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The Effects of Yoga, Patient Education on the Physical and Psychological Symptoms of Chemotherapy

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Abstract

Background and purpose: Non-specific low back pain (NSLBP) or mechanical low back pain has become a significant problem due to high healthcare utilization, rising costs of care and perceived limitations of effectiveness of many current treatments. It is a significant source of long-term disability and absence from work and a substantial burden in industrialized societies. The purpose of the study was to compare the effects of clinical Pilate exercises in comparison with McKenzie exercises in reducing pain, disability and improving lumbar flexibility in patients with non-specific low back pain and also to compare the effectiveness of clinical Pilates exercises over McKenzie exercises on pain, disability and flexibility in non-specific low back pain.

Materials and methods: The research design is quasi experimental design with comparative in nature.60 subjects with non specific low back pain ,Age group of (18 to 40) Mean+SD A (24.77+3.674) B (25.33+3.527) years were included in the study by convenient Sampling according to inclusion & exclusion criteria. Pre test readings of pain by NPRS, Functional disability by Modified Oswestry low back pain and disability index scale and lumbar flexibility by sit and reach test of patients in both the groups were taken before the intervention. Group-A received clinical Pilate's exercises protocol and Group-B received McKenzie exercises protocol for 45 min/day, two sessions per week for 4 week.

Results: According to data analysis, the t value of NPRS, ODI, Lumbar Flexibility are 3.944 ($p<0.05$), 2.298 ($p<0.05$), 9.181 ($p<0.05$) respectively.

Conclusion and clinical signification: The study concludes that Clinical Pilates exercises and McKenzie exercises both are equally significant in reducing pain and disability but clinical Pilates exercises is more significant in improving the flexibility in Non-Specific low backache patient.

Keywords: Clinical Pilates exercises; McKenzie Exercises; Non specific low backache

Introduction

Low back pain is a major diagnostic and therapeutic problem, which causes a great deal of suffering and is a major expense to society [1]. Low back pain represents a particularly costly socio medical problem. These patients use more than 80% of health care resources. Thus, the development of effective interventions aimed at management of the chronic problems is urgently required [2]. Back pain complaints are second only to upper respiratory conditions as a cause of work absenteeism [3]. Internationally, mechanical low back pain has been seen to be more prevalent in countries with higher per capita income e.g. Germany, Sweden, Belgium. An estimated 1.3 billion days a year are lost for work in US on account of low back pain. This amounts to be more than $20 billion in direct costs & approx $50 billion per year if indirect expenses are included [4].

The lifetime prevalence of spinal or back pain ranges from 4.7% to 74.4%. The lifetime prevalence of low back pain had a similar range, 7% to 72% [5]. In a study conducted in rural north India it was observed 23.09% patients reporting to outpatients' clinics during 1st year had back pain. It remains the leading cause of disability in persons younger than 45 years old and comprises approximately 40% of all the population. In this group 67% had psychosocial issues, 57% were in blue-collar jobs (heavy manual workers). 26% had to changes or leave their profession & 38% did not enjoy their present jobs [6]. In India, occurrence of low back pain is also alarming; nearly 60 per cent of the people in India have significant back pain at some time or the other in lives [7].

LBP is defined as pain and discomfort in the lumbo-sacral region, below the twelfth rib and above the gluteal crease. According to the recommended diagnostic triage, three types of back pain can be defined: 1) non-specific low back pain; 2) back pain with nerve root symptoms; and 3) back pain resulting from serious pathology (e.g. malignancy, fracture, ankylosing spondylitis, infection). Non-specific LBP, in which there is no recognized patho-anatomic cause, is usually a benign condition but without appropriate management can develop into chronic LBP. Using the traditional classification system, LBP is also categorized according to its duration from onset, as acute (<6 weeks), sub-acute (6 weeks-12 weeks), and chronic (>12 weeks) [8].

Non-specific low back pain (NSLBP) or mechanical low back pain has become a significant problem due to high healthcare utilization, rising costs of care and perceived limitations of effectiveness of many current treatments. It is a significant source of long-term disability and absence from work and a substantial burden in industrialized societies [9]. Mechanical low back pain may be defined as the pain secondary to overuse, injury or deformity of a structure. These disorders are quite specific and local in nature, affecting the specific anatomic location and relationship. Systemic illness plays no role in

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the etiology of specific low back pain [10] of all cases of mechanical LBP, 70% are due to lumbar strain or sprain and postural dysfunction, 10% are due to age-related degenerative changes in disc & facets, 4% are due to herniated disc, 4% are due to osteoporotic compression fracture, and 3% are due to spinal stenosis. All other causes account for less than 1% of cases [4]. Most back pain is non-specific or mechanical pain of musculoskeletal origin in which symptoms vary with physical activities and includes a variety of different conditions [11].

A simple and practical classification which has gained international acceptance is to divide low back pain into 3 categories- the so called 'Diagnostic triage' [12].

- Specific spinal pathology
- Nerve root pain/radicular pain
- Non-specific low back pain

Non-specific low back pain has become a significant problem due to high health care utilization, rising costs of care lead to limitations of effectiveness of many current treatment. It is a significant source of low back disability and chronic low back pain and absence from work and a substantial burden in industrialized societies [13]. It means low back pain that is not attributable to a recognizable, known specific pathology that is having no clear specific cause. In clinical practice, the triage is focused on identification of 'red flags' as indicators of possible underlying pathology, including nerve root problems. When red flags are not present, the patient is considered as having non-specific low back pain [14].

The abnormal posture has lead to mechanical low back pain. The most common postural abnormality seen in people with protruded abdomen, increased lordosis with in addition is worsened by their sedentary lifestyle. This tends to result in a distinctive pattern of muscle imbalance in which muscles are either tight or weak [15]. Adolescents with recurrent non-specific LBP had significantly reduced lumbar sagittal mobility, lateral spinal flexion and abdominal muscular endurance compared with matched controls. Spinal mobility and trunk muscular endurance are biological risk indicators [16].

All international clinical guidelines for low back pain agree on the importance of diagnostic triage: Nerve root pain (usually associated with disc prolapse or spinal stenosis; about 5% of cases), possible serious spinal pathology (the so-called "red flags" for vertebral fracture, spinal tumor or infection, or cauda equina syndrome; about 1–2% of cases), nonspecific low back pain (85–95% of cases). Thus, unfortunately, in 80 to 90% of back pain cases there are no evident objective findings, and therefore difficult to establish a pathological basis of pain [17,18].

It is now recognized widely that back problems generally are not due to mal adaptation caused by upright posture, but rather to abuses of the body that are common in modern life. This includes lack of exercise and poor posture, stress, and the requirement that one be in unusual positions for long periods of time, such as bending forward on an assembly line or on a computer. In short, anything which decreases normal lordosis causes problems. Other major factors that lead to back problems are bone deterioration that can affect the back, Smoking (which contributes to osteoporosis) and obesity [19].

Physical and Biomechanical factors including postural stresses (high spinal loads and awkward postures), whole body vibration, heavy work, frequent lifting and prolonged and repeated binding, driving, sitting, and twisting have been considered to be associated with back pain and disc prolapses [20]. Hoogendoorn et al. 1999 [21] also found strong evidence for handling manual materials, bending, twisting, and whole body vibration, and moderate evidence for heavy physical work as risk factors for LBP. Chen et al. 2009 [22] confirmed that sedentary lifestyle by itself is not associated with LBP.

Physical therapy treatment for non specific low back pain starts with educating the patient about correct movement and posture. Some physical therapists use methods of therapy that apply heat, electric stimulation and ultrasound to the affected area. Also the combination of flexibility and strengthening exercises of back: low-impact aerobics, swimming, biking, walking, strength training exercises, regular flexibility exercises, contraction exercises that retrains back muscles, and yoga, tai chi, or Pilates exercise programs [23].

In 1981, Robin McKenzie proposed a classification system and individualized treatment regimen for low back pain called "diagnostic and mechanical therapy" or, simply, the McKenzie method. The McKenzie method consists of three steps: evaluation, treatment, and prevention. The evaluation step is conducted using repeated movements and sustained positions where the symptoms in the lower back and lower limbs are classified into three subgroups: 1) derangement syndrome, 2) dysfunction syndrome, and 3) posture syndrome.

The choice of appropriate exercises in the McKenzie method is based upon the direction (flexion, extension, or lateral shift of the spine) that can lead to the following possible responses: pain reduction, "centralization of symptoms" (i.e., symptoms migrating towards the middle line of the body), and the complete recovery of pain. The prevention step consists of educating and encouraging the patient to exercise regularly and self-care. Physiotherapists commonly adopt the McKenzie Method for treating patients with LBP.

A recent systematic review concluded that there is insufficient evidence to evaluate the effectiveness of the McKenzie Method for patients with LBP. A critical concern is that most trials to date have not implemented the McKenzie Method appropriately. The most common flaw is that all trial participants are given the same intervention regardless of classification, an approach contradictory to the principles of McKenzie therapy [24].

The Pilates method was created by Joseph Pilates, who combined exercise/movement, philosophy, gymnastics, martial arts, yoga, and dance into an approach for healthy living. This program of mind-body exercise is based on 6 key principles: centering, concentration, control, precision, flow, and breath [19]. According to Pilates, his method is total coordination of body, mind, and spirit, promoting the uniform development of the body; restoration of good posture and physical activity; and revitalization of the mind and spirit [25]. Pilates, an exercise approach, has recently become popular in fitness and rehabilitation.

Although, the popularity of Pilates has heightened since 1990, Joseph Pilates (1880-1967), founded this approach during WWI. He utilized these exercises and began devising equipment to rehabilitate the internees struck with wartime disease and physical injury. The intent of Pilates training is to improve flexibility, strength, and balance through physical movement. Pilates exercises are designed to be adapted for all different fitness and rehabilitation levels. The positions utilized in Pilates are designed to put participants in a position that minimizes unnecessary muscle recruitment and focuses on the core: back extensors and the abdominal musculature.

The goal of Pilates is increased core strength without straining peripheral joints. This is done by coordinating breathing with movement; maintaining scapular, pelvic and rib cage stabilization; and maintaining correct cervical and head placement throughout physical movement. This exercise approach is similar to lumbar stabilization programs used in the treatment of low back pain [26].

Clinical Pilates is a form of physical exercise that focuses on posture, core stability, balance, control, strength, flexibility, and breathing. The Pilates Method was developed by Joseph Pilates in the early 20th century in Germany. These days, Clinical Pilates is often used in conjunction with physiotherapy as a means of treating a variety of injuries, particularly those of the neck and back. This is based on literature that demonstrates strong evidence to support the use of therapeutic exercise in the management of patients with injuries, particularly low back pain. Recent research advocates the retraining of the deep stabilizing muscles for patients with low back pain. Clinical Pilates focuses on the retraining and recruitment of these stabilizing muscles (core stability) as well as improving posture, strength and flexibility [27].

Need of the study

Low back pain is a leading cause of disability. It occurs in similar proportions in all cultures, interferes with quality of life and work performance, and is the most common reason for medical consultants. It is a significant source of long term disability and frequent absenteeism at work.

Many studies have proved the effect of Pilate's exercises technique with another intervention in low back ache. McKenzie exercises also been found beneficial in treatment of low backache. A very few studies have documented the effect of clinical Pilates exercises in reduction pain, disability and increasing flexibility in non-specific low backache but there no study claim the difference on these two exercise protocol. So the present study intends to find out the effective protocol to improve functional level of the patients with low backache.

Significance of study

The finding of the study can be used to determine the most effective protocol used by physiotherapist who will be treating low backache patients.

The finding would determine whether Clinical Pilates can be used over the McKenzie exercises for the reduction of pain and disability and increase in flexibility in patients with non specific low back ache or vice versa.

The study will help in determining the effective physiotherapy rehabilitation program for both patients with non specific low backache as well as for the physiotherapists dealing with such patients who in turn can be used as an interventional tool for improving the functional ability of the back pain patients.

The result of this study will provide physiotherapy community a new insight about a better treatment of non specific low backache among Clinical Pilates exercises and Mackenzie exercises.

Aims and objectives

To find out the effect of clinical Pilates exercises on pain, disability and flexibility in non-specific low backache.

To find out the effect of McKenzie exercises on pain, disability and flexibility in non-specific low backache.

To compare the effectiveness of clinical Pilates exercises over McKenzie exercises on pain, disability and flexibility in non-specific low backache.

Hypothesis

Null Hypothesis (H_0): There is no significant difference in effect of clinical Pilates exercises and McKenzie exercises on pain, disability and lumbar flexibility in non-specific low backache.

Alternate Hypothesis (H_1): There is significant difference in effect of clinical Pilates exercises and McKenzie exercises on pain, disability and lumbar flexibility in non-specific low backache.

Operational definitions

Pilates Technique: Cassity (2004) defined Pilates as a rehabilitation method that aimed to improve the stability of the core muscles, for example by the improvement of the activation of trunk muscles and enhanced pelvis and lumbar spine stability through the performance of sequential movement. Pilates is a movement system designed for rehabilitation purposes that utilized biomechanical principles, including lowering the centre of gravity and increased base of support during the performance of specific exercises that are performed either on the floor or on resistance equipment utilizing springs and tables (Anderson, 2001). All the exercises in the repertoire could be modified by changing the length of lever arms situated in the limbs in the performance of progressive exercises which allow for the facilitation of motor changes in the trunk area and lower back (Faccioni, 1994). Brody (1998) stated that Pilates consisted of a combination of strengthening exercises for core postural stabilization to achieve abdominal control and muscle symmetry and balance and flexibility training.

Nonspecific low back pain: Pain occurring primarily in the back with no signs of a serious underlying condition (such as cancer, infection, or caudaequina syndrome), spinal stenosis or radiculopathy, or another specific spinal cause (such as vertebral compression fracture or ankylosing spondylitis). Degenerative changes on lumbar imaging are usually considered nonspecific, as they correlate poorly with symptoms [8].

McKenzie Technique: Robin McKenzie proposed a classification system and individualized treatment regimen for low back pain called "diagnostic and mechanical therapy" or, simply, the McKenzie method. The McKenzie method consists of three steps: evaluation, treatment, and prevention [28].

Pain-Pain has been defined as unpleasant sensory and emotional experience associated with actual and potential tissue damage [29].

Disability: Any restriction or lack (resulting from impairment) of ability to perform an activity in the manner or within the range considered normal for a human being [30].

Flexibility:-Flexibility refers to the absolute range of movement in a joint or series of joints that is attainable in a momentary effort with the help of a partner or a piece of equipment. Flexibility in some joints can be increased to a certain degree by stretching [31].

Review of Literature

Safoora Ebadi et al. 2011 [28] showed that a total of 46 patients, between the ages 18 and 65 years old who have had LBP for more than three months will be recruited from university hospitals. Participants will be randomized to receive continuous ultrasound plus exercise therapy or placebo ultrasound plus exercise therapy. These groups will be treated for 10 sessions during a period of 4 weeks. Primary outcome measures will be functional disability and pain intensity. Lumbar flexion and extension range of motion, as well as changes in electromyography muscle fatigue indices, will be measured as secondary outcomes. All outcome measures will be measured at baseline, after completion of the treatment sessions, and after one month. The results of this trial will help to provide some evidence regarding the use of continuous ultrasound in chronic LBP patients. This should lead to a more evidence-based approach to clinical decision making regarding the use of ultrasound for LBP.

Machado et al. 2010 [32] conducted a study on low back pain. One hundred and forty-eight participants were randomized into study groups, of whom 138 (93%) completed the last follow-up. The addition of the McKenzie method to first-line care produced statistically significant but small reductions in pain when compared to first-line care alone: mean of -0.4 points (95% confidence interval, -0.8 to -0.1) at 1 week, -0.7 points (95% confidence interval, -1.2 to -0.1) at 3 weeks, and -0.3 points (95% confidence interval, -0.5 to -0.0) over the first 7 days. Patients receiving the McKenzie method did not show additional effects on global perceived effect, disability, function or on the risk of persistent symptoms. These patients sought less additional health care than those receiving only first-line care (P=0.002). So a treatment program based on the McKenzie method does not produce appreciable improvements in pain, disability, function, global perceived effect or risk of developing persistent symptoms in patients with acute low back pain receiving recommended first-line care. Patients with acute low back pain receiving only the recommended first-line care seek more additional health care than patients receiving the McKenzie method.

Markku Paatelma et al. 2008 [33] stated that after following McKenzie exercises at the 3-months follow–up point, significant improvement should occur in all subjects in leg and low back pain and in the disability index in group A, At the 6-months follow-up, leg pain (-15 mm; 95% confidence interval(CI) -30 to -1),back pain(effect: -15 mm; -27 to -4) , and disability index (-4 points; -7 to -1) At the year follow –up, the McKenzie method group had (p=0.028) a better disability index (-3 points; -6 to 0) than did the advice only group. In the orthopaedic manual therapy group at the 6-month and 1-year follow-up visits, improvements in the pain and disability index were somewhat better than in the advice-only group (p=0.067 and 0.068, respectively). No differences emerged between the orthopedic manual therapy and McKenzie method groups in pain-and disability-score changes at any follow-up.

Busanich and Verscheure, 2006 [34] stated that McKenzie therapy provides reduction in short-term pain (mean reduction of 8.6 on a 100-point scale) compared with the standard therapies. A second (sensitivity) analysis was conducted to include data from 3 studies that were initially excluded because of lack of individualized treatment. The evidence supports the notion that McKenzie therapy is more effective in short-term pain relief than other therapies (reduction of 11.4 on a 100-point scale). This review provides evidence that McKenzie therapy results in a decrease in only short-term (>3 months) pain and disability for low back pain. On compared with other standard treatments, such as nonsteroidal and anti-inflammatory drugs, no statistical differences were found between McKenzie therapy and other therapies at intermediate-term (3-12 months) follow-up.

Meseguer, 2006 [35] showed that a significant improvement in the visual analogue scale following either classical or modified application of the strain/counter strain technique (P<0.001). The control group did not show any change (P>0.3). Pre-post effect sizes were large in both strain/counter strain groups (D=1.1), but small in the control group (D=0.01). Differences were found between both strain/counter strain groups as compared to the control group (P<0.001), but not between both strain/counter strain groups (P=0.8). Our results suggest that strain/counter strain was effective in reducing tenderness of tender points in the upper trapezius muscle. The application of a longitudinal stroke during the strain/counter strain did not influence the effectiveness of the classical description of the technique.

Machado et al. 2005 [36] concluded that the commonly use a system of diagnosis and exercise prescription called the McKenzie Method to manage patients with LBP. However, there is insufficient evidence to support the use of the McKenzie Method for these patients. We have designed a randomized controlled trial to evaluate whether the addition of the McKenzie Method to general practitioner care results in better outcomes than general practitioner care alone for patients with acute LBP.

Udermann, 2004 [37] stated that McKenzie therapy is effective at improving physiological as well as psychosocial variables in CLBP patients, and the addition of RTLE, at the level prescribed this investigation, provided no added benefits participants were randomly assigned to 1 of 2 groups that received Mc therapy. One group received McKenzie therapy combined with RTLE (McKenzie+RTLE), and the other group received McKenzie therapy only. The physiological variables evaluated during this investigation (i.e. lumbar strength, endurance, and the range of motion) significantly improved (p<.05) following 4 weeks of McKenzie therapy (no difference noted between groups). Six of 8 quality-of-life measurements (assessed by the SF-36) significantly improved (p<.05) following 4 weeks of McKenzie therapy.

Clare H et al. 2004 [38] reported in a systematic review of randomized clinical trials which was conducted to investigate the efficacy of McKenzie therapy in the treatment of spinal pain. Databases searched included Dare, cinahl, embase, medline and pedro. Six trials were found to be eligible, all comparing McKenzie therapy to a comparison treatment. These included NSAIDS, educational booklet, back massage and back care advice, strength training, and spinal mobilization and general exercises. The data from lumbar trials were pooled at short term (less than three months) and from three at intermediate (3-12 months) follow-up. At short term follow–up the McKenzie therapy provided a mean 8.6 point greater pain reduction on a 0 to 100 points scale (95% CI 3.5 to 13.7) and a 5.4 point greater reduction in disability on a 0 to 100 point scale (95% CI 2.4 to 8.4) than comparison . At intermediate follow-up, relative risk of work absence was 0.81 (0.46 to 1.44) favouring McKenzie, however the comparison treatments provided a 1.2 point greater disability reduction (95% CI -2.0 to 4.5).

Moseley, 2002 [39] emphasized that combined physiotherapy treatment consisting of manual therapy, specific exercise training and neurophysiology education is effective in producing functional and symptomatic improvement in chronic low back pain patients. By concealed randomization, 57 chronic low back pain patients were allocated to either the four week physiotherapy program or management as directed by their general practitioners. Positive findings were seen in the treatment group as compared to the control group.

Hides and Jull, 2001 [40] conducted a study on 39 patients for first episode of low back pain. Patients randomly allocated to 2 groups; either specific exercise group or control group. One year after treatment, specific exercise group recurrence was 30%, and control group recurrence was 84% (P 0.001). Two to three years after treatment, specific exercise group recurrence was 35%, and control group recurrence was 75% (P<0.01). They concluded that specific exercise therapy in addition to medical management and resumption of normal activity may be more effective in reducing low back pain recurrences than medical management and normal activity alone [36].

Lewis and Cynan et al. 2001 [41] concluded that strain-counter strain (S-CS) is a manipulative technique routinely used by manual practitioners to treat somatic dysfunction. However, no peer-reviewed literature to support or refute its use has been reported. In the four clinical cases reported, S-CS was initially provided as the sole treatment for low back pain. The S-CS intervention phase for each case took approximately one week and consisted of 2 to 3 treatment sessions to resolve perceived "aberrant neuromuscular activity." Outcome measures were derived from the McGill Pain Questionnaire and the Oswestry Low Back Pain Disability Questionnaire. All patients registered reductions in pain and disability following S-CS intervention. No experimental evidence for the effectiveness of S-CS is offered, although outcomes do suggest that a controlled study is warranted to examine the effectiveness of S-CS for the treatment of low back pain.

La Touche et al. [42] have been published on the effectiveness of the PME in relieving pain and improving function in adults with low back pain concluded that when adapted for subjects' situations, the PME improved general functioning and decreased pain.

Posadzki et al. [43] reported inconclusive evidence to support the clinical effectiveness of the PME in reducing pain and functional disability. Critical Review of Previous Research of Pilates for Treatment of LBP To date there have been four studies investigating the effect of Pilates on CLBP, and one review article in which the three studies were considered (La Touche et al. 2008). Published to date, there have been two randomized controlled trials (RCT) (Gladwell et al. 2006; Rydeard, Leger & Smith, 2006), one clinically controlled trial (Donzelli, Di Domenica, Cova, Galletti & Giunta, 2006), and one comparative trial of three different Pilates regimens (Curnow et al. ,2009).

Lim EC et al. 2011 [38] compare pain and disability in individuals with persistent nonspecific low back pain who treated with Pilates exercises compared to minimal or other interventions. Randomized controlled trials were selected and reviewed if they compared pain and disability in individuals with persistent nonspecific low back pain who treated with Pilates exercises compared to other treatment approaches. Quality of the trails was evaluated. Data for pain and disability scores were extracted. Narrative synthesis plus meta-analyses were performed, and tests for heterogeneity. Seven RCT were identified and included in the meta-analyses. Data pooling was performed using RevMan5. When compared to minimal intervention, Pilates–based exercises are superior to minimal intervention for pain relief. Existing evidence does not establish superiority of Pilates-based exercise to other forms of exercise to reduce pain and disability for patients with persistent non specific low back pain.

Phrompae et al. 2011 [44] assess and compare the effects of Pilates exercise on flexibility and lumbo-pelvic movement control between the Pilates training and control groups. Forty healthy male and female volunteers were randomly divided into Pilates-based training (20 subjects) and control groups (20 subjects).The Pilates group attended 45-minutes training sessions, 2 times per week, for a period of 8 weeks. Flexibility and lumbo-pelvic stability tests were determined as outcome measures using a standard "sit and reach test" and "pressure biofeedback " respectively at 0,4 and 8 weeks of the study. The results showed that the Pilates training group improved flexibility significantly during time intervals. This effect was also significantly greater than control group for both 4 weeks and 8 weeks of the training period. Pilates can be used as an adjunctive exercise program to improve flexibility, enhance control-mobility of trunk and pelvic segments. It may also prevent and attenuate the predisposition to the axial musculoskeletal injury.

Korkmaz, 2010 [45] investigate the effect of Pilates exercises on the social physical concern (SPC) of patients with fibromyalgia syndrome and determine the effect of Pilates exercises on strength, body mass index, pain and depression. 25 female patients diagnosed with FMS according to the American College of Rheumatology criteria. Patients administrated 24 session Pilates exercise program for 12 weeks. Prior to exercise and at the end of the 12th week, the patient's weight, grip strength of the hands, back strength, body fat ratio, and BMI were measured. Before and after exercise measurements were compared. The level of patients using for; pain-VAS, depression Beck Depression Inventory, SPC-social Physique Anxiety Scale (SPAS). Result after 12-weeks shows Pilates program had positive effects on anthropometric parameters, SPC, and pain and depression levels of FMS patients. Patients with FMS can safely perform Pilates exercises to control weight, improve physical appearance , and reduce SPC and pain and depression levels, and no adverse side effects were observed.

Kloubec et al. 2010 [46] determined the effects of Pilates exercise on abdominal endurance, hamstring flexibility, upper-body muscular endurance, posture, and balance. Fifty subjects were recruited to participate in a 12-weeks Pilates class, which met for 1hour 2 times per week. Subjects were randomly assigned to either the experimental (n=25) or control group (n=25).Subjects performed the essential (basic) mat routine consisting of approximately 25 separate exercises focusing on muscular endurance and flexibility of the abdomen, low back and hip each class session. At the end of the 12-weeks period, 1-way analysis of covariance showed a significant level of improvement in flexibility, posture and balance. This study suggests that individuals can improve their muscular endurance and flexibility using relatively low intensity Pilates exercises that do not require equipment or a high degree of skill and are easy to master and use within a personal fitness routine.

Pajek et al. 2009 [27] reports the incidence and prevalence of spinal injuries and low back pain in artistic gymnastics. The origin of low back pain is described and analyzed. Pilates is an increasingly popular system of body-stabilising exercise. Its main principles are devoted to activation of the muscles contributing to spinal stabilization. This study implementing similar lower-trunk stabilizing principles as Pilates, gymnastics couches may be encouraged to implement this kind of exercise for prevention and treatment of chronic low back pain in gymnasts.

Curnow et al. 2009 [47] to compare the effects of three different Pilates regimes on chronic, mild low back pain symptoms and to determine whether the efficiency of load transfer through the pelvis is improved by those exercises. A between subjects equivalent group experimental design was used. The independent variable was the type of exercise training (three groups) and the two-dependent variables were low back pain symptoms and load transfer through the pelvis. The outcome measures of the first dependent variable were a comparison between modified Oswestry Disability Questionnaires (one of the standard pain instruments) completed pre-and post-program and frequency, intensity and duration of low back pain. The outcome measure of the second-dependent variable, efficiency of load transfer through the pelvis was the stork test (one legged standing test) in weight bearing. Although all groups experienced statically significant reduction in frequency, intensity and duration of low back pain across the weeks of exercising, there were no significant differences between the groups relative to each other.

Touchea et al. 2007 [48] conducted systemic review and analyze scientific articles where the Pilates Method was used as treatment for non-specific chronic low back pain. The criteria used for inclusion were randomized controlled trails and clinical controlled trails where therapeutic treatment was based on the Pilates Method. The analysis was carried out by two independent reviewers using the PEDro and Jadad Scales. Two RCTs and one CCT were selected for a retrospective analysis. The results of the studies analyzed all demonstrate positive effects, such as improved general function and reduction in pain when applying the Pilates Method in treating non-specific CLBP in adults.

Betul et al. 2007 [49] determined the Effect of Pilates Exercise on trunk strength, endurance and flexibility in sedentary adult females. 38 subjected randomly assigned; 21 women of the exercise group and 17 women in control groups. Exercise group were given intervention 3 times a weeks. At the end of 5 weeks statistical analysis done by SPSS (version 9.0), one way analysis and t-test. Result show that Pilates exercise group shows more improvement (on trunk strength, endurance, and flexibility) than control group.

Valerie et al. 2006 [50] investigate the program of Pilates Improve Chronic Non-Specific Low Back Pain: Improvements were seen in the Pilates group post-intervention period with increases ($P<0.05$) in general health, sports functioning, flexibility, proprioception and a decrease in pain. The control group showed no significant differences in the same measures post-intervention. These data suggests that Pilates used as a specific core stability exercise incorporating functional movements can improve non-specific chronic low back pain in an active population compared to no intervention. Additionally, Pilates can improve general health, pain level, sports functioning, flexibility, and proprioception in individuals with chronic low back pain.

Melinda et al. 2003 [51] proposed the Pilates exercise can be introduced into a physical therapy program as a procedure incorporating both the traditional applications of physical therapy principles and goals, affecting strength, flexibility, and pain, while enhancing it with a reeducation approach using somatic principles and theory. Breathing patterns are incorporated and the entire body is engaged. Functional patterns of movement are performed with the guidance of the therapist. Positions include supine, prone, sitting, kneeling, quadruped, Standing and a variety of other postures that require balance and control.

Materials and Methods

Study design

Quasi experimental design with comparative in nature.

Study setting

Outpatient department of physiotherapy Sri Baldev Raj Mittal Hospital, Lovely Professional University Chehru Phagwara (Punjab).

Population and sampling

- Patient with non-specific low backache
- Convenient Sampling
- 60 subjects divided into two groups by a chit system method 30 Patients each.

Selection criteria

Inclusion criteria:

- Age group between 18-40 yrs age population
- Both the genders are included.
- Patients with non specific low back pain
- Pain for more than six week
- Low back pain with and without radiating pain
- Low back pain with hamstring tightness

Exclusion criteria:

- Fracture, tumor, inflammatory or infective disease of the spine
- Cauda equine syndrome
- Major surgery within the past year
- Nerve root compromise (at least 2 of the following signs: weakness/reflex changes/sensation loss)
- Severe respiratory, cardiac or metabolic disease, renal disease, malignancy
- Pregnancy

Parameters

- Pain
- Functional Disability
- Lumbar Flexibility

Instruments and tool

Numeric pain rating scale: Numerical pain rating scale to intensity to discomfort in numbers ranging from 0-10. Rating the intensity of sensation is one way of helping the physician to determine treatment. Pain scale is based on self-report, observational and physiological data. The reliability for Numerical Pain Rating Scale is 0.847 [52].

Modified Oswestry low back pain and disability index: Oswestry disability index covers 10 domains. It is designed to assess how pain affects various activities of daily living (pain level, personal care, lifting, walking, sitting, standing, sleeping, sex life, social life, and travelling). Higher score means greater activity limitation. Total possible score is 100.The scale is design to assess disability in LBP patients and is recommended as a functional score for back pain. Depending on the score, the patients can be categorized minimal or minimal disability (0-20%), moderate disability (21-40%), severe disability (41-60%), crippled (61-80%), and bed ridden (80-100%). Fairbank JCT & Pynsent conducted a detailed validation of the questionnaire. The ODI has been tested for good reliability. The reliability of Oswestry disability index is 0.84 [53].

Sit and reach test (Box): The sit and reach test is a common measure of flexibility, and specifically measures the flexibility of the lower back and hamstring muscles. This test is important as because tightness in this area is implicated in lumbar lordosis, forward pelvic tilt and lower back pain. This test was first described by Wells and

Citation: Girish C, Rati (2013) Efficacy of Clinical Pilates Exercises and McKenzie Exercises In Non Specific Low Backache. J Nov Physiother 3: 164. doi:10.4172/2165-7025.1000164

Dillon (1952) and is now widely used as a general test of flexibility. The reliability of Sit and Reach Test is 0.94 [54].

Procedure

Before the main study a pilot study was conducted consisting 5 patients each group. Based on the pilot study main study was conducted with sample size 60 eligible patients with non specific low backache between the age group 18 to 40 years of both genders were included in the study according to the specified inclusion & exclusion criteria. They were informed to sign the consent form by explaining the whole procedure of the study. Then patients were allocated into two Groups-Group A and Group B (30 each) by chit method. In both groups baseline measures (Pre test) were assessed for level of pain by NPRS, Functional disability by Modified Oswestry low back pain and disability index scale and lumbar flexibility by sit and reach test of patients in both the groups were taken before the intervention (Table 1) (Figure 1).

Group-A received first heat therapy by hot pack for 10 min and then clinical Pilate's exercises protocol was given to them for 4 weeks as described below:

Breathing practice: Lying supine in neutral spine position inhale through nose, exhale through mouth engaging Pelvic Floor (PF) and Transversus Abdominis (TrA) with every exhalation maintain this position for 5 minutes.

Variable		Group A (N=30)	Group B (N=30)
Gender	Males	21	23
	Females	9	7
Age	Males	24.90	24.50
	Females	24.44	24.57
Types of exercises		Clinical Pilates Ex	McKenzie Ex

Table 1:

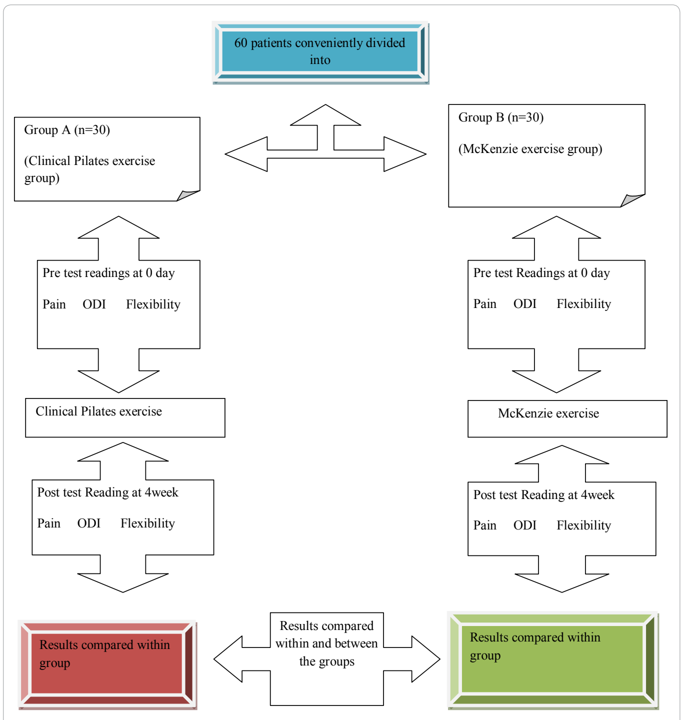

Figure 1: Summary of procedure.

Modified spine twists: Lateral rotation of spine and obliques (waist), keep hips facing forwards arms out of sides, shoulders down, chest lifted, contraction of TrA and pelvic floor muscles maintain this position for 5 minutes.

Spine stretch forward: Strengthens deep abdominals and TrA and help to develop a better posture, increases flexibility in hamstrings too, keep shoulders away from ears, move from Abs first, bringing them towards the spine to help reach forward, deep cleansing breaths to encourage deep stretch maintain this position for 5 minutes.

Seated knee extension: Sitting on bar, feet on carriage maintain good spinal position extend knee maintain this position for 5 minutes

Standing hip abduction: One foot on bar, other on carriage, maintain good spinal position, keeping knee straight push carriage away maintain this position for 5 minutes.

Kneeling press: Kneeling on carriage, hands onto bar, maintain good spinal position push arms into flexion to move carriage backward. Maintain this position for 5 minutes.

Group-B also received first heat therapy by hot pack for 10 min and then McKenzie exercises protocol was given for 4 weeks to them as described below:

Prone lying: Lie on the stomach with arms along the sides and head turned to one side. Maintain this position for 5 minutes.

Prone lying on elbows: Lie on stomach with weight on elbows and forearms and hips touching the floor or mat. Relax lower back. Remain in this position 5 minutes.

Prone press-ups: Lie on stomach with palms near shoulder, as if to do a standard push–up. Slowly push shoulder up, keeping your hip on the surface and letting back and stomach sag. Slowly lower the shoulders, repeat 10 times.

Prone lying: With arms raising forwards and holding this position for 5 minutes and then returning back to normal prone lying, repeat it for ten times.

Progressive extension:-with hands at sides lie on stomach and raise head, shoulders and chest then stay in that position for 5 minutes and then return back to normal prone lying, repeat this for 10 times.

Standing extension: -While standing, place hands in the small of back and lean backward. Hold for 5 minutes and repeat 10 times .Use this exercise after normal activities during the day that place back in a flexed position: lifting forward bending, sitting, etc.

If improvements in symptom response were not sustained, patient generated forces were supplemented by the clinician generated forces: overpressure by the therapist within the same treatment direction.

The exercise session was started on the second day of the study. Patients were asked to refrain from eating a heavy meal 1-2 hours prior to exercise and they were asked to wear loose fitting clothes during the exercise session. The duration of each session was 45 min/day and the duration of the whole exercise protocol was two sessions per week for 4 weeks with 10 repetitions for each exercises.

After the interventional duration of 4 weeks, the post test readings of pain by NPRS, functional disability by Modified Oswestry low back pain and disability index scale and lumbar flexibility by sit and reach test were again recorded for both the groups Group-A (received clinical Pilates exercises) and Group-B (received McKenzie exercises).

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Age	Mean ± SD	t- value	Level of Significance
Group A	24.77 ± 3.674	0.609	0.5446 NS
Group B	25.33 ± 3.527		

SD=standard deviation, t-value=unpaired test value, NS=not significant (p>0.05)

Table 2: Mean and SD of age of the subjects for the Group A and Group B.

After this both the Pre and Post test readings were compared to find out the results.

Statistical tool

Data analyzed by paired t-test or unpaired t-test and SPSS V.16.0 software used to compare the pre and post test readings.

Data Analysis and Result

Data analysis was carried out after collecting the data for the three outcome measures of the patients in both the groups. The comparison was to be done between the NPRS, Modified Oswestry low back pain and disability index scale (ODI), Lumbar Flexibility sit and reach test (in cm) of patients of the group A and patients of the group B. As the comparison was done within and between the two groups, the sample size was small (n=30 group A and n=30 group B) so paired and unpaired t-test was used (Table 2).

The relevant t test statistics is calculated from the data and then compared with its probable value based on the t-distribution at a specified level of significance for concerning degrees of freedom for accepting or rejecting the null hypothesis. (Kothari 2007).

Arithmetic mean

It gives the average value of the whole range of the data given. Its value is obtained by adding together all the items and by dividing this total by the number of items. Using statistical formula for the mean, for a given number of subjects, mean of different age groups and variables were calculated by:-

$$\overline{X} = \frac{\sum X}{N}$$

Where, $\overline{X}$ =Arithmetic Mean

$\sum x$ =Sum of the variable

N=the total number of variables.

Standard deviation (σ)

It is defined as the positive square root of the arithmetic mean of the squares of the deviations of the given observations from their arithmetic mean. It is used mostly in research studies and is considered to be the best measure of depression of a series.

Where, x=the individual score

$\overline{X}$ = The mean score

N = the total number of scores.

Standard error

It enables the management of magnitude of sampling error. It is calculated by the following formula:

$$Standard\ Error(\sigma_{\mu}) = \frac{\sigma}{\sqrt{n}}$$

n=sample size, σ=standard deviation

Paired t test

For judging the significance of difference within the group.

$$t = \frac{\overline{X}_D - \mu_0}{S_D / \sqrt{\eta}}$$

Unpaired t test

For judging the significance of difference between the means of two samples or groups when population variance is not known.

$$t = \frac{\overline{X}_1 - \overline{X}_2}{S_{X_1X_2} \cdot \sqrt{\frac{1}{\eta_1} + \frac{1}{\eta_2}}}$$

Comparison of mean and standard deviation of subject's age (18-40 years) between the groups A (clinical Pilates Exercises) & group B (McKenzie Exercises). The mean age of group A was 24.77 ± 3.674 and that of group B was 25.33 ± 3.527 respectively. The unpaired t test value was 0.609 (P>0.05). There was no significant difference in the age group (Figure 2) (Table 3).

The mean and standard deviation of the variable NPRS within the groups A was 5.50 ± 0.938 and 0.97 ± 0.765 respectively. Paired t-test was done within group A for the variable NPRS to check the changes within the group. The t-value for NPRS was 31.994 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group (Figure 3) (Table 4).

The mean and standard deviation of the variable NPRS within the groups B was 5.93 ± 0.944 and 1.97 ± 1.159 respectively. Paired

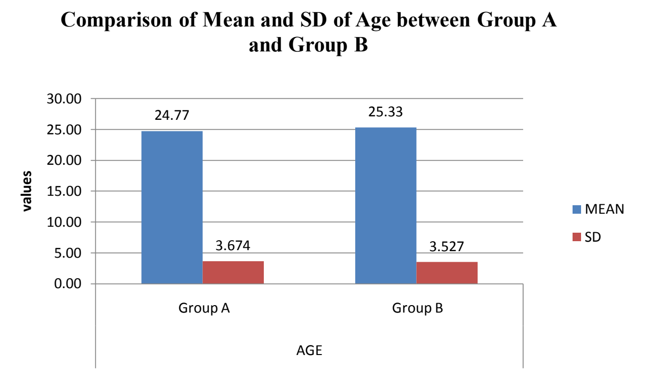

Figure 2: Showing comparison of Age (Mean ± SD) between the group A and B.

NPRS		Mean ± SD	t-value	Level of Significance
Group A	Pre Value	5.50 ± 0.938	31.994	0.000 S
	Post Value	0.97 ± 0.765		

SD=standard deviation, t-value=paired test value, S=Significant (p<0.05)

Table 3: Paired T-Test for the variable NPRS within group A.

NPRS		Mean ± SD	t-value	Level of Significance
Group B	Pre Value	5.93 ± 0.944	20.377	0.000 S
	Post Value	1.97 ± 1.159		

SD=standard deviation, t-value=paired test value, S=Significant (p<0.05)

Table 4: Paired T-Test for the variable NPRS within group B.

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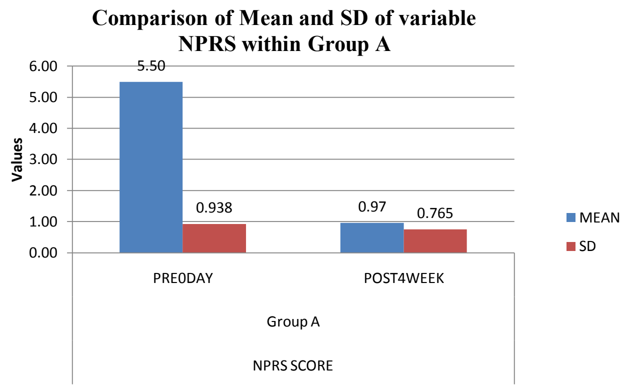

Figure 3: Showing comparison of NPRS (Mean ± SD) within the group A.

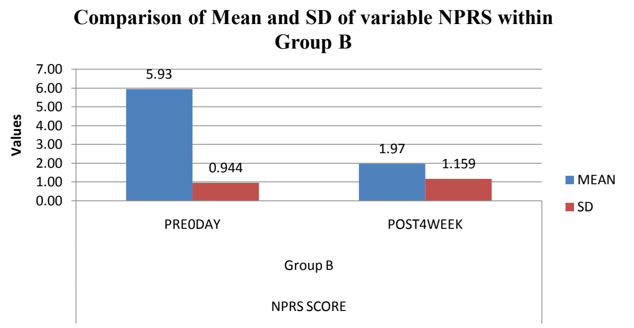

Figure 4: Showing comparison of NPRS (Mean ± SD) within the group B.

ODI		Mean ± SD	t-value	Level of Significance
Group A	Pre Value	23.40 ± 5.203	8.165	0.000 S
	Post Value	19.67 ± 4.428		

SD=standard deviation, t-value=paired test value, S=Significant (p<0.05)

Table 5: Paired T-Test for the variable ODI within group A.

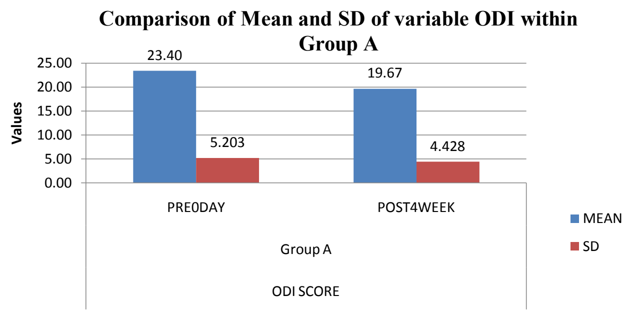

Figure 5: Showing comparison of Functional disability (ODI) (Mean ± SD) within the group.

t-test was done within group B for the variable NPRS to check the changes within the group. The t-value for NPRS was 20.377 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group (Figure 4) (Table 5).

The mean and standard deviation of the variable ODI within the groups A was 23.40 ± 5.203 and 19.67 ± 4.428 respectively. Paired t-test was done within group A for the variable ODI to check the changes within the group. The t-value for ODI was 8.165 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group (Figure 5) (Table 6).

ODI		Mean ± SD	t-value	Level of Significance
Group B	Pre Value	25.20 ± 6.294	8.839	0.000 S
	Post Value	22.67 ± 5.616		

SD=standard deviation, t-value=paired test value, S=Significant (p<0.05)

Table 6: Paired T-Test for the variable ODI within group B.

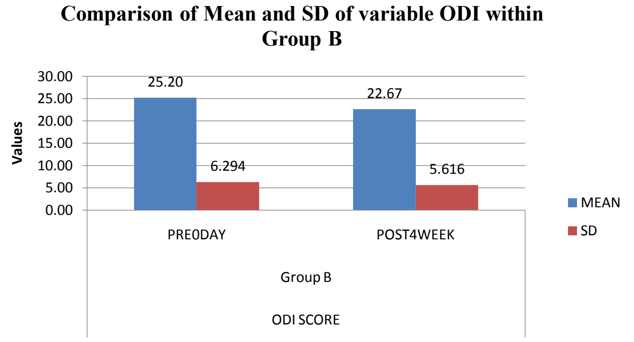

Figure 6: Showing comparison of Functional disability (ODI) (Mean ±SD) within the group.

Lumbar Flexibility (cm)		Mean ± SD	t-value	Level of Significance
Group A	Pre Value	-5.95 ± 2.090	18.318	0.000 S
	Post Value	1.43 ± 1.278		

SD=standard deviation, t-value=paired test value, S=Significant (p<0.05)

Table 7: Paired T-Test for the variable Lumbar Flexibility (cm) within group A.

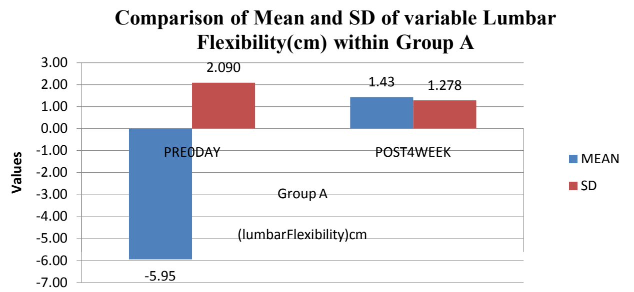

Figure 7: Showing comparison of Lumbar Flexibility (cm) (Mean ±SD) within the group A.

Lumbar Flexibility(cm)		Mean ± SD	t-value	Level of Significance
Group B	Pre Value	-7.18 ± 2.967	7.274	0.000 S
	Post Value	-4.77 ± 3.471		

SD=standard deviation, t-value=paired test value, S=Significant (p<0.05)

Table 8: Paired T-Test for the variable Lumbar Flexibility (cm) within group B.

The mean and standard deviation of the variable ODI within the groups B was 25.20 ± 6.294 and 22.67 ± 5.616 respectively. Paired t-test was done within group B for the variable ODI to check the changes within the group. The t-value for ODI was 8.839 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group (Figure 6) (Table 7).

The mean and standard deviation of the variable lumbar flexibility (cm) within the groups A was -5.95 ± 2.090 and 1.43 ± 1.278 respectively. Paired t-test was done within group A for the variable lumbar flexibility (cm) to check the changes within the group. The t-value for lumbar flexibility (cm) was 18.318 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group (Figure 7) (Table 8).

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The mean and standard deviation of the variable lumbar flexibility (cm) within the groups B was -7.18 ± 2.967 and -4.77 ± 3.471 respectively. Paired t-test was done within group B for the variable lumbar flexibility (cm) to check the changes within the group. The t-value for lumbar flexibility (cm) was 7.274 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group (Figure 8) (Table 9).

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for NPRS was 1.783 (P>0.05). The results for the variable NPRS were not significant which showed that there were not significant changes between the groups (Figure 9) (Table 10).

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for ODI was 1.207 (P>0.05). The results for the variable ODI were not significant which showed that there were not significant changes between the groups (Figure 10) (Table 11).

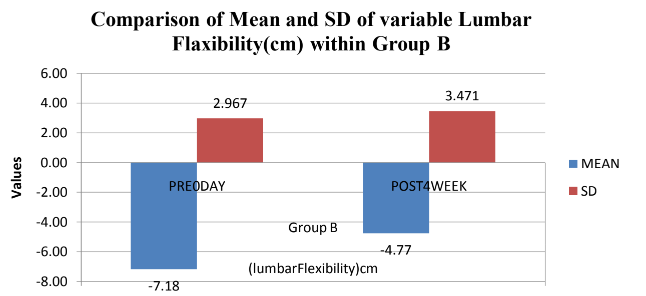

Figure 8: Showing comparison of Lumbar Flexibility (cm) (Mean ±SD) within the group B.

NPRS		Mean ± SD	t-value	Level of Significance
Pre Value	Group A	5.50 ± 0.938	1.783	0.0798 NS
	Group B	5.93 ± 0.944		

SD=standard deviation, t-value=Unpaired test value, NS=Not Significant (p>0.05)

Table 9: Unpaired T-Test for the variable NPRS between group A and group B.

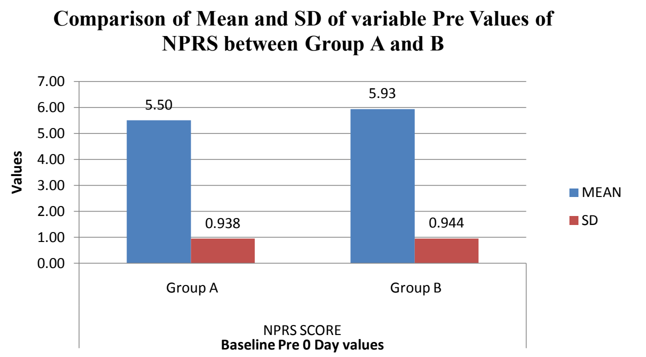

Figure 9: Showing comparison of baseline (pre) NPRS between the group A and group B.

ODI		Mean ± SD	t-value	Level of Significance
Pre Value	Group A	23.40 ± 5.203	1.207	0.2322 NS
	Group B	25.20 ± 6.294		

SD=standard deviation, t-value=paired test value, NS=Not Significant (p>0.05)

Table 10: Unpaired T-Test for the variable ODI between group A and group -B.

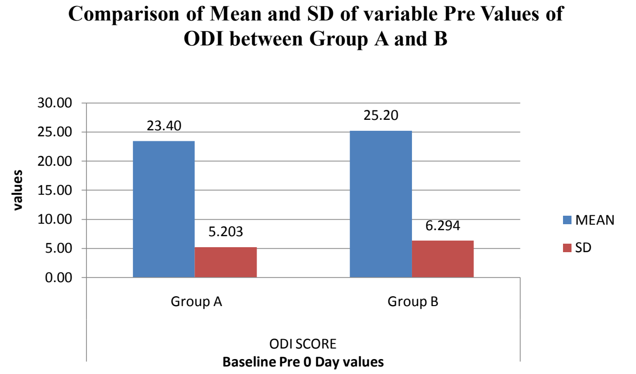

Figure 10: Showing comparison of baseline (pre) Functional disability (ODI) between the group A and group B.

Lumbar Flexibility (cm)		Mean ± SD	t-value	Level of Significance
Pre Value	Group A	-5.95 ± 2.090	1.861	0.0677 NS
	Group B	-7.18 ± 2.967		

SD=standard deviation, t-value=Unpaired test value, NS=Not Significant (p>0.05)

Table 11: Unpaired T-Test for the variable Lumbar Flexibility (cm) between group A and group -B.

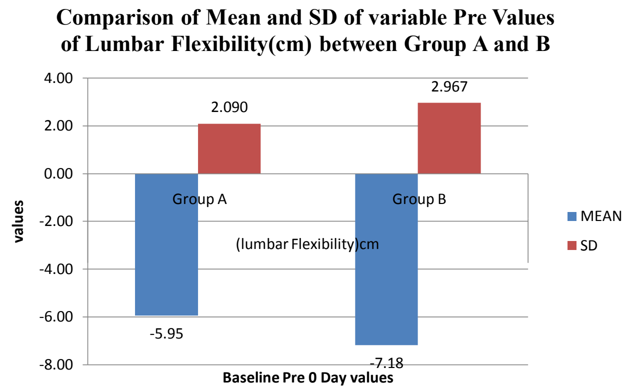

Figure 11: Showing comparison of baseline (pre) Lumbar Flexibility (cm) between the group A and group B.

NPRS		Mean ± SD	t-value	Level of Significance
Post Value	Group A	0.97 ± 0.765	3.944	0.0002 S
	Group B	1.97 ± 1.159		

SD=standard deviation, t-value=Unpaired test value, S=Significant (p<0.05).

Table 12: Unpaired T-Test for the variable NPRS between group A and group -B.

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for Lumbar Flexibility (cm) was 1.861 (P>0.05). The results for the variable Lumbar Flexibility (cm) were not significant which showed that there were not significant changes between the groups (Figure 11) (Table 12).

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for NPRS was 3.944 (P<0.05). The results for the variable NPRS were significant which showed that there were significant changes between the groups (Figure 12) (Table 13).

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for ODI was

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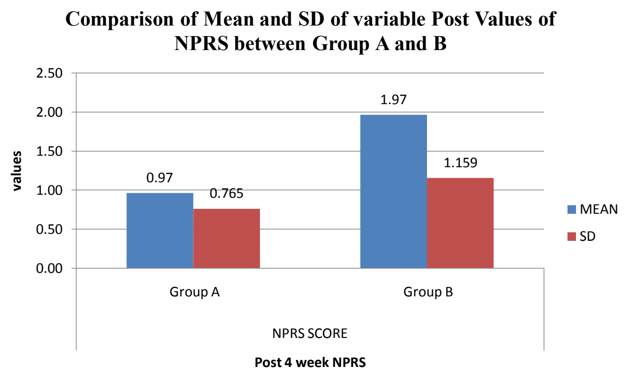

Figure 12: Showing comparison of Post value of NPRS between the group A and group B.

ODI		Mean ± SD	t-value	Level of Significance
Post Value	Group A	19.67 ± 4.428	2.298	0.0252 S
	Group B	22.67 ± 5.616		

SD=standard deviation, t-value=Unpaired test value, S=Significant (p<0.05)

Table 13: Unpaired T-Test for the variable ODI between group A and group B.

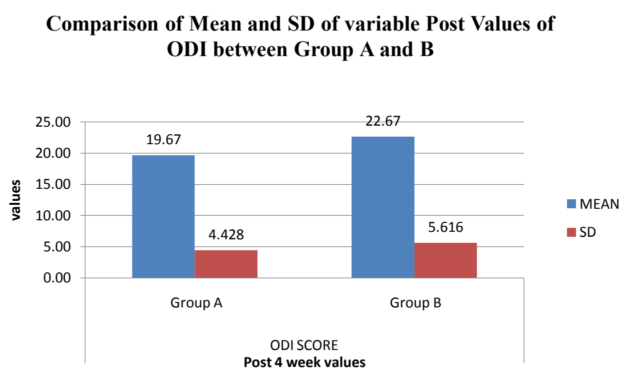

Figure 13: Showing comparison of Post value of Functional disability (ODI) between the group A and group B.

Lumbar Flexibility (cm)		Mean ± SD	t-value	Level of Significance
Post Value	Group A	1.43 ± 1.278	9.181	0.0000 S
	Group B	-4.77 ± 3.471		

SD=standard deviation, t-value=Unpaired test value, S=Significant (p<0.05)

Table 14: Unpaired T-Test for the variable Lumbar Flexibility (cm) between group A and group -B.

2.298 (P<0.05). The results for the variable ODI were significant which showed that there were significant changes between the groups (Figure 13) (Table 14).

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for Lumbar Flexibility (cm) was 9.181 (P<0.05). The results for the variable Lumbar Flexibility (cm) were significant which showed that there were significant changes between the groups (Figure 14) (Table 15).

In group A and group B the mean difference in terms of NPRS was 0.567 with (p<0.05). The results for the mean difference of NPRS were statistically significant which showed that there were statistically significant changes between the groups (Figure 15) (Table 16).

In group A and group B the mean difference in terms of ODI was 1.200 with (p<0.05). The results for the mean difference of ODI were statistically significant which showed that there were statistically significant changes between the groups (Figure 16) (Table 17).

In group A and group B the mean difference in terms of Lumbar Flexibility (cm) was 4.967 with (p<0.05). The results for the mean difference of Lumbar Flexibility (cm) were statistically significant which showed that there were statistically significant changes between the groups (Figure 17).

Results

The significant improvements were noted in the pain score by

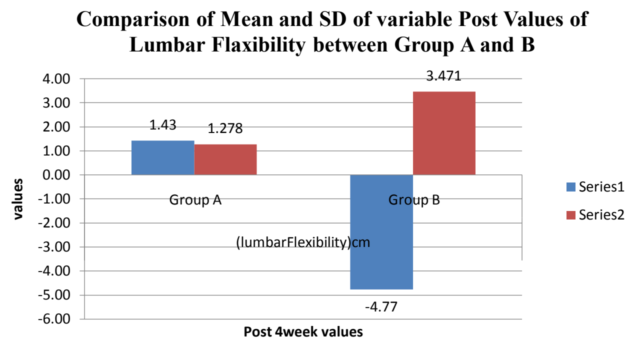

Figure 14: Showing comparison of Post value of Lumbar Flexibility (cm) between the group A and group B.

Mean Difference	Mean ± SD	MD	t-value	Level of Significance
Group A	4.53 ± 3.97	0.567	2.354	0.0220 S
Group B	0.776 ± 1.066			

SD=standard deviation, t-value=Unpaired test value, S=Significant (p<0.05)

Table 15: Comparison of mean difference of Improvement of NPRS between group A and group B.

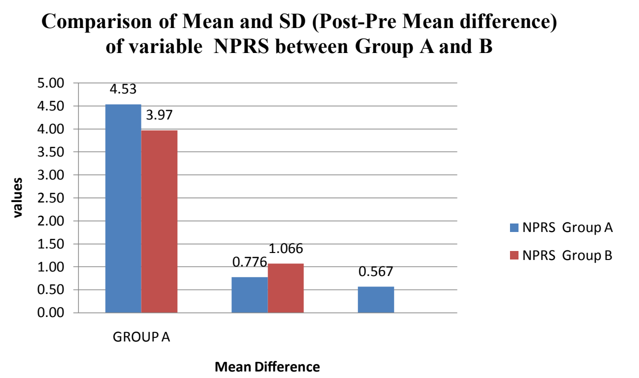

Figure 15: Showing comparison of mean difference of NPRS between the group A and group B.

Mean Difference	Mean ± SD	MD	t-value	Level of Significance
Group A	3.73 ± 2.57	1.200	2.354	0.0301 S
Group B	2.504 ± 1.570			

SD=standard deviation, MD=Mean difference t-value=Unpaired test value, S=Significant (p<0.05)

Table 16: Comparison of mean difference of Improvement of Functional Disability (ODI) between group A and group B.

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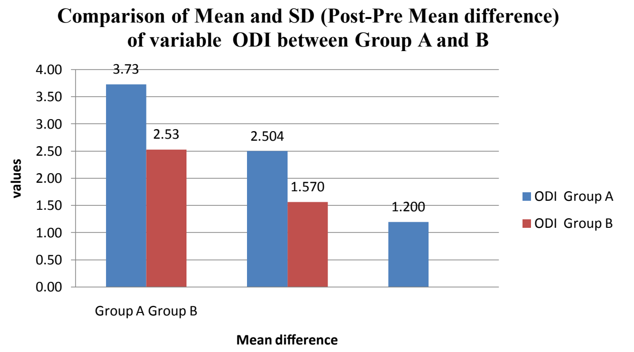

Figure 16: Showing comparison of mean difference of Functional Disability (ODI) between the group A and group B.

Mean Difference	Mean ± SD	MD	t-value	Level of Significance
Group A	-7.38 ± 2.208	4.967	9.508	0.000 S
Group B	-2.42 ± 1.820			

SD=standard deviation, MD=Mean difference t-value=Unpaired test value, S=Significant (p<0.05)

Table 17: Comparison of mean difference of Improvement of Lumbar Flexibility (cm) between group A and group B.

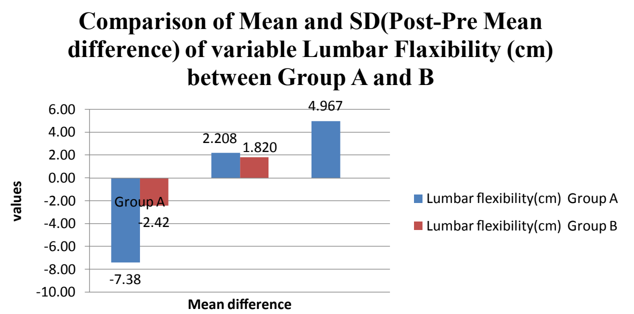

Figure 17: Showing comparison of mean difference of Lumbar Flexibility (cm) between the group A and group B.

NPRS as shown by the results within the group. The pre and post test readings for NPRS in group A were found to be 5.50 ± 0.938 and 0.97 ± 0.765 respectively and for group B the values were 5.93 ± 0.944 and 1.97 ± 1.159, (p<0.05) respectively.

The significant improvements were also noted in the Oswestry Disability Index as shown by the results within the group. The pre and post test readings for Oswestry Disability Index in group A were found to be 23.40 ± 5.203 and 19.67 ± 4.428 for group A: There were significant improvement in group B; the values were 25.20 ± 6.294 and 22.67 ± 5.616, (p<0.05) respectively.

The significant improvements were also noted in the lumbar flexibility as shown by the results within the group. The pre and post test readings for lumbar flexibility in group A were found to be -5.95 ± 2.090 and 1.43 ± 1.278. For group B, the values were -7.18 ± 2.967 and -4.77 ± 3.471, (p<0.05) Group A, were showing significant results as compared to Group B when comparing the lumbar flexibility. After the treatment period in subjects of the current study, this was more likely due to decreases in pain inhibition and improvement in lumbar flexibility.

Unpaired t-test showed significant mean difference for the variable NPRS between both the groups (t=3.944, p<0.05). The other findings for the variable ODI were also significant in both the groups (t=2.298, p<0.05). The other findings for the variable lumbar flexibility was also significant in both the groups (t=9.181, p<0.05) group A and B. But group A, there was more significant improvement in Lumbar flexibility.

From the statistical analysis and interpretation of the data the following result were found Comparison of mean and standard deviation of subject's age (18-40 years) between the groups A (clinical Pilates Exercises) & group B (McKenzie Exercises). The mean age of group A was 24.77 ± 3.674 and that of group B was 25.33 ± 3.527 respectively. The unpaired t test value was 0.609 (P>0.05). There was no significant difference in the age group.

The mean and standard deviation of the variable NPRS within the groups A was 5.50 ± 0.938 and 0.97 ± 0.765 respectively. Paired t-test was done within group A for the variable NPRS to check the changes within the group. The t-value for NPRS was 31.994 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group.

The mean and standard deviation of the variable NPRS within the groups B was 5.93 ± 0.944 and 1.97 ± 1.159 respectively. Paired t-test was done within group B for the variable NPRS to check the changes within the group. The t-value for NPRS was 20.377 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group.

The mean and standard deviation of the variable ODI within the groups A was 23.40 ± 5.203 and 19.67 ± 4.428 respectively. Paired t-test was done within group A for the variable ODI to check the changes within the group. The t-value for ODI was 8.165 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group.

The mean and standard deviation of the variable ODI within the groups B was 25.20 ± 6.294 and 22.67 ± 5.616 respectively. Paired t-test was done within group B for the variable ODI to check the changes within the group. The t-value for ODI was 8.839 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group.

The mean and standard deviation of the variable lumbar flexibility (cm) within the groups A was -5.95 ± 2.090 and 1.43 ± 1.278 respectively. Paired t-test was done within group A for the variable lumbar flexibility (cm) to check the changes within the group. The t-value for lumbar flexibility (cm) was 18.318 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group.

The mean and standard deviation of the variable lumbar flexibility (cm) within the groups B was -7.18 ± 2.967 and -4.77 ± 3.471 respectively. Paired t-test was done within group B for the variable lumbar flexibility (cm) to check the changes within the group. The t-value for lumbar flexibility (cm) was 7.274 (P<0.05). The result for the variable was significant which showed that there were significant changes within the group.

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for NPRS was 1.783 (P>0.05). The results for the variable NPRS were not significant which showed that there were not significant changes between the groups.

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for ODI was 1.207 (P>0.05). The results for the variable ODI were not significant which showed that there were not significant changes between the groups.

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for Lumbar Flexibility (cm) was 1.861 (P>0.05). The results for the variable Lumbar Flexibility (cm) were not significant which showed that there were not significant changes between the groups.

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for NPRS was 3.944 (P<0.05). The results for the variable NPRS were significant which showed that there were significant changes between the groups.

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for ODI was 2.298 (P<0.05). The results for the variable ODI were significant which showed that there were significant changes between the groups.

Unpaired t-test was done between the group A and Group B to check the changes between the groups. The t-value for Lumbar Flexibility (cm) was 9.181 (P<0.05). The results for the variable Lumbar Flexibility (cm) were significant which showed that there were significant changes between the groups.

When the results were compared between the groups:

In group A and group B the mean difference in terms of NPRS was 0.567 with (p<0.05). The results for the mean difference of NPRS were statistically significant which showed that there were statistically significant changes between the groups.

In group A and group B the mean difference in terms of ODI was 1.200 with (p<0.05). The results for the mean difference of ODI were statistically significant which showed that there were statistically significant changes between the groups.

In group A and group B the mean difference in terms of Lumbar Flexibility (cm) was 4.967 with (p<0.05). The results for the mean difference of Lumbar Flexibility (cm) were statistically significant which showed that there were statistically more significant changes between the groups.

Discussion

This was the first study to compare the efficacy of the Clinical Pilates exercises and McKenzie exercises in patient with non specific low backache. Earlier no such study has been conducted to compare the efficacy of the Clinical Pilates exercises and McKenzie exercises in patient with non specific low backache. The current study was carried out and the results of which showed that four week of clinical Pilates exercises and McKenzie exercises, both reduced pain, disability and increase lumbar flexibility of patient with Non-specific low backache. Thus both the intervention improved recovery of patient within the group individually but on comparing both groups there was significant change seen in flexibility in Clinical Pilates exercises group as compared to pain and disability.

The main study was carried out to evaluate the efficacy of Clinical Pilates exercises and McKenzie exercises technique on pain, disability and flexibility in non specific low backache patients. 60 subjects of non specific low backache were taken and divided into 2 groups, 30 patients in each group. Group A received Clinical Pilates exercises protocol (two times per week for 4 weeks) and Group B received McKenzie exercises technique (two times per week for 4 weeks). Both groups were given supervised exercises program and back care education after specific treatments. The selected outcome measures were Numerical pain rating scale (NPRS) for pain, Modified Oswestry Disability Index for functional disability and Sit and reach test for lumbar flexibility. Data was collected at the baseline (at pre 0 day) and after intervention (after 4 week) to evaluate the changes in the outcome measure. The data obtained was analyzed by using the Paired and Unpaired t-test.

The result of this study shows the significant improvements (p<0.05) were noted in the pain score by NPRS as shown by the results within the group. The significant improvements were also noted in the Oswestry Disability Index as shown by the results within the group. The significant improvements were also noted in the lumbar flexibility as shown by the results within the group. Unpaired t-test showed significant difference for the variable NPRS between both the groups (t=3.944, p<0.05). The other findings for the variable Modified Oswestry Disability Index (ODI) were also significant in both the groups (t=2.298, p<0.05). The other findings for the variable lumbar flexibility was also significant in both the groups (t=9.181, p<0.05) group A and B. The result of the present study rejects the null hypothesis that there was no significant difference in effect of clinical Pilate's exercises and McKenzie exercises on pain, disability and lumbar flexibility in non-specific low backache. Respectively, after the treatment period in subjects of the current study, this was more likely due to decrease in pain inhibition and improvement in lumbar flexibility.

Both the treatment techniques were effective in decreasing pain, disability and improving flexibility. But there was significant difference in the flexibility outcome following clinical Pilates as compared to McKenzie exercises technique. On comparing flexibility variable in both the groups, there was a significant change between groups.

The result of this study showed that the implementation of clinical Pilate's exercises and McKenzie exercises reduces pain and disability within the group. In clinical Pilates exercises group all exercises were performed with engaging the core muscles by breathing, concentration and control principle. The three dimentational breathing in Pilates exercises involve diaphragm, transverse abdominals and multifidus muscles and lumbo-pelvic stability.

Studies on the efficacy of McKenzie exercises reported decrease in pain, Oswestry disability index 31, muscle strength, pain, quality of life [33], decrease pain-and increasing comfortable sitting time improvements in the acute pain, disability, function or global perceived effect [8].

Wide range of age group was taken varying from 18-30 years (22.96-33.76 years). For individuals younger than 45 years, mechanical Low back pain represents the most common cause of disability and is generally associated with a work -related injury. Chen et al. (2009) investigated whether a sedentary life style is a risk factor for low back pain [22]. Total workers compensation costs for cases occurring in 1989 in the United States amounted to $ 11.4 billion, making it the most costly ailment for working–age adults. The impact of sex on prevalence of low back pain has not been established.

While back pain effects men and women of all ages, it is believed that adults of working age are the most vulnerable, and hence the prevalence of back pain decreases around the middle of the sixth decade, perfection arose from the early pain surveys in the journal population, including the pioneering work of Sternbach et al. (1973), which showed that all self–reported regional pains were lower in prevalence in the older post–retirement age groups than at younger ages. The same journal conclusion given in the south Manchester back pain study and the Southampton Back pain survey, further fuelling of the idea came from the generalization of the results of studies conducted in working populations, showing the same trend of decline in prevalence at older age.

Safoora Ebadi et al also suggest that incidence of LBP peaks in middle age and declines in old age, when degenerative changes of the spine are universal Throughout youth (at least the first 2 decades), 80-90 percent of the weight of the lumbar spine is transmitted across the posterior third of the disc; however as disc height decreases and the biomechanical axis of loading shifts posteriorly, the posterior articulations (i.e., facet joints) bear greater percentages of the weight distribution. Bone growth (osteophyte) compensates for this increased biomechanical stress to stabilize the tri joint complex. Over time, hypertrophy of the facets and bony over growth of the vertebral endplates contribute to progressive foraminal and central canal narrowing. In addition to relative thickening of the ligament flavum and disc herniations, these changes contribute to reduction of the anteroposterior canal diameter [8].

As examined by the review of previous literature which focus more on decreasing the present symptoms of the patient without curing the root cause lead to the chronicity of the condition with the recurrence of symptoms after a certain period of time this study focused more on the functional aspect and in curing the basic ailment and aiming to provide the long term results by not only reducing the symptoms but increasing the strength and maintaining it, we are now moving to the advancement of the techniques and using more of the physical means exercises and manipulations, making the patient more independent previously treatment was limited to the electrotherapy modalities as using TENS, S.W.D , etc for decreasing pain only, but now it is more focused on exercises as it not only decreases the pain but also increases the joint nutrition, strength the adjoining muscles also affects the flexibility, tissue size, and muscle power.

The McKenzie paradigm was founded on the premise that mechanical forces are not accepted properly by certain tissues, such as Para-spinal musculature, spinal joint articulations; inter vertebral discs, and neural tissue, leading to tissue damage and subsequent injury. If normal function is not restored, tissue healing will not occur and the problem will persist. Symptom relief is the goal, accomplished through an individualized treatment program in which the patient performs specific exercises approximately 10 times, although McKenzie therapy proved to be an effective technique in alleviating back pain compared with other conservative treatment options. In a systemic review [55] which investigated the effectiveness of McKenzie method in the treatment of chronic low back pain compared with other interventions found results in favor of the McKenzie's method for the pain intensity and disability outcome in the short term. When the McKenzie's method was compared to passive therapies, stabilization exercises and strengthening exercises, result were found in its favor in reducing pain and improving disability in the short term [38,55-58].

The results of Oswestry Disability index were significant in both the groups' i.e.; there was significant reduction in disability with clinical Pilates exercises as well as McKenzie exercises. But on comparing both the groups, the results were significant. The results were in support with the findings stated by Julie A Hides et al. (2001) in their study found that pain and disability were correlated indicating that pain and disability decreased simultaneously in patients with low back pain.

Meseguer et al. 2006 [31], they measured an immediate decrease in pain intensity (using VAS) for both groups, and an increase in PPT for the SCS group. Effect sizes for the SCS were 'very large' for the change in pain intensity and 'small' for the change in PPT, whereas the effect sizes of the Sham group were 'moderate' for the change in pain intensity and 'trivial' for the change in PPT. Lewis C et al. 2011 [36] concluded that there is no advantage in providing-Counter strain treatment to patients with acute low back pain, although further studies could examine whether a subset of these patients can benefit from the treatment.

The mechanism of Pilates exercises supported by Anderson & Spector (2005) the Pilates exercises, includes local stabilizers, global stabilizer and global mobilizer muscles. The strengthening of specific stabilization muscle increase stiffness of local muscle, propioception, muscle coordination and stability of each segment of spine where as the strengthening of global stabilizers and mobilizers muscles providing general trunk stabilization and muscles balance external loads and in that way help to minimize the resulting forces on the spine. The transverses abdominus muscle as being a primary postural control muscle. It is hypothesized that the transverses abdominus is activated at a subconscious and sub maximal contraction, as part of the motor plan, to provide trunk stiffness during dynamic movement. This approach to core control supports the theory of movement advocated by Pilates evolved practitioners ,more so then traditional methods [27] pilates encompasses core stabilization exercises that are not only static but also involve dynamic functional strengthening movements [49].

The result of the study shows that Clinical Pilates exercises and McKenzie exercises both were effective in increasing flexibility of back muscles but flexibility was markedly increased in Clinical Pilates exercises group then in McKenzie exercises group.

Because in Clinical Pilates exercises during breathing–in inspiration phase segment of spine pulled apart, creating space and stretching the spine; in expiration phase the vertebra comes closer causing compression of the segment of spine. Deep breathing provides compression and decompression of spine, emphasize segmental mobility, lungs cleansing and increase abdominal strength during Pilates exercise proper breathing ensures that enough oxygen is transported to brain and all of the muscles of the body. During the exercise when stretching position is applied slow stretch to the soft tissue and muscles activates Golgi tendon organ. Golgi tendon organ inhibits alpha motor neuron activity as a result of decreased tension in muscles, permitting sarcomeres to lengthen. These effects of stretching exercises increased range of motion by affecting the visco-elastic properties of tendon [59].

In support of Pilates breathing, Metel and Milert, 2007 [60]. suggest that appropriate coordination of breathing with performance of an exercises constitutes the first rule introduced in teaching of Pilates technique. Proper respiration favors better blood oxygenation thus improving functioning of the mind and movement control .rib diaphragmatic breathing is used, accentuated at forced expiration with simultaneous traction of the umbilicus towards the spine. At inspiration, the thorax is widened in three planes, at forced expiration, oblique muscles of abdomen are additionally involved, which enables batter pulmonary ventilation. The crucial movement of an exercise is performed during expiration at proper spinal stabilization [60].

Limitations

- Small sample size.

- Absence of randomization of sampling and appropriate control group.
- Intervention duration was less.
- Patients with acute etiologies of back pain were taken in the study.

Future Scope of Study

- This study can be done on older age group.
- Gender specific study can also be done.
- This study can be done in Patients with different stages and various etiologies of low back pain (Sub Acute and Chronic).
- A long term follow up of the study is recommended for a more comprehensive analysis of recovery.

Conclusion

In summary, as interpreted from the results:

Clinical Pilates exercises were effective in decreasing pain and disability and increasing flexibility in non specific low backache patient.

McKenzie exercises were effective in decreasing pain and disability in non specific low backache patient.

On comparing both of these exercises regimens however, there was significant difference seen in relation to pain and disability. But in Flexibility Clinical Pilates exercises group shows more effective Increasing Flexibility in non specific low backache.

Implementation of the study:-Both the Clinical Pilates and McKenzie exercises can be applied in case of non specific low backache to reduce pain and disability; whereas the Clinical Pilates exercises only can be advocated in relation to increase flexibility.

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