Original Article

Non-drug Non-invasive Treatment in the Management of Low Back Pain

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Abstract

Background: Low back pain (LBP) is a major medical problem. World-wide, from 60% to 80% of people will have it during their lifetime and 2-5% will have it at any given time. The disease impacts upon activities of daily living ultimately leading to a loss of functional independence and quality of life. **Aim:** The main purpose of this study was to assess the results of non-drug non-invasive treatment in the management of LBP. **Subjects and Methods:** This was prospective study conducted in the Department of Orthopedics in M. M. Medical College, Mullana, Ambala, Haryana, India from June 2005 to June 2010. A total of 251 out-patients of LBP with a mean age of 45 years were studied. They were managed with non-invasive treatment and were followed for 24 months. **Results:** Objective Lumbar Spine Assessments up to the age of 40 years at 2 years were excellent. At 40-60 years of age, it was good to excellent. Over the age of 60 years, it was good. The back pain functional scale were found very good up to the age of 40 years at 2-year follow-up, good to very good between 40 and 60 years and over the age of 60 years it was good. **Conclusions:** Non-drug non-invasive interventions can reduce pain and improve function in LBP.

Keywords: Low back pain, Medical problem, Non-invasive, Treatment

Introduction

Low back pain (LBP) is a common clinical problem and a significant socioeconomic problem. Although the lifetime prevalence of back pain is 60-80%,[1] little is known of its pathophysiology. Clinically, the natural course of LBP is usually favorable; acute LBP frequently disappears within 1-2 weeks. In some cases, however, acute LBP becomes chronic and quite difficult to treat and has a major socio-economic impact. Any of the spinal structures, including intervertebral discs, facet joints, vertebral bodies, ligaments, or muscles could be an origin of back pain, which is, unfortunately, quite difficult to determine.[2] In those cases in which the origin of back pain cannot be determined, the diagnosis given is nonspecific LBP.[2] Non-specific LBP is defined as LBP not attributable to a recognizable, known specific pathology, such as infection, tumor, osteoporosis, fracture, structural deformity, inflammatory disorder, radicular syndrome, or *Cauda equina* syndrome.[2] The intensity of LBP is usually evaluated by a visual analogue scale (VAS), numerical rating scale, or a disability scoring system, such as the Oswestry disability index (ODI), Roland Morris disability questionnaire, and others. However, the use of these established rating systems does not fully evaluate the characteristics of LBP. Previous studies suggested that LBP varies in different situations.[3,4] The main purpose of this study was to assess the results of nondrug noninvasive treatment in the management of LBP.

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Subjects and Methods

Registration

This prospective study was carried out at Orthopedics Department of M. M. Medical College from June 2008 to June 2010. Institutional medical ethics committee approved it. In this series, 251 patients were enrolled and registered for the study in the spinal clinic of this institution. All the updated medical records regarding all health problems, their clinical examination, investigation, management and follow-up.

Patient sample

Patients were included in the study if they had either LBP or LBP with radiating symptoms. They were aged 15-75 years and

they had their current symptoms for at least 3 months [Table 1]. Patients not meeting the inclusion criteria were considered ineligible for entering the study. The average follow-up was done up to 2 years.

Inclusion criteria

- Age between 18 and 75 years
- No general illnesses or use of medication
- A characteristic history and symptoms of LBP for at least 3 months (Pain in the lumbosacral area (lower part of the back) is the primary symptom of LBP, the pain may radiate down the front, side, or back of leg, or it may be confined to the low back, pain may become worse with activity, occasionally, the pain may be worse at night or with prolonged sitting such as on a long car trip, you may have numbness or weakness in the part of the leg that receives its nerve supply from a compressed nerve, this can cause an inability to plantar flex the foot. This means you would be unable to stand on your toes or bring your foot downward. This occurs when the first sacral nerve is compressed or injured and another example would be the inability to raise your big toe upward. This results when the fifth lumbar nerve is compromised) [Table 2]
- Characteristic clinical signs of LBP (local tenderness at sacroiliac joint, loss of lumbar lordosis, limitation of movement of the spine, straight leg raising test to detect nerve root compression, complete neurological examination such as sensation, motor power and reflexes of the lower limb are examined. Peripheral pulses to detect a vascular cause of LBP due to vascular claudication, adjacent joints, an abdominal, rectal or per vaginal examination)
- Indication of LBP on anteroposterior, lateral or oblique radiographs of the lumbo-sacral spine to detect fracture of the spine, osteoporosis, magnetic resonance imaging (MRI) scans to detect *Cauda equina* syndrome, infection of the spinal canal, bone infection, tumor, or fracture. A computed tomography (CT) scan is an X-ray test that is able to produce a cross-sectional picture of the body. CT scan is used much like MRI. Electromyogram (EMG) is a test that involves the placement of very small needles into the muscles. Electrical activity is monitored. Its use is usually reserved for more chronic pain and to predict the level of nerve root damage. The test is also able to help the doctor distinguish between nerve root disease and muscle disease
- Blood tests: Sedimentation rate or C-reactive protein is blood tests that can indicate whether inflammation is present in the body. Complete blood count is used to detect elevations of white blood cells and anemia [Table 3].

Exclusion criteria

- Aged over 75 years
- Serious spinal disorder, including malignancy, ankylosing spondylitis, *cauda equina* compression and infection
- Main complaint of pain below the hip
- Previous spinal surgery
- Additional over-riding musculoskeletal disorder
- Attendance at or referral to a specialized pain management clinic
- Medical condition (e.g., cardiovascular disease)
- Anticoagulant treatment
- Steroid medication
- Unable to get up from or down to the floor unaided
- Physical therapy (including acupuncture) in the previous 3 months.

Treatment protocol

A written informed consent was obtained from all the patients; they were explained the treatment plan. Green pathway triage groups of LBP parameters were evaluated. Simple LBP: Pain mechanical in nature; pain in lumbosacral/buttock/thigh area; patient well. Nerve root pain: Unilateral leg pain; pain in leg usually more than back; pain radiates to foot; numbness, paraethesia; localized neurological deficit; straight leg raise reproduces leg pain. A complete neurological examination of the limb was performed in these patients. There is clear evidence that chronic disability due to simple backache is often associated with psychological and social factors. At week 1, the patients received 2 1-h sessions of back-care

Table 1: Age and sex variations in study group (*n*=251)

Age	Male	Female	Total
20-40	20	32	52
40-60	34	46	80
60-75	47	72	119
Total	101	150	251

Table 2: Clinical findings in study group (*n*=251)

Clinical findings	Percentage
Lower back pain	100
Stiffness	100
Limitation of range of movement	100
Leg pain	4
Straight leg raising test	4
Neurological examination	0
Step sign	2
Pain at posterior superior iliac spine	1

Table 3: Radiological findings in study group (*n*=251)

Radiological findings	Percentage
Myofascial or soft-tissue injury, strain, or sprain, (non-specific/idiopathic mechanical low back pain)	76
Spondylosis, degenerative changes of the vertebrae, facet joint and disc, usually age related	10
Disc herniation	4
Osteoporotic vertebral fracture	4
Spinal stenosis	3
Traumatic vertebral fracture	<1
Spondylolisthesis	2

education. From week 2 to 13, physical conditioning (5 weeks), followed by work conditioning (4 weeks) and work readiness (3 weeks) were provided. These activities entailed 6 h a day for 5.5 days a week. Training protocols entailed flexibility and endurance training, hydrotherapy, weight lifting and work simulation. In the physical conditioning phase, patients underwent 4 h of physiotherapy and 2 h of occupational therapy to improve flexibility and strength of upper and lower limbs, spinal stabilization and range of motion, strength of lower back and abdominal muscles and cardiovascular fitness. In the work-conditioning phase, patients underwent 3 h of physiotherapy and 3 h of occupational therapy. Progressive resistance further enhanced flexibility and strength and cardiovascular fitness and stretching exercises. Work-simulation tasks were introduced. In the work-readiness phase, patients underwent 2 h of physiotherapy and 4 h of occupational therapy. This involved work hardening, vocational guidance and transference of working skills. The work-simulation tasks demanded transference of the acquired work skills in different work situations. Tasks were adjusted according to the job demands and physical conditions of each patient. At baseline (week 1), mid-term (week 7), at the end of the program (week 14) and at the 6-month follow-up.

Evaluation scales

In all patients: (1) The intensity of LBP was assessed using a VAS. The VAS is probably the most used and simple tool for pain evaluation. It is a simple analog scale that measures pain perception on a scale from 0 to 10, where "0" is graded as "no pain" and "10" is graded "as bad as it gets." Patients place a mark between the 0 and 10 (100-mm) line that corresponds to the level of pain they are experiencing. Studies show that a change of 13 mm or more can be considered statistically important and clinically relevant.[5] The original ODI (version 1.0) Oswestry disability index[6] includes 10 sections of questions that evaluate the activities of daily living, which can be drastically influenced by LBP. The sections have been selected from experimental questionnaires that aimed to assess several aspects of daily living. The ODI domains are the following: Pain intensity, personal care, lifting, walking, sitting, standing, sleeping, sex life, social life and travelling. Each section contains six statements that are scored from 0 (minimum degree of difficulty in that activity) to 5 (maximum degree of difficulty). If more than one statement is marked in each section, the highest score should be taken. The total score is obtained by summing up the scores of all sections, giving a maximum of 50 points. The final score is expressed as a percentage with the following formula: (Total score/(5 × number of questions answered) ×100%. For example, if all 10 sections are completed the score is calculated as follows: 16 (total scored)/50 (total possible score) ×100 = 32%. If one section is missed (or not applicable), the score is calculated as follows: 16 (total scored)/45 (total possible score) ×100 = 35.5%.[7] The authors suggest rounding the percentage to a whole number for convenience and the higher the percentage, the greater the perceived level of disability by the patient. The total score ranges from 0% to 100%, with 0 representing no disability and 100 representing maximum disability. A total score between 0% and 20% means minimal disability; between 20% and 40%, moderate disability; between 40% and 60%, severe disability; between 60% and 80%, crippled; between 80% and 100%, bed bound or symptom magnifier.[6] The questionnaire is self-administered by the patient; it is usually completed in < 5 min and scored in less than 1 min. The back pain functional scale (BPFS) is a self-report measure-evaluating patient's functional status in clinical and researching settings.[8] Items reduction was performed by examining the test-retest reliability, internal consistency, content and constructs validity. SPSS version 16.0 (Chicago Illinois) statistical soft ware was used for this analysis. The final version of the BPFS consists of 12 items, investigating work, hobbies and home activities, bending or stooping, dressing shoes or socks, lifting, sleeping, standing, walking, climbing stairs, sitting and driving. Each item is scored with a six-point scale, in which 0 means unable to perform activity, 1 extreme difficulty, 2 quite a bit of difficulty, 3 moderate difficulty, 4 a little bit of difficulty and 5 no difficulty. The total BPFS score can vary from 0, representing the lowest functional level, to 60, representing the highest functional level. Subjective and objective lumbar spine assessments were also done.[9]

During the follow-up visits at 3, 6, 9, 12, 15, 18, 21 and 24 months, the examinations were repeated, and treatment continuity was investigated by asking the patients whether they had managed to do exercises at home and if so, how often. During the final control at 24 months, the patients were asked whether they had experienced any relapses, if so, whether these had caused absences from work, and whether they had sought advice from other specialists.

Results

At 2 years follow-up visits, the intensity of LBP were assessed using a VAS. It is a simple analog scale that measures pain perception on a scale from 0 to 10, where 0 is graded as no pain and 10 is graded as the worst pain than before treatment with significant *P* value ($P = 0.16$, 0.73 and 0.08 respectively. Before treatment, pain was found in 100% (251/251) cases, stiffness and limitation of movement in 100% (251/251) cases, leg pain in 4% (10/251) cases, step sign in 2% (5/251) cases, pain at posterior superior iliac spine in 1% case and straight leg raising test in 4% (10/251) cases. In the study group, 101 cases were males and 150 cases were females. 76% (191/251) cases were diagnosed as myofascial or soft-tissue injury, strain, or sprain, 10% (25/251) as spondylosis, degenerative changes of the vertebrae, facet joint and disc, usually age related, 4% (10/251) cases of disc herniation, 4% (10/251) cases of osteoporotic vertebral fracture, 3% cases of spinal stenosis, 2% (5/251) cases of spondylolisthesis and less than 1% case of traumatic vertebral fractures. From the radiological classification, 16% (40/251) of cases were severely affected, 40% (100/251) of cases moderately affected and 44% (111/251) of cases were

mildly affected with LBP. After treatment, the subjective overall assessment below the age of 40 years was done, 100% (251/251) of the patients were given one point. Between 40 and 60 years, 75% (188/251) of the patient had one point, 15% (38/251) had four to six points and 10% (25/251) had seven to eight points. Over the age of 60 years, 50% (126/251) of the patients had one point, 30% (75/251) had four to six points and 20% (50/251) had four to five points. In ODI blow the age of 40 years, 100% (251/251) had a full recovery (0% disability). Between 40 and 60 years, 75% (188/251) of the patient had a full recovery (0% disability), 25% (63/251) had minor recovery (<20% disability). Above the age of 60 years, 50% (126/251) had a full recovery (0% disability) and 50% (125/251) had minor recovery (<20% disability). In subjective lumbar spine assessments, blow the age of 40 years, 100% (251/251) had full improvement. Between 40 and 60 years, 75% (188/251) of the patient had full improvement. 25% (63/251) had minor improvement. Above the age of 60 years, 50% (126/251) had full improvement and 50% (125/251) had minor improvement. In objective lumbar spine assessments, blow the age of 40 years, 100% (251/251) had full improvement. Between 40 and 60 years, 75% (188/251) of the patient had full improvement. 25% (63/251) had minor improvement. Above the age of 60 years, 50% (126/251) had full improvement and 50% (125/251) had minor improvement. In the BPFS, blow the age of 40 years, 100% (251/251) had no difficulty. Between 40 and 60 years, 75% (188/251) of the patient had no difficulty, 25% (63/251) had minor difficulty. Above the age of 60 years, 50% (126/251) had no difficulty and 50% (125/251) had minor difficulty. Blow the age of 40 years, At 6 months, complete subjective, functional and clinical recovery had occurred in almost 100% (251/251) of the patients. From 40 to 60 years of age at 6 months, complete subjective, functional, and clinical recovery had occurred in almost 75% (188/251) of the patients. Nearly 20% of the patients had minor recovery even at 24 months, but their severity became lowered significantly. Over the age of 60 years at 6 months, complete subjective, functional and clinical recovery had occurred in almost 50% (126/251) of the patients, rest 50% (125/251) had minor recovery even at 24 months, but their severity became lowered significantly. Objective lumbar spine assessments up to the age of 40 years at 2 years were excellent. At 40-60 years of age, it was good to excellent. Over the age of 60 years, it was good. The BPFS were found very good up to the age of 40 years at 2-year follow up, good to very good between 40 and 60 years and over the age of 60 years it was good [Table 4]. A total of 12 patients had taken the treatment, but lost on follow-up were excluded from the study.

Discussion

Various factors have been speculated for the causation of LBP. LBP tends to begin in the 3rd decade of life and reacts its maximal frequency during the middle age.[10] In our series, 52 patients (20.71%) belong to 3rd and 4th decade. Individual height, weight and body build do not have any correlation to the occurrence.[11] LBP is common in 35% of sedentary workers and 45% 0f heavy handlers.[12] In this series, also patients (46%) are sedentary worker. It may be attributed to the abnormal postures and poorly developed back muscle. There is no predilection for sex, but the operation for the disc is performed twice as often in men as in women.[13] Risk factors associated with severe LBP jobs with repetitive heavy lifting, the use of machine tools, the operation of motor vehicle, vibration, smoke.[14] (Pain in lumbar spondylotic spine could be a result of dysfunction, instability and stabilization phase as stiffness.[15] Puig *et al*.[16] in their study demonstrated diminished the amount of endorphins-chronic LBP. Devor[17] postulated new theory of LBP that various centers in the brain stem can be modulated by various psychological influences and can alter the production of pain mediating chemical substances such as enkephalins, serotonin etc., Due to this person interprets more pain when he is tired or depressed. In rats gene for a special type of pain sensitivity has been found.[18] Free nerve endings are present in the outer part of the annulus fibrosus is the dorsal longitudinal ligament and in the facet joint capsule.[19] The pathomechanism of pain in spondyloìisthesis may be due to instability as demonstrated by traction and compression radiography.[20] Similarly, in spinal stenosis various obstructions caused by mechanical compression results a pain. There is always a doubt over the investigation such as EMG, Myelography, CT-scan, MRI. All have been used and have demonstrated 90-98% disc hernia in patients with appropriate symptoms. In normal volunteers without known symptoms 28-35% show the same finding.[21] The natural history of idiopathic LBP is good and 90% of patients return to work within 6 weeks.[22] In our series, the conservative treatment seems to be good as it shows relief of pain in 172 LBP patients out of 251 and no recurrence was seen in 24 months follow-up.

Prospective randomized trial has demonstrated effectiveness of pain suppression and return to work with few days bed rest and education at back program.[23] Nachemson[24] in their

Table 4: Results in study group (*n*=251)

Age group	Visual analog scale (%)	Oswestry disability index (%)	Subjective lumbar spine assessments (%)	Objective lumbar spine assessments	The back pain functional scale
20-40	100 full recovery	100 full recovery	100 full recovery	Excellent	Very good
40-60	75 full recovery 25 minor recovery	75 full recovery 25 minor recovery	75 full recovery 25 minor recovery	Good-excellent	Good-very good
60-75	50 full recovery 50 minor recovery	50 full recovery 50 minor recovery	50 full recovery 50 minor recovery	Good	Good

study reported good relief of pain in patients with chronic LBP less than 3 months by bed rest, medication manipulation and general fitness exercise. Studies of back pain patients in England suggest that a stratified management approach including prognostic screening and a treatment approach targeting primary care efficiency and physiotherapy, leads to greater health gains for patients with back pain. Significant improvements were noted in the stratified management group at both 4- and 12-month follow-up with respect to physical and emotional wellbeing, pain intensity and workdays missed and quality of life.[25] A study also reported an increased risk of hospitalization for sciatica in males who smoked at a young age.[26] It has been estimated that LBP will affect 84% of the general adult population at some point in their life, with 49% reporting some LBP in the previous 6 months, 23% suffering from chronic LBP and 11% experiencing physical impairment due to LBP.[2] Various surveys suggest that only 5-10% of adults in Canada and the United States visit a chiropractor in any given year.[27] The validity of proposed clinical prediction rules for LBP remains unclear; it is highly unlikely that all patients with LBP would in fact benefit from chiropractic care.[28] One study evaluating pain and sleep found the estimated prevalence of sleep disturbance was 58.7% among people with low-back pain. Sleep disturbance was found to be dependent on pain intensity, where each increase by one point on a 10-point scale was associated with a 10% increase in the likelihood of reporting sleep disturbance.[29] The only evidence of treatment effectiveness can be evaluated by randomized double blind controlled trial, which in our set is very difficult to perform. Regarding the management of LBP, it is clear that ill-conceived diagnosis behavior on the part of surgeon can lead to abnormal LBPs, which may lead to abnormal treatment behavior. A potential limitation of our study was the absence of a control group treated by a different modality. A total of 12 patients were excluded from the study due to loss of follow-up.

Conclusion

Majority of patients with back pain do not need surgical treatment. Those who are symptomatic can usually be successfully treated with electrotherapy and back muscles strengthening exercises, cutaneous stimulation, behavioral modification and manual techniques. The 2 years overall outcome was good in approximately two-thirds of the patients. However, the remaining patients still had symptoms or objective signs of a lower back pain abnormality.

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