	Extremely so - could not work or take care of things
	b)	Very much so
	c)	Quite a bit
	d)	Some - enough to bother me
	e)	A little
	f)	Not at all
3. Have you been in firm control of your behavior, thoughts, emotions or feelings during the past month?	a)	Yes, definitely so
	b)	Yes, for the most part
	c)	Generally so
	d)	Not too well
	e)	No, and I am somewhat disturbed
	f)	No, and I am very disturbed
4. Have you felt so sad, discouraged, hopeless, or had so many problems that you wondered if anything was worthwhile during the past month?	a)	Extremely so - to the point that I have just about given up
	b)	Very much so
	c)	Quite a bit
	d)	Some - enough to bother me
	e)	A little bit
	f)	Not at all
5. Have you been under or felt you were under any strain, stress, or pressure during the past month?	a)	Yes - almost more than I could bear or stand
	b)	Yes - quite a bit of pressure
	c)	Yes - some, but about usual
	d)	Yes - some, but about usual
	e)	Yes - a little
	f)	Not at all
6. How happy, satisfied, or pleased have you been with your personal life during the past month?	a)	Extremely happy - could not have been more satisfied or pleased
	b)	Very happy
	c)	Fairly happy
	d)	Satisfied - pleased
	e)	Somewhat dissatisfied
	f)	Very dissatisfied

(CONTINUED)

7. Have you had any reason to wonder if you were losing your mind, or losing control over the way you act, talk, think, feel, or of your memory during the past month?	a)	Not at all	☐
	b)	Only a little	☐
	c)	Some - but not enough to be concerned or worried about	☐
	d)	Some and I have been a little concerned	☐
	e)	Some and I am quite concerned	☐
	f)	Yes, very much so and I am very concerned	☐
8. Have you been anxious, worried or upset during the past month?	a)	Extremely so - to the point of being sick or almost sick	☐
	b)	Very much so	☐
	c)	Quite a bit	☐
	d)	Some - enough to bother me	☐
	e)	A little bit	☐
	f)	Not at all	☐
9. Have you been waking up fresh and rested during the past month?	a)	Every day	☐
	b)	Most every day	☐
	c)	Fairly often	☐
	d)	Less than half the time	☐
	e)	Rarely	☐
	f)	None of the time	☐
10. Have you been bothered by any illness, bodily disorders, pains, or fears about your health during the past month?	a)	All the time	☐
	b)	Most of the time	☐
	c)	A good bit of the time	☐
	d)	Some of the time	☐
	e)	A little of the time	☐
	f)	None of the time	☐
11. Has your daily life been full of things that were interesting to you during the past month?	a)	All the time	☐
	b)	Most of the time	☐
	c)	A good bit of the time	☐
	d)	Some of the time	☐
	e)	A little of the time	☐
	f)	None of the time	☐
12. Have you felt down-hearted and blue during the past month?	a)	All of the time	☐
	b)	Most of the time	☐
	c)	A good bit of the time	☐
	d)	Some of the time	☐
	e)	A little of the time	☐
	f)	None of the time	☐

I3. Have you been feeling emotionally stable and sure of yourself during the past month?

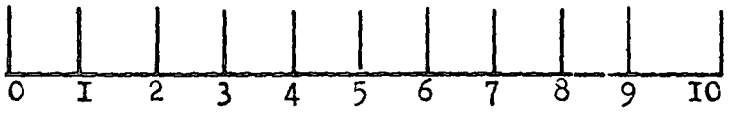
a) All of the time ☐
b) Most of the time ☐
c) A good bit of the time ☐
d) Some of the time ☐
e) A little of the time ☐
f) None of the time ☐

I4. Have you felt tired, worn out, used-up, or exhausted during the past month?

a) All of the time ☐
b) Most of the time ☐
c) A good bit of the time ☐
d) Some of the time ☐
e) A little bit of the time ☐
f) None of the time ☐

For each of the four scales below, note that the words at each end of the 0 to IO scale describe opposite feelings. Circle any number along the bar which seems closest to how you have generally felt during the past month.

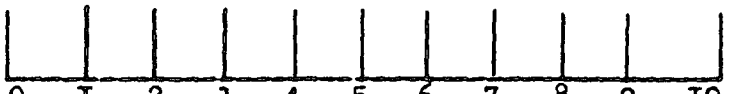
I5. How concerned or worried about your health have you been during the past month?



0 = not concerned at all

IO = very concerned

I6. How relaxed or tense have you been during the past month?



0 = very relaxed

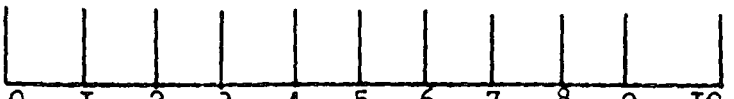
IO = very tense

I7. How much energy, pep, vitality have you felt during the past month?

0 = no energy at all, listless

IO = very energetic, dynamic

I8. How depressed or cheerful have you been during the past month?



0 = very depressed

IO = very cheerful

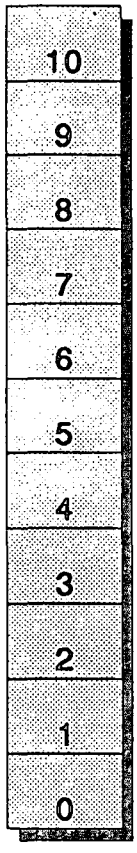
PATIENT:. ..... FILE NO.: .....

DATE:. .....

NUMERICAL PAIN RATING SCALE :

RATE YOUR LEVEL OF PAIN ON THE SCALE, BY MARKING THE APPLICABLE BOX WITH A X

0 = No Pain
10 = Unbearable Pain



DORSOLUMBAR RANGES OF MOTION:

	DEGREES	PERCENTAGE IMPAIRMENT
FLEXION:		
EXTENSION:		
RIGHT LATERAL FLEXION:		
LEFT LATERAL FLEXION:		
RIGHT ROTATION:		
LEFT ROTATION:		

FORMULA 1A AND FORMULA 1B FOR MASSAGE OILS

Formula 1a: 1Ø ml almond oil

4 drops chamomile essential oil

6 drops lavender essential oil

Formula 1b: 1Ø ml almond oil

EFFLEURAGE MASSAGE FOR THE BACK

1. Put 1 - 2 teaspoons of massage oil in the palm of one hand. Rub both hands together lightly and spread the oil over the entire back and buttocks with wide sweeping movements.

2. Place hands at the base of the spine, fingers facing towards the shoulders all the time, and stroke firmly upwards alongside the spine, round the shoulder blade, then very lightly down the back, to the base of spine. Repeat 1Ø times.
- see diagram 4.1 below

3. Put one hand over the other, and still starting at the base of the spine, push firmly up one side of the back to the shoulder area, where the hands cross the spine upwards between the shoulder blades, go right around the shoulder, cross upwards, and go right around the other shoulder (figure of 8 movement).
Repeat 4 times, bringing hands back to the base of the spine on the last repeat. Keep the whole of the reinforced hand on the body.
- see diagram 4.2 below

4. Repeat no. 2 5 times

5. With fingers facing towards the shoulders, on left side of the spine, move out towards the side of the body, opening the fingers whilst doing so. The next hand comes underneath the first one, and repeats the movement: - each hand moves up the body a little

as well as going sideways like a fan. Finish at shoulder level. Repeat on the right side of the spine.

- see diagram 4.3 below

6. Using the thumbs, do friction circles from waist on either side of the spine, out and around the hip bone. Repeat 3 times, each time doing a smaller curve.

- see digram 4.4 below

7. Repeat no.2 4 times

8. Repeat no.6 3 times

9. Repeat no.2 6 times

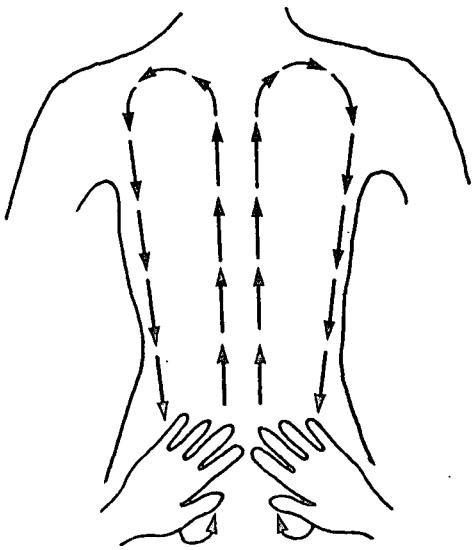


Diagram 4.I

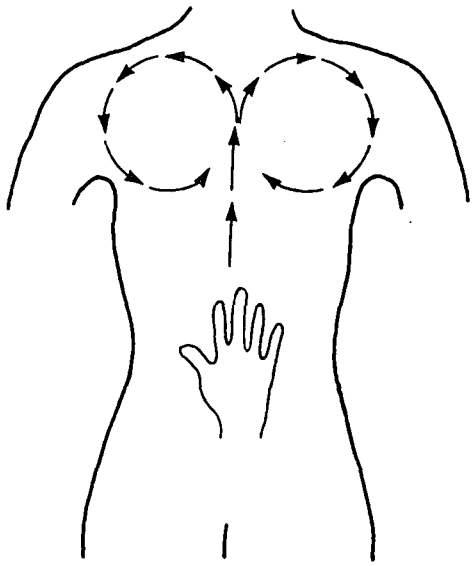


Diagram 4.2

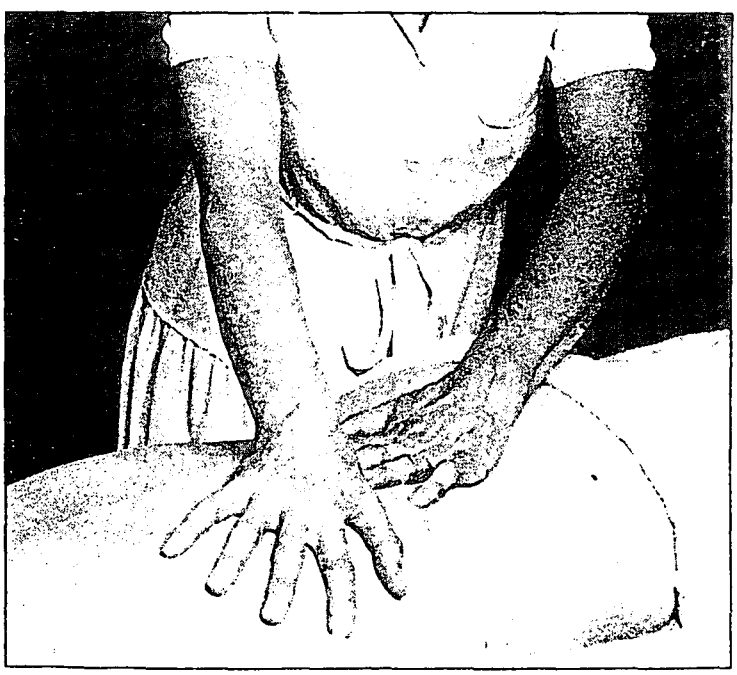


Diagram 4.3

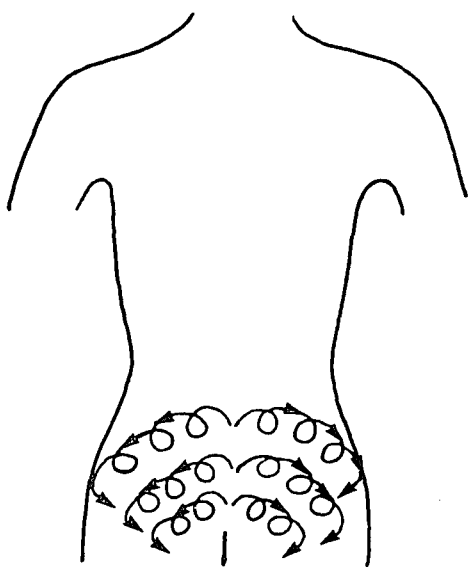


Diagram 4.4

RANGE OF MOTION MEASUREMENTS CONVERSION TO PERCENTAGE IMPAIRMENT

(American Medical Association, 1983)

DORSOLUMBAR REGION

Impairment of Whole Man

Restricted Motion

Average range of FLEXION–EXTENSION = 120 degrees
Value to total range of dorsolumbar motion = 40%

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

Extension from neutral position (0°) to:	Degrees of Dorsolumbar Motion LOST	RETAINED	Impairment of Whole Man
0°	30	0	3%
10°	20	10	2
20°	10	20	1
30°	0	30	0

Restricted Motion

Average range of ROTATION = 60 degrees
Value to total range of dorsolumbar motion = 35%

Right rotation from neutral position (0°) to:	Degrees of Dorsolumbar Motion LOST	RETAINED	Impairment of Whole Man
0°	30	0	5%
10°	20	10	4
20°	10	20	2
30°	0	30	0

Left rotation from neutral position (0°) to:			
0°	30	0	5%
10°	20	10	4
20°	10	20	2
30°	0	30	0

Average range of LATERAL FLEXION (lateral bending) = 40 degrees
Value to total range of dorsolumbar motion = 25%

Right lateral flexion from neutral position (0°) to:	Degrees of Dorsolumbar Motion LOST	RETAINED	Impairment of Whole Man
0°	20	0	4%
10°	10	10	2
20°	0	20	0

Left lateral flexion from neutral position (0°) to:			
0°	20	0	4%
10°	10	10	2
20°	0	20	0