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COMPARATIVE STUDY ON FOUR DIFFERENT TYPES OF CONSERVATIVE MANAGEMENT IN LOW BACK PAIN DUE TO LUMBAR INTER-VERTEBRAL DISC PROLAPSE

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Abstract

Context: Treatment for lumbar disc prolapse includes conservative, interventional and operative treatment. Controversies exist regarding most effective type of conservative treatment.

Aim: To assess the efficacy of different types of conservative management in low back pain due to lumbar inter vertebral disc prolapse.

Study design: Prospective study

Methods and Materials: 160Adult patients of either sex with low back pain due to lumbar disc prolapse with or without mild neurological deficits visiting or admitted in our hospital were included in the study. 40 patients were treated with bed rest, 40 patients were allowed to continue routine daily activities, 40 patients were treated with back school exercises and 40 patients were treated with McKenzie exercises. The patients were followed for a period of three months with serial neurological examination and outcome measures.

Statistical analysis used: ANOVA and Chi square test.

Results: Back school group and McKenzie group had more favorable scores with respect to VAS, ODI and JOA score which is statistically significant(P=<0.001). Among back school group and McKenzie group, latter had better results with respect to VAS, ODI and JOA score but statistically not significant. JOA post intervention improvement is maximally seen in McKenzie group. Majority of patients from McKenzie group returned to work at the end of 12 weeks.

Conclusions: Back school exercises and McKenzie exercises have better results for low back pain due to lumbar disc prolapse compared to other types of conservative management.

Keywords: Low back pain, Lumbar inter vertebral disc prolapse, bed rest, back school exercise, McKenzie exercise

Introduction

Low back pain is one of the commonest symptoms for which patients seek medical consultation. Low backache leads to significant work absenteeism in young to middle aged group (i.e., 20-50 years) causing high medical care cost to society. There are many causes of low back pain but herniated disc is cause for 4% of low back pain. It is more common at L4-5 and L5-S1 levels. L3-4 and L2-3 levels accounts for the majority of remaining herniations[1, 2, 3, 4].

Conservative management for low back pain due to disc prolapse has good results and hence most of the patients with low back pain due to disc prolapse can be managed conservatively. Surgery should be reserved for those patients who cannot tolerate pain or who have definitive indication for surgery like cauda equina syndrome, progressive neurological deficits or no improvement with conservative management[5, 6]. There are many papers which support conservative management to be superior compared to surgical management in low back ache due to disc prolapse[5, 6]. Many papers have also proved that improvement in low back pain after surgery is only short term. In long term follow up, there is no significant difference in outcome between patients who were managed either conservatively or surgically[5, 6].

Different types of conservative management are oral medications (NSAIDS, Muscle relaxants, antidepressants), bed rest, Mckenzie treatment, physical therapy, spinal manipulation, exercises, TENS, orthoses, behavior therapy, ultrasound therapy, chiropathy, etc. All these modalities of conservative management claim efficacy as better than others. Till date, as per our knowledge there is no study comparing four types of conservative management (Bed rest, continued routine daily activities, back school exercises, McKenzie exercises) and also

no study assessing efficacy of back school and McKenzie exercise for low backache due to inter vertebral disc prolapse. However, studies exist for non-specific low back pain [8]. Hence, we are conducting study to assess the efficacy of four different types of conservative management in low back pain due to prolapsed disc.

Materials and Methods

This research got approved in our institute's ethical committee meeting for clearance of financial, ethical and other conflicts of interest. No financial sponsorship was taken and all patients were treated free of cost as our institute is government hospital.

Adult patients of either sex with lumbar intervertebral disc prolapse with or without mild neurological deficits visiting or admitted in our Institute were taken into the study. A total of 160 patients were included in the study. Patients with signs and symptoms of lumbar disc prolapse, who come under the inclusion criteria and give informed written consent, has been included. After the clinical assessment, investigations of the patients were done, which includes CBC, ESR, CRP, X rays of Lumbar spine both in AP and Lateral views, lateral standing flexion and extension views. X rays were done to rule out other causes of back pain like tumors, instability, spondylolisthesis, infections, osteoporosis, thoracolumbar fractures. MRI is done to confirm diagnosis and assess nerve root compression, level and stage of disc prolapse.

Then patients were divided using computer generated randomization software (Graph pad/randomize) into 4 groups depending on the treatment modality they receive.

1) Group I consist of patients who receive bed rest for one week. Patients were not allowed even for toilet except commode and pain treated with analgesics i.e., paracetamol, up to three grams per day. After one week of bed rest, patients were allowed to continue routine daily activities.
2) Group II consists of patients with continued routine daily activities and pain treated with analgesics i.e., paracetamol, up to three grams per day.
3) Group III patients received back school exercises (Fig 1) with back education, which includes functional anatomy of back, biomechanics of spine, ideal postures and pain treated with analgesics i.e., paracetamol, up to three grams per day. Back school exercises weregiven by trained physiotherapist, three times per week for two weeks and patients were advised to continue exercises at home, six days a week for three months. Patients were also educated about body postures during work and rest.
4) Group IV includes patients who receive McKenzie method of treatment based on McKenzie classification and pain treated with analgesics i.e., paracetamol, up to three grams per day. Disc prolapse comes under derangement syndrome according to McKenzie classification[9] and hence McKenzie exercises for derangement syndrome were given to this group of patients depending on direction of preference (Fig 2). McKenzie exercises were given to the patient initially for one week by physiotherapist who is trained in McKenzie exercises, after which patients were advised to continue same exercise at home daily for three months.

Demographic data, history, clinical examination and details of investigations and interventions were recorded. On first day before commencing treatment, patient baseline leg pain, function and disability was evaluated with use of a 10-cm visual analogue scale (VAS), Japanese Orthopaedic Association Score (JOA) and Modified Oswestry Disability Index (ODI) respectively by a blinded assessor, who is not aware of patient's treatment group.

The patients were asked to come for follow up at one week, two weeks, four weeks, six weeks and 12 weeks. At each follow up patients were evaluated by blinded assessor with VAS for leg pain, JOA Score and ODI questionnaire. Patients also underwent neurological examination at each follow up, to look for new signs of neurological deficits, progression or regression of neurological deficits if deficits were present in previous examination. At the end of three months, post intervention percentage of improvement with respect to JOA score is calculated for all patients available for follow up by the formula:

Post intervention improvement in percent = (post intervention score)-(pre intervention score)/(29-pre intervention score) X 100%.

Statistical analysis

Collected data were analyzed using R software version 3.5.3. Continuous variables were presented as mean and Standard Deviation (SD).Categorical variables were presented as count and per cent. Comparisons of mean between four groups were done using ANOVA.Chi-square test was used to find association between categorical variables and treatment groups.$P < 0.05$ was considered as statistically significant.

Results

Out of 160 eligible and consented patients, 150 patients were evaluated at final follow up as ten patients were

lost to follow up. At the end of final follow up there were 36 patients in bed rest group i.e., group 1, 38 patients in continued daily routine activity group i.e., group 2, 37 patients in back school group i.e., group 3, and 39 patients in McKenzie group i.e., group 4. Baseline variables of all four groups were comparable (P>0.05) except ODI score which is statistically significant between the groups at baseline (P-value = 0.024).Mean age group of the study participants was 42 years with 59 females and 101 males. Mean duration of symptoms was seven months and majority of our patients were heavy workers (53%). Most of them had significant radicular pain i.e., 134 patients (84%) and rest had mild radicular pain. Sixty-one patients (38%) had recurrent episodes of pain and 90 patients (56%) had undergone some form of conservative treatment before presenting to us. Thirty-three patients (21%) were presented with mild neurological deficits (Grade 4). Most of them were presented in stage of bulge or protrusion (86%) and only few patients were presented in extrusion or sequestration stage. One hundred four patients (65%) had multilevel disc prolapse and among isolated disc prolapse group, 37 patients had prolapsed at L4-5 and 19 had at L5-S1 level with none at L1-2, L2-3 and L3-4.

Mean VAS for leg pain at baseline and at three months follow up for four groups were 5.7, 6.1, 5.9, 5.8 and 3.7, 2.7, 2.2, 1.5 respectively. There was no significant difference between groups with respect to VAS till first week (P-value=0.064 at 1st week) and there was significant difference between the groups from second week (P-value=0.014) till end of three months (P-value=<0.001 at 4th, 6th and 12th week) (Fig 3). Mean ODI for four groups at baseline and at end of three months follow up were 45.4, 49.3, 48.2, 46.6 and 31.2, 22.8, 17.7, 13.0 respectively and there was significant difference between groups with respect to ODI at all points till end of three months (P-value at baseline=0.024 and 12weeks=<0.001) (Fig 4). Mean JOA Score for four groups at baseline and at end of three months follow up were 17.1, 16.5, 17.2, 17.4 and 21.0, 22.9, 24.6, 25.5 respectively and there was no significant difference between groups with respect to JOA score at baseline (P-value=0.152 at presentation), but there was significant difference between the groups from first week (P-value=0.021) till end of three months (P-value=<0.001 at 4th, 6th, and 12th week) (Fig 5). Mean post intervention percentage of improvement with respect to JOA score in group 1 is 33.2%, 52% in group 2, 62.9% in group 3 and 70.7 in group 4. In group 4, 33 patients (83.5%) returned to same work at end of 12 weeks which shows significant improvement compared to other groups.

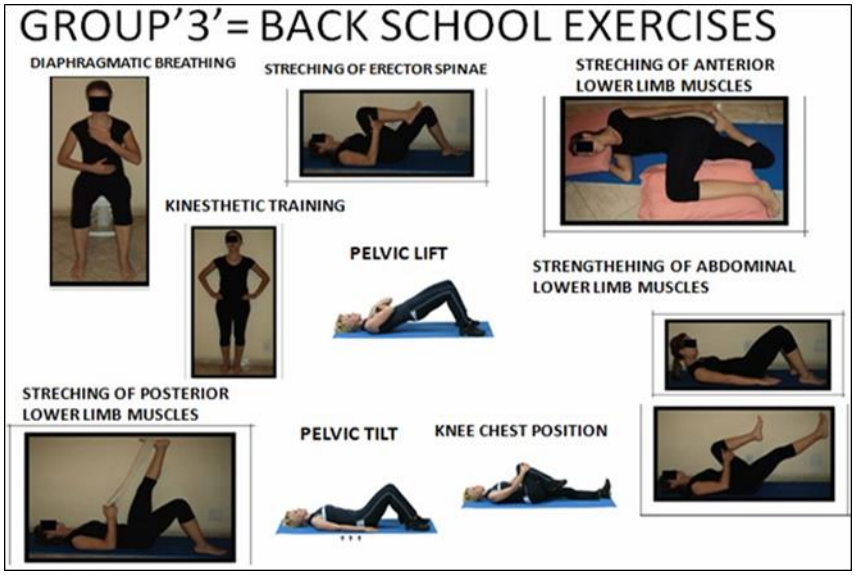

Fig 1: Back school exercises for group 3 patients

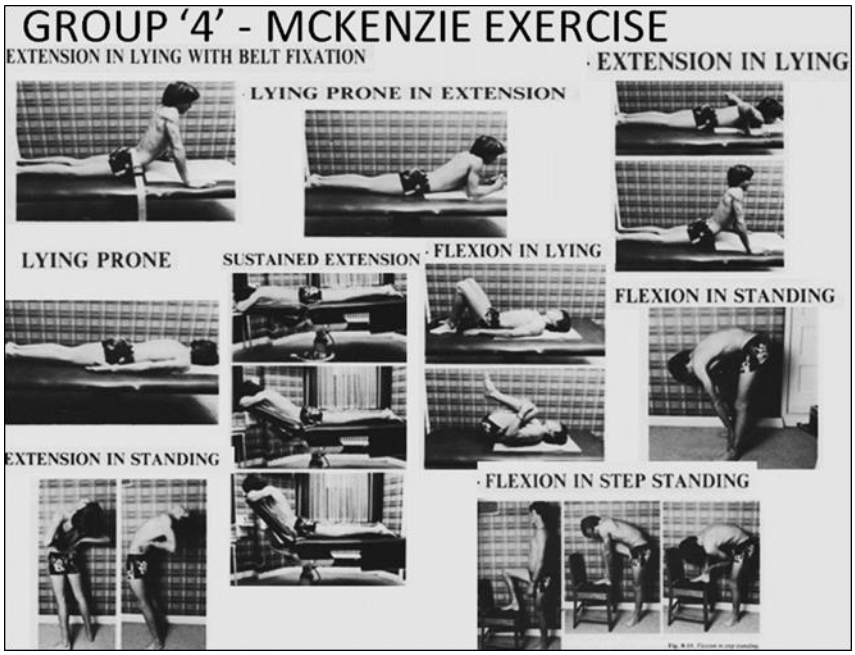

Fig 2: McKenzie flexion and extension exercises for group 4 patients

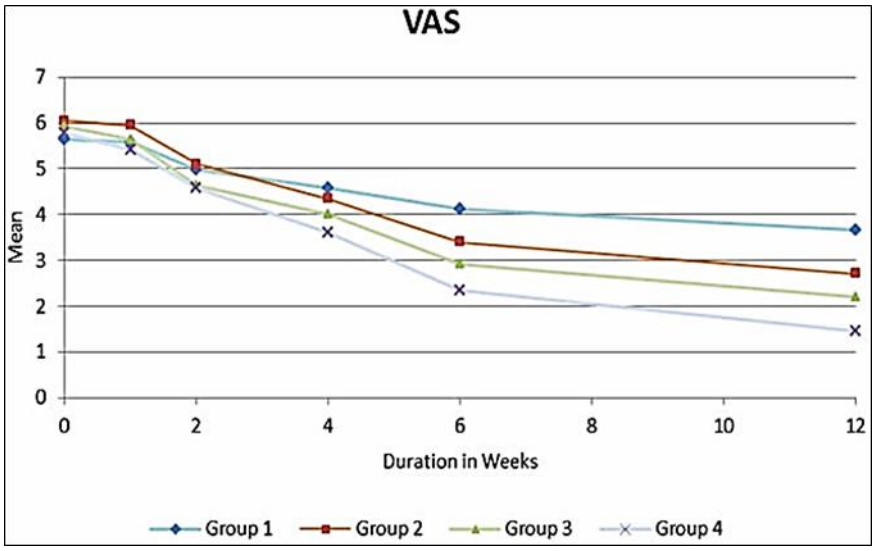

Fig 3: VAS Scores of all four groups from baseline to 3 months follow up

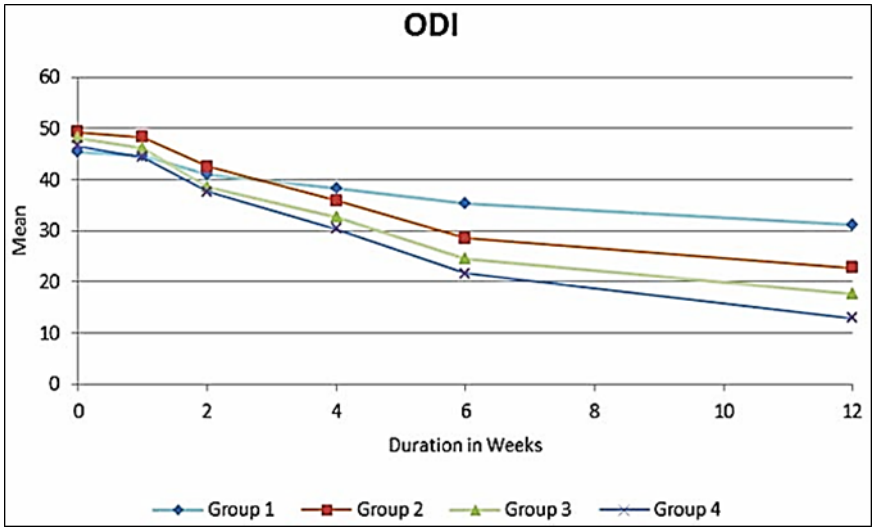

Fig 4: ODI Scores of all four groups from baseline to 3 months follow up

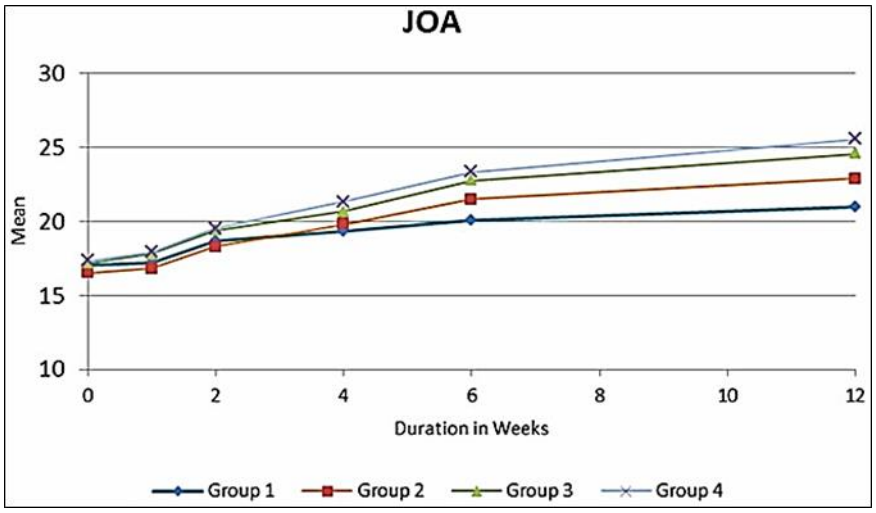

Fig 5: JOA Scores of all four groups from baseline to 3 months follow up

Discussion

Many papers have been published in literature regarding efficacy of conservative managementin low back pain due to lumbar inter vertebral prolapse and non-specific low back pain[1, 10, 11, 12, 13, 14, 15, 16]. Also, there are many papers assessing effect of conservative versus surgical management in lumbar IVDP favoring conservative care[5, 17, 18, 19]. Saal et al. found a 90% good or excellent outcome in patients treated non-operatively for a lumbar disc herniation[5]. Weinstein et al., in SPORT trial concluded that patients in both the surgery and the non-operative treatment groups improved substantially over a two year period[20]. These findings suggest that operative and non-operative treatment outcomes seem to converge with time and that the benefits of surgery are in the early post-operative period only. Garcia et al. conducted RCT comparing efficacy of back school exercises versus McKenzie exercises for non-specific low back pain[8], but it was not specific for lumbar inter vertebral disc prolapse. We have conducted study to assess efficacy of these conservative management in low back pain due to lumbar IVDP.

The mean age group in our study is 42 years which is comparable other studies[7, 21, 22]. Most of the studies have female preponderance but our study has a greater number of male patients[7, 8, 21, 22]. In our study mean duration of symptoms was seven months which is equal to study by Sahinet al. i.e., 6.5 months, but much more compared to other studies[7, 21, 22], however study by Narciso et al. has much higher duration i.e., 23 months[8]. The higher duration of symptoms may be due to patients undergoing various treatments prior to presenting us. Most of patients i.e., 84% in our study had significant radicular symptoms which are quite common in disc prolapse, but we have higher percentage of patients with radicular symptoms compared to studies by Deyoet al. and Malmivaaraet al. [7, 21]. This is probably because, other studies are conducted on patients with non-specific low back pain and our study is on low back pain due to disc prolapse. Deyoet al. [7] has shown 7% of their patients had neurological deficits on presentation which is much lower compared to our study i.e., 21%, probably because our study is on low back ache patients due to disc prolapse and their study was on patients with non-specific low back pain. Majority of patients in our study were in stage of bulge or protrusion which is supported by Spengler and colleagues where most common stage of disc prolapse is bulge or protrusion[23].

In our study, there was significant difference between the groups from second week after intervention with respect to VAS till end of three months (P-value=<0.05) with better VAS in McKenzie and back school group. Among McKenzie and back school group, McKenzie group had better VAS but not statistically significant (P value= 0.207). At the end of 12 weeks, mean VAS score for leg pain in our study is lesser compared to studies by Sahinet al. and Narciso et al. [8, 22], which implies our patients had better pain relief. Sahinet al. has shown better ODI scores in back school compared to control group, similarly in our study back school and Mckenzie group had better ODI scores compared to other group which is statistically significant(P-Value<0.05). Among McKenzie and back school group, McKenzie group had better ODI score but not statistically significant (p= 0.376). There was statistically significant difference between groups in terms of JOA score (P value=0.001) from first week till end of three months with better JOA score in McKenzie and back school group. Among McKenzie and back school group, McKenzie group had better JOA score but not statistically significant (p= 0.542). Majority of patients from McKenzie group (82.5%) and back school group (60%) returned to same work at the end of 12 weeks, but a smaller number of patients from bed rest group (25%) and continue routine activity

group (42.5%) returned to same work at the end of 12 weeks. This result in our study shows significant improvement in patients who received McKenzie exercises.
Cochrane review by Hagen KB et al. has stated that there is high-quality evidence that advice to rest in bed is less effective than advice to stay active[24]. Similarly, in our study bed rest group has got less pain relief and functionally had more ODI scores compared to other groups. Cochrane review of patient education and advice to stay active showed strong evidence that individual instructional session of 2.5 hours is more effective in returning patients to work than no intervention[25]. Even in our study staying active has better results compared to bed rest group. Koeset al. reviewed a set of 21 randomized control trials and indicated that back schoolmight be effective in occupational settings in acute, recurrent and chronic condition[26]. Systematic review from Cochrane Database in 2004, concluded that there was moderate evidence that back schools in an occupational setting reduce pain, improve function and return-to-work status compared with other forms of therapy, such as exercises, manipulation, myofascial therapy, advice, placebo, and waiting list controls[27]. Our patients had better results in back school group compared to bed rest and routine activity group, but lesser pain relief and functional outcome when compared to McKenzie group. Berthelot et al. concluded that centralization is associated with better outcomes after nonsurgical treatment, even in patients with nerve root pain; its presence may constitute an argument against surgical treatment [28]. A Meta-Analysis conducted by Luciana Andrade et al. concluded that McKenzie method is more effective than passive therapies, including educational booklets, ice packs and massage for acute LBP patients[29]. Similarly, we have got best results in McKenzie group compared to other three groups. There was statistically significant difference between groups in terms of VAS, ODI and JOA score (P value=0.001) at the end of three months with better scores in McKenzie and back school group. Among McKenzie and back school group, McKenzie group had better scores but not statistically significant (P Value>0.05).

Limitations: Limitations of study are patient is not blinded to the type of intervention but only assessor was blinded and shorter follow up i.e., three months. Back school education was not given in groups but it is given individually which also a limitation in our study.

Conclusion

Patients treated with back school exercises and McKenzie exercise had better pain relief and functional outcome compared to patients who were managed with bed rest and patients who were allowed for continued routine activity. Most of the patients from McKenzie group returned to same work at the end of 12 weeks.

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