CHAPTER III

LITERATURE SURVEY OF SCIENTIFIC STUDIES

3.1 Epidemiology of back pain

LBP is the most prevalent musculoskeletal condition and the most common cause of disability in developed nations (Woolf et al, 2003). In about 85% of these people, LBP is secondary to nonspecific or functional causes, meaning that no specific underlying anatomic etiologic condition can be identified (Vuori, 2001). Low back pain (LBP) has an overall prevalence of 60% to 80% in industrialized countries (Borenstein, 2001; Walker, 2000). In developed countries such as the United States of America (USA) and Australia, prevalence of LBP ranges from 26.4% to 79.2% (Deyo et al, 2006; Walker, 2004). Anderson (1981) reports insurance data among United Kingdom males indicate an annual loss from back pain of 627 days per 1000 employed though detailed studies in cohorts of manual workers suggests that the loss from low back pain may be half as much again. A study on 11234 patients reporting to outdoor clinic in rural North India (Sharma et al 2003) during June 2001 to June 2002, 2594 patients (23.09%) had low back pain results showing that 67% had psychosocial issues, 57% were in blue-collar jobs, 26% had had to change/leave their profession, and 38% did not enjoy their present job. More than 70 percent of people in developed countries will experience low back pain at some time in their lives. Each year, 15 to 45 percent of adults suffer low back pain, and one in 20 people present to a hospital with a new episode. Low back pain is most common between 35 and 55 years of age (Anderson 1997). One study found that recurrent pain accounted for 75 to 85 percent of absenteeism from work (Frymover et al 1988). Low back pain is a major burden to society (Van Tulder et al, 2005).
3.2 Economic burden of CLBP

Musculoskeletal disorders specially back pain impose a significant direct cost burden on health care systems in the US and Canada and account for even greater indirect losses of productivity (Baldwin 2004). LBP creates billions of dollars in medical expenditures each year (Childs, et al., 2004). It was reported that in 2001, expenditure for back pain represented 11% of the total costs for short-term sick leave in Sweden, and about 13% of all early retirement pensions were granted for back problems, of which LBP is the most important symptom (Ekman, et al, 2005). Work-related stress costs society between Euro 1,167 million and Euro 1,975 million in France, or 14.4-24.2% of the total spending of social security occupational illnesses and work injuries branch. Thus the economic, societal and public health effects of LBP appear to be increasing. Many factors are associated with the development of low back pain. Among them, obesity, age, smoking, exercise, educational level and stress are the most common (Kwon MA, et al., 2006).

3.3 Obesity and CLBP

Obesity is another factor that is positively correlated with chronic LBP (CLBP), in particular with chronic or recurrent CLBP (Leboeuf et al,1999). In young women, abdominal obesity increases the risk of LBP (Shiri, et al., 2008).

3.4 Occupation and CLBP

Epidemiological research links ergonomic and job stress exposures to back pain. The jobs considered high risk for back pain involve specific ergonomic exposures with biomechanical risks, including heavy lifting, certain work postures, forceful exertions, and whole-body vibration (Marras, et al., 1995). Factors such as manual materials handling, bending and twisting, and whole-body vibration (Hoogendoorn, et al 1999), and lifting or carrying loads have been identified as physical load risk factors. These are consistently
associated with work-related job dissatisfaction and low job decision opportunity that have been proved to be important factors contributing to LBP (Burdorf et al., 1997). Apart from these physical stresses, psychosocial variables have been related to back pain onset, its progression from acute to chronic pain, and disability (Carragee et al., 2005; Linton, 2000). Evidence was found by Hoogendoorn, et al (2000) who showed that low social support in the workplace, low job satisfaction, low job content, low job control, high work pack, high qualitative demand are risk factors for back pain. A baseline cross-sectional survey showed significant associations between CLBP and perceived inadequacy of income (risk ratio 1.3), dissatisfaction with work (risk ratio 1.4) and social class IV/V (risk ratio 1.2) (Papageorgiou, et al., 1997). High psychological demands, lack of decision-making and low social support have been reported as risk factors for CLBP and related disability. Monotonous and hectic work increases the risk of acute back pain. Thus, it appears that a combination of physical distress and physiological demands of work are related to increased risk of back symptoms.

3.5 Psychosocial stress and CLBP

There is growing consensus that psychosocial factors play a role in the development of CLBP. Many potential risk that include lifestyle, physical, psychosocial (both work-related and non-work-related) factors have been studied. These factors have been linked to low back pain, starting from psychological and psychosocial factors at work and private life. A major issue in pain rehabilitation programs for chronic low back pain (CLBP) is the suggested relation between psychological factors and disability. This relationship is stressed in dominant models such as the bio-psychosocial model (Truchon, 2001) and the fear avoidance model (Vlaeyen - a, et al 1995; Vlaeyen -b, 1995). According to the bio-psychosocial model, a patient’s functioning is influenced by biological, psychological and social factors. Psychological factors such as distress (depression, anxiety, and fear), self-
efficacy, fear-avoidance beliefs, coping styles and cognitive factors generally are presumed to have more impact on back pain disability than biomedical or biomechanical factors (Hazard et al, 1996; Linton, 2000).

3.6 Depression and anxiety in CLBP

The most important psychological disturbance in CLBP is emotional distress, measured on questionnaires as increased bodily awareness and depression (Waddell, et al 1984). Clinical studies suggest that an excessively negative orientation towards pain (pain catastrophizing) and fear of movement due to re-injury (kinesiophobia) are important in the etiology of chronic low back pain and associated disability (Fritz et al 2001; Vlaeyen et al, 2000). Patients with CLBP reported increased psychological distress that led to higher level of pain (Verbunt, et al., 2005). Depression is a condition that worsens the prognosis of low back pain (Nahit et al., 2003). High job insecurity, feeling stressed at work, and feeling depressed increase the relative risk for developing low back pain (Clays, et al., 2007). Hence LBP results in significant levels of disability, producing significant restrictions on usual activity and participation, such as inability to work (Katz, 2006).

A study conducted analyzed the impact of anxiety, anger and depression in predicting self report of clinical pain as indicated by McGill Pain Questionnaire (MPQ) in a sample of 60 chronic pain patients. A study examined whether anxiety sensitivity (AS) influences pain related anxiety and associated cognitive and affective reactions in patients with physically unexplained CLBP. Results indicated that patients high on AS were more negatively affected by pain (Asmudson et al, 1995). A study was conducted to document the prevalence of depression and examine the relationship between depression and pain related variables associated CLBP among elderly and non elderly samples (Herr et al 1993). and reported that dysphoric chronic pain patients reported more antidepressant use,
greater pain intensity, greater interference due to pain and less control over life than the non depressed patients.

3.7 Psychological stress and musculoskeletal health

Various manual therapy authors have speculated on the possible nature of muscle spasm as the major change contributing to chronic low back pain, with some authors hypothesizing that it represents deep segmental muscle overactivity (Fryer et al, 2004). Increased paraspinal electromyographic (EMG) activity observed in subjects with LBP appears to be a result of voluntary and nonvoluntary changes in motor control, modified by psychophysiological responses to perceived stress rather than a simple protective reflex. The connection between psychosocial stress and musculoskeletal disorders has been explained in studies showing that mental stress induces a significant increase in muscle tension in the trapezius muscle. Several models have been proposed in order to understand the mechanisms linking low sustained muscle tension to musculoskeletal disorders. It has been demonstrated that the same motor units are activated by mental stress as by physical demands, which means that mental stress may keep low threshold motor units active also during breaks at work and off the job (Lundberg, 2003). Increased paraspinal electromyographic (EMG) activity has been observed in subjects with CLBP that may be the result of both voluntary and non-voluntary changes in motor control in response to perceived stress (Fryer G 2004). In another study by Rissén et al (2000) surface trapezius electromyographic (sEMG) activity, heart rate, blood pressure, and levels of urinary catecholamines and salivary cortisol were measured in 31 female employees working at supermarkets, where the prevalence of neck and shoulder disorders is high (60-70%). The results showed that psychophysiological arousal was high during work. Significant correlations were found between self-reports indicating negative stress
physiological responses to demonstrate that they serve the role as objective indicators of stress as well as a link between psychosocial stress and various health outcomes. The aim was to compare different physiological stress responses (systolic and diastolic blood pressure, heart rate, urinary epinephrine and norepinephrine, salivary cortisol) as well as trapezius muscle activity, measured by surface electromyography, during mental and physical stress in 11 women and ten men. The results showed significantly increased activity in all measures but cortisol and significant associations between sympathetic arousal and EMG activity. The association between sympathetic arousal and muscle activity is important for understanding the high prevalence of musculoskeletal disorders in mentally stressful but physically light work tasks. It was concluded that sympathetic activity is more sensitive to moderately intense stress exposure than pituitary adrenocortical (cortisol) activity and that men respond to performance stress with more epinephrine output than women. It was reported based on established principles of breathing and job stress and the relevant empirical literatures, a hyperventilation theory of job stress and work-related musculoskeletal disorders (Schleifer, et al 2004) which was developed and states that hyperventilation (over breathing) refers to a drop in arterial CO2 caused by ventilation that exceeds metabolic demands for O2. This disruption in the acid-base equilibrium triggers a chain of systemic physiological reactions that have adverse implications for musculoskeletal health, including increased muscle tension, muscle spasm, amplified response to catecholamine, and muscle ischemia and hypoxia.

3.8 Neurophysiology of pain

International Association for the Study of Pain describes pain as (Carver, 2005) “An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.” Acute pain is described as an unpleasant
experience with emotional, cognitive, and sensory features, resulting from tissue trauma usually associated with significant, observable tissue pathology; resolves with healing of causative injury; protective biological function to protect against further injury; associated protective reflexes include withdrawal, muscle spasm, and autonomic reactions. Chronic pain is described as pain lasting beyond expected recovery period; identifiable pathology insufficient to explain the pain state; disrupts sleep and normal activities of living. (Carver, 2005).

Both cortical and limbic systems are involved in conscious awareness (perception) of pain (Carver, 2005). Recognition of location, intensity, and quality of pain is mediated by processing of signals from the spinothalamic tract, thalamus, and somatosensory cortex. Pain information processing is carried out in midbrain, and thalamus. Limbic system appears to mediate affective, motivational, and behavioral responses to painful stimuli (Melzack et al, 1965). Pain Modulation. Gate control theory advanced by Melzack and Wall in 1965 focused on descending pathways from the brain to the spinal cord that inhibit pain signaling (National Pharmaceutical Council, 2001). Neurotransmitters involved in these pathways include Endogenous opiates (enkephalins, dynorphins, beta-endorphins) serotonin and norepinephrine (Hudspith et al, 2006).

Pain is no more seen as a predetermined result of simple activation of certain neural structures. It is now understood to be a dynamic phenomenon due to myriad of pathophysiological changes in the peripheral and central nervous system in response to disease, injury, or loss of function. These changes reflect the surprising but indisputable fact that the human nervous system is adaptable and capable of substantial plasticity. In chronic pain the abnormal activity in the altered pain mediating afferent system continues irrespective of its original causation signals originating in the brain can both inhibit and facilitate pain signal transmission (Melzack et al 1965). Perception and reaction to pain
are influenced by social and environmental cues, as well as by cultural norms and personal experience (Carver, 2005).

3.8.1 Brain areas functionally related to pain processing

Neuroimaging in chronic pain shows that there are several functional (Figure below), neurochemical and structural changes have now been defined in the CNS of humans using functional, chemical, and structural neuroimaging techniques. These changes not only provide novel insights into the pathology of the disease but also opportunities for objective indices for therapeutic efficacy (David Borsook et al, 2007).

Fig 3.1
Schematic of cortical areas involved with pain processing. The highlighted areas summarize areas found active in previous functional imaging studies. Color-coding reflects the hypothesized role of each area in processing the different psychological dimensions of pain. For examples of brainstem involvement in pain processing. Areas displayed include insula, anterior cingulate cortex (ACC), posterior cingulate cortex (PCC), primary somatosensory cortex (SI), secondary somatosensory cortex (SII), inferior parietal lobe (Inf. Par), dorsolateral prefrontal cortex (DLPFC), pre-motor cortex (Pre-Mot), orbitofrontal cortex (OFC), medial prefrontal cortex (Med. PFC), posterior insula (P. Ins), anterior insula (A. Ins), hippocampus (Hip), entorhinal cortex (David Borsook et al 2007).

3.8.2 Examples of CNS Functional Measures

Functional changes
A number of research groups have reported significant changes in pain processing at a functional level including allodynia, functional plasticity, and alterations in basic processes in the brain and brainstem (David Borsook et al 2007). Many of these functional changes have been defined in the context of evoked pain. More recently, basal pain levels have been measured using other approaches, including functional connectivity of how networks are coupled together. Measures of resting state networks contribute to the understanding and defining the brain state in different chronic pain conditions and the have potential to measure therapeutic efficacy. Such resting state networks have been reported to be consistent across healthy subjects and altered with drug use or disease state.

Neurochemical Changes
Alterations in neurotransmitters have also been reported in chronic pain patients using magnetic resonance spectroscopy (MRS). This approach has been applied to migraine,
back pain, and to spinal cord injury. This can also be used to define neuronal and axonal markers, including specific metabolites such as glutamate, aspartate, glycine, and GABA (David Borsook et al 2007).

Fig 3.2 Example of chemical measures. The relative concentration of neurotransmitters, such as glutamate (Glu) and glycine (Gly), can be measured using Magnetic Resonance Spectroscopy (MRS). Here, an in vivo proton MRS spectrum focused on the thalamus is displayed in a patient with chronic pain.

Fig 3.3 Subjects with chronic back pain show decreases in gray matter density in bilateral dorsolateral prefrontal cortex (DLPFC) and right anterior thalamus.

**Structural Changes**

At a macroscopic level, a number of papers have indicated changes in volume in brain regions in patients with chronic neuropathic pain, CRPS, and fibromyalgia. These last two papers have been seminal in transforming our approach and thinking on chronic pain,
since these changes indicate the potential of chronic pain to become a neurodegenerative
disease (David Borsook et al 2007). At a microscopic level, changes in dendritic spine
density or alterations in neuronal count have been observed in pain and stress. Such
changes also have implications for the development of comorbid disease such as
depression. In chronic pain conditions, there is an altered internal milieu as a result of
external inputs, altered endogenous processing, or both. Chronic pain resulting from
physical (e.g., surgery, trauma) or emotional (abuse, torture, depression) events produce
changes in gene function that result in alterations in neural circuits, neural integrity, and
receptor function in the CNS. The result is the phenotypic expression of spontaneous pain
and increased sensitivity to painful and normally non-painful stimuli (e.g., brush,
pressure, thermal). In addition, the condition is sensitive to less obvious perturbations
such as changes in barometric pressure, or exacerbated in generalized inflammatory
conditions such as the flu (David Borsook et al 2007).

The 'perfect' chronic pain treatment – Targeting sensory, emotional and neurodegenerative
processes.

Current evidence suggests that the perfect therapeutic approach would be to: (a) provide
early and prolonged pain relief; (b) have peripheral and central effects; (c) have
neuroprotective effects; (d) protect against neurodegenerative effects; (d) enhance
endogenous analgesic systems though receptor mediated or other mechanisms; and (e)
modulate cytokine/immune responses. Such information may now be garnered from
neuroimaging approaches potentially helping clinical development programs by enabling
the objective evaluation of candidate therapeutics in clinical trials (David Borsook et al
2007). Is yoga the answer?
3.9 Recent trends in managing spinal pain

A theoretical model for the development of a diagnosis-based clinical decision rule for the management of patients with spinal pain (Donald R Murphy et al, 2007).

One classification system is that of McKenzie. In this classification, three "syndromes" are considered. The clinician attempts to identify in each patient which of these syndromes is present, so that treatment can be applied that is appropriate for that syndrome. According to McKenzie, the largest of these is the "derangement syndrome". In this group of patients, end range loading maneuvers are used to identify a characteristic pattern of "centralization" of symptoms when loading manoeuvres are applied in a certain direction, and "peripheralization" of symptoms when loading manoeuvres are applied in another direction (typically the direction opposite of that which produced centralization). The McKenzie system, at least as it applies to the derangement syndrome, has been found to be efficacious for those patients for whom it applies. Another classification system was initially developed by Delitto and used historical factors, symptom behaviour and clinical signs to categorize spinal pain patients. This system evolved into one in which patients with LBP are placed into one of four categories: 1. Immobilization 2. Mobilization 3. Specific exercise 4. Traction.
Fig 3.4 Diagnostic algorithm for the application of the diagnosis-based clinical decision rule for the management of patients with spinal pain.
Fig 3.5 Management algorithm for the application of the diagnosis-based clinical decision rule for the management of patients with spinal pain
3.10 Quality of life in CLBP

Health related Quality of life is an important outcome measure in chronic disorders. In chronic musculoskeletal pain, treatment effect often means improvement in patients’ physical and social functioning and psychological well – being, rather than pain reduction alone. Becker et al investigated the relationship between pain and HRQL (Becker et al, 1997). Mean pain severity was 71.6 on the Visual Analogue Scale (VAS). 42% reported poor quality of sleep. Skevington (1998) examined the impact of pain on quality of (QOL) and found that pain and discomfort made a significant impact on perceptions of general quality of life related to health. A review of literature in this area of QOL amongst CLBP patients indicates that CLBP affects QOL adversely and the intervention programs should be targeted at enhancing QOL (Andersson, 1997).

3.11 Psychological therapies

Meta-analysis of RCT was conducted to evaluate the efficacy of psychological interventions for adults with noncancerous CLBP (Hoffman et al, 2007). Cognitive-behavioral and self-regulatory treatments were specifically found to be efficacious. Multidisciplinary approaches that included a psychological component, when compared with active control conditions, were also noted to have positive short-term effects on pain interference and positive long-term effects on return to work. The results demonstrated positive effects of psychological interventions for CLBP. In conclusion, reviewed trials on (non randomized and randomized control) provide evidence that intensive multidisciplinary bio-psycho-social rehabilitation with a functional restoration approach improves pain and function. Less intensive interventions did not show improvements in clinically relevant outcomes (Guzman, et al., 2006). Combined respondent-cognitive therapy and progressive relaxation therapy are more effective than WLC on short-term
pain relief. It is unknown whether these results sustain in the long term. No significant differences could be detected between behavioral treatment and exercise therapy (Ostelo, et al., 2005).

3.12 Exercise and LBP

A review of 39 trials is strong evidence was found that exercise therapy is no more effective for acute low back pain than inactive or other active treatments with which it was compared (van Tulder et al 2000). There was conflicting evidence on the effectiveness of exercise therapy compared with inactive treatments for chronic low back pain. Exercise therapy was found more effective than general practitioner and just as effective as conventional physiotherapy for CLBP. Evidence summarized in this systematic review does not indicate that specific exercises are effective for the treatment of acute low back pain. Exercises may be helpful for patients with chronic low back pain to increase return to normal daily activities and work.

Another review of randomized controlled trials (RCTs) investigated evidence for the type and quality of exercise being offered to chronic low back pain (CLBP) patients, and to assess how treatment outcomes were measured (Liddle et al, 2004). Despite the variety offered, exercise has a positive effect on CLBP patients, and results are largely maintained at follow-up. Strengthening is a common component of exercise programmes. However, the role of exercise co-interventions must not be overlooked.

Exercise therapy seems to have a small effect in decreasing pain and improving function in adults with chronic low back pain, particularly in health care populations. In sub acute low back pain populations, some evidence suggests that a graded-activity program improves absenteeism outcomes, although evidence for other types of exercise is unclear.
In acute low back pain populations, exercise therapy is as effective as either no treatment or other conservative treatments (Hayden et al, 2005).

Exercise therapy that consists of individually designed programs, including stretching or strengthening, and is delivered under supervision, may improve pain and function in chronic nonspecific low back pain. Strategies should be included to encourage adherence (Hayden et al, 2005).

3.13 Prevalence of the use of CAM therapies

Complementary medicine refers to a group of therapeutic and diagnostic disciplines that exist largely outside the institutions where conventional health care is taught and provided (Zollman et al, 1999). Many people use CAM for following reasons: i) belief that the body has the intuitive knowledge to heal itself given the proper tools; encouraging patients to take responsibility for their own health (Barrett et al, 2004; Kaptchuk & Eisenberg, 1998), biomedical research identifies mechanisms by which the mind and body influence each other (Kiecolt-et al, 2002). Mind–body medicine often involves inexpensive self-care-based activities, and so is cost-effective alternative to conventional medicine (Friedman et al, 1995; Sobel, 2000a, 2000b).

A study reported that patients suffering from chronic low back pain (CLBP) are often unsatisfied with conventional medical care and seek alternative therapies (Mehling et al, 2005). A critical review of the literature on acupuncture, herbal therapies, homeopathy, and spinal manipulation said that the experimental evidence was insufficient to recommend the use of traditional Chinese acupuncture over other modalities for older adults with persistent musculoskeletal pain. Breath therapy is a western mind-body therapy integrating body awareness, breathing, meditation, and movement. Preliminary data suggest benefits from breath therapy for proprioception and low back pain. Breath
therapy was safe. In summary, the results on CAM therapies for (acute episodes of) chronic LBP are promising but more evidence on the relative cost-effectiveness compared to conventional treatments is needed. Fibromyalgia, neck pain, osteoarthritis and rheumatoid arthritis. Kessler, et al., (2001) conducted a telephone survey of a stratified sample of 2055 adults and reported increasing demand for CAM therapies across all socioeconomic groups. Characteristics of persons most likely to use CAM therapies include adults between 35 and 49 years of age, non-African American, college education, incomes above 35,000, poor health status, and having a holistic orientation to health (Eisenberg, et al., 1993). Population based studies conducted by Eisenberg, et al., (1998) found that from 1990 to 1997, the use of at least one of 16 CAM therapies in the US grew from 33.8% to 42.1%. Examples of CAM therapy used for treating chronic pain include acupuncture, aromatherapy, biofeedback, chiropractic care, energy healing, folk remedy, herbal medicine, homeopathy, hypnosis, imagery, lifestyle diet, massage, megavitamins, naturopathy, osteopathy, relaxation techniques, self-help groups, spiritual healing by others, copper bracelets, and yoga (Braverman et al 2003; Eisenberg, et al., 1998).

Complementary and alternative medicine (CAM) is based on national survey data. Relaxation techniques, guided imagery, hypnosis, and biofeedback the most popular mind–body therapies in the United States (Eisenberg, et al., 2001) are frequently utilized to treat chronic pain syndromes (Astin, 1998; Barrett, et al., 2004; Eisenberg, et al., 1993). The frequency of CAM therapy use for chronic pain and other medical problems has been reported by a number of researchers. The 10 most commonly used CAM therapies were use of prayer specifically for one’s own health (43.0%), prayer by others for one’s own health (24.4%), natural products (18.9%), deep breathing exercises (11.6%), participation in prayer group for one’s own health (9.6%), meditation (7.6%), chiropractic care (7.5%), yoga (5.1%), massage (5.0%), and diet-based therapies (3.5%). Adults age 18 years or
over who used CAM were more likely to do so because they believed that CAM combined with conventional medical treatments would help (54.9%) and/or they thought it would be interesting to try (50.1%) (Barnes et al, 2004).

A survey of CAM therapy was conducted with a systematic sample of 908 primary care patients receiving opioids as a primary treatment method for chronic pain (Fleming et al, 2007) such as LBP (38.4%), headaches (9.9%), and knee pain (6.5%) that had lasted for an average of 16 years, 44% reported CAM therapy use in the previous 12 months. Therapies utilized included massage therapy (27.3%, n = 248), chiropractic treatment (17.8%, n = 162), acupuncture (7.6%, n = 69), yoga (6.1%, n = 55), herbs and supplements (6.8%, n = 62), and prolotherapy (5.9%, n = 54). CAM utilization correlated significantly with age, gender (F), pain severity, and income, diagnosis of neck and upper back pain, and illicit drug use. Medical insurance covered chiropractic treatment (81.8%) and prolotherapy (87.7%), whereas patients primarily paid for other CAM therapies. Over half the sample reported that one or more of the CAM therapies were helpful.

3.13.1 Back pain and CAM therapies

3.13.1.1 Acupuncture

A meta-analysis conducted by Manheimer et al 2005) analyzed 33 clinical trials designed to test the efficacy of acupuncture for the treatment of low back pain. The report found acupuncture significantly decreased chronic low back pain compared to sham treatment (standard mean difference 0.54, 95%CI, 0.35–0.73). Most of these studies were limited by short follow-up, absence of controlling for potential confounding variables such as pain medication, and small sample sizes. Two other studies found Acupuncture was more effective in improving pain than non-acupuncture treatment in patients with chronic low
back pain, whereas there were no significant differences between acupuncture and minimal acupuncture (Brinkhaus, et al., 2006).

3.13.1.2 Osteopathic manipulative treatment

Osteopathic manipulative treatment (OMT) is a distinctive modality commonly used to complement their conventional treatment of musculoskeletal disorders. Meta-analyses of studies on spinal manipulation for low back. OMT significantly reduces low back pain. The level of pain reduction is greater than expected from placebo effects alone and persists for at least three months. Additional research is warranted to elucidate mechanistically how OMT exerts its effects, to determine if OMT benefits are long lasting, and to assess the cost-effectiveness of OMT as a complementary treatment for low back pain (Licciardone 2005).

3.13.1.3 Massage therapy

A study conducted over telephone interviews with 249 patients with CLBP, 54% had utilizing chiropractic treatment and 38% massage therapy with massage therapy being reported as the most helpful (Sherman, et al., 2004). Massage was compared to an inert therapy (sham treatment) in two studies, which showed that massage was superior for pain and function on both short and long-term follow-ups. In eight studies, massage was similar to exercises, and massage was superior to joint mobilization, relaxation therapy, physical therapy, acupuncture and self-care education. The beneficial effects of massage in patients with chronic low-back pain lasted at least one year after the end of the treatment. Two studies compared two different techniques of massage. One concluded that acupuncture massage produces better results than classic (Swedish) massage and another concluded that Thai massage produces similar results to classic (Swedish) massage. Massage might be beneficial for patients with subacute and chronic non-specific
low-back pain, especially when combined with exercises and education. The evidence suggests that acupuncture massage is more effective than classic massage (Furlan et al 2002a, 2002b; Furlan et al 2008). Therapeutic massage was effective for persistent low back pain, apparently providing long-lasting benefits. Traditional Chinese Medical acupuncture was relatively ineffective. Massage might be an effective alternative to conventional medical care for persistent back pain (Cherkin, et al., 2001).

3.14 Yoga therapy

Yoga offers a largely unexplored, widely available resource for the management of psychosomatic ailments. A number of studies exist on the efficacy of yoga.

As early as nineteen thirties Swami Kuvalayananda of Kaivalyadhama started studying the effects of yogic practices on blood pressure, heart rate etc. in yogis. Bijlani et al reported favorable metabolic effects after 9 days of yoga-based lifestyle change program (4 hours per day) in patients with hypertension and diabetes mellitus which pointed to the feasibility and efficacy short-term yoga program.

Manchanda’s study (2000) on yoga-based lifestyle change of 1 year also showed a significant reduction in total cholesterol LDL and triglycerides with significant difference between groups. Ornish et al (1998) observed that in the experimental group, LDL cholesterol levels decreased by 40% at 1 year and remained 20% below baseline at 5 years whereas in the control group, LDL cholesterol levels decreased by 1.2% at 1 year and by 19.3% at 5 years.

Monro et al (1992) carried out a controlled trial on 21 subjects with NIDDM. Fasting blood glucose and glycosylated haemoglobin reduced significantly in the group of 11 who practiced the integrated program of yoga as compared to a matched control group of 10 who did not practice yoga.
The medication requirement, symptoms scores reduced with increased PFR in the yoga group than the control group in a matched control study for 54 months in 106 asthmatics (Nagendra and Nagarathna 1985). In a study done in an Integral Health Clinic, Vempati et al. (2009) showed the efficacy of yoga in treating bronchial asthma by specially studying the immunological measures and concluded that adding the mind-body approach of yoga to the predominantly physical approach of conventional care results in measurable improvement in subjective as well as well objective outcomes in bronchial asthma.

Narendran et al (2005) showed in babies the birth-weight was significantly higher (p < 0.018) in the Yoga group (2.78 +/- 0.52 kg), compared to the control group (2.55 +/- 0.52 kg). In another study by the same author yoga was shown to improve birth weight, decrease in preterm labor, and decrease in IUGR either in isolation or associated with PIH, with no increased complications (Narendran et al 2005).


A study by Rao et al (2009) showed anxiolytic effects of a yoga program in early breast cancer patients undergoing conventional treatment. Results showed overall decrease in both self-reported state anxiety (p<0.001) and trait anxiety (p=0.005) in yoga group as compared to controls.
Haslock (1994) reported the beneficial effect on grip strength and Stanford health assessment questionnaire disability index in 10 severe rheumatoid arthritis subjects, as compared to 10 matched controls who participated in a programme of IAYT.

Research done in our institute have shown that specific Práïáyáma practices can have relaxing effect on the sympathetic nervous system thereby reducing stress levels (Telles S et al 1994). Studies on different types of meditation have consistently shown increased mental alertness even while being physiologically relaxed. Om meditation that was used in this study has also been shown to provide this psychophysiological rest (Shirley Telles et al 1995).

Om meditation and cyclic meditation showed reduced oxygen consumption suggesting psychophysiological rest. Thus, these yogic practices be it physical or breathing or mental, practiced independently or as a combination seem to produce better mental alertness even while being physiologically relaxed both in the sick and healthy persons that may account for the reduction in anxiety and depression (Shirley Telles et al., 1995).

Jnana yoga promotes the introspective realization that ‘I have the internal freedom and behavioural autonomy to react or not to react to a situation as my true nature is a state of unchanging state of bliss (saccidananda)’ (Nagarathna R et al, 2000). This realization makes the participant unearth the root cause of the emotions (anxiety or depression) that had resulted in the somatic response of pain (Nagarathna R et al, 2001).

Practices such as meditation and Práïáyáma are known to promote neural plasticity in a positive direction as seen in our studies which showed improvement (Shirley Telles et al., 1994, Telles S et al., 1993) in information processing at the primary thalamo-cortical level (seen as decreased latency and increased amplitude of Na waves in middle latency auditory evoked potentials).
3.14 Yoga & back pain

A randomized control trial was conducted in subjects with non-specific chronic low back pain comparing Iyengar yoga therapy to an educational control group. Both programs were 16 weeks long. The primary outcome for the study was functional disability (Williams et al, 2005). Secondary outcomes including present pain intensity, pain medication usage, pain-related attitudes and behaviors, and spinal range of motion were measured before and after the interventions. These preliminary data indicate that the majority of self-referred persons with mild chronic low back pain will comply to and report improvement on medical and functional pain-related outcomes from Iyengar yoga therapy. Vini yoga (Sherman et al, 2005) was effective in reducing pain, analgesic usage and functional disability when administered as an outpatient intervention for 4 months. Trends in the functional measurement scores showed improved balance and flexibility and decreased disability and depression for the yoga group but this pilot was not powered to reach statistical significance (Galantino et al, 2004). Significant limitations included a high dropout rate in the control group and large baseline differences in the secondary measures. One study lacked a control group (Vidyasagar et al., 1989). Nespor K., (1989) reports about the psychosomatics of back pain and the use of yoga. In this article, a review is given of the psychosomatic aspect of back pain and the use of multi-dimensional methods of managing back pain. A study without control groups on Veterans Administration (VA) patients were undergoing 10-week yoga training. Baseline and follow-up data available for 33 participants show significant improvements for pain, depression, energy/fatigue, and the Short Form-12 Mental Health Scale. The number of yoga sessions attended and the frequency of home practice were correlated with improved outcomes. It was a pre-post study design which was a limitation. (Groessl et al 2008).