INTRODUCTION

Low back pain (LBP) is one of the most common ailments affecting human being. Epidemiological studies showed that 70 to 80% of all people have LBP at some time in their life.¹ Back Pain may be mechanical or non-mechanical in nature. The mechanical conditions related with chronic low back pain consist of osteoarthritis and spinal...
Chronic mechanical low back pain stenosis. The non-mechanical conditions are neoplastic, infection, vascular, rheumatologist rest other multiple systemic issues.2

The management of low back pain consists of different intervention strategies. These include surgery, drug therapy, and non medical intervention. Most of the systematic reviews focus on the effectiveness of a single intervention and describe the effectiveness on different types of LBP.3

Various types of exercises have been used in the management of low back pain. For example, William’s flexion exercise, and McKenzie extension exercise are used in the treatment of low back pain.4 Spinal Manual Therapy (SMT) is also an effective complementary and alternative treatment for individual experiencing LBP.57 Spinal manual therapy is used in treatment of LBP and significant improvement in Oswestry Disability Questionnaire (ODQ) and Numeric Pain Rating Scores (NPRS) were achieved from both thrust and non thrust manipulative therapy technique, but significant differences in ODQ was obtained in favour of thrust manipulation group.8

One of most important technique of mobilization with movement (MWM) is SNAGs, which involve the application of accessory passive glide to lumbar vertebra, while patient simultaneously perform active movement.9 The McKenzie extension exercise program is another method of treatment focusing on sustained posture or repeated movement, which could improve pain intensity in acute and sub acute low back pain.10 The current study was designed to determine the effects of Mackenzie EEP Versus Mulligan SNAGs for chronic mechanical low back pain.

METHODS

This randomized control trial (RCT) was conducted at Riphah Physical Rehabilitation Centre, Pakistan Railways General Hospital Rawalpindi, from 1st July to 31st December 2014. The inclusion criteria were patients of both gender and age range 30-70 years with minimum 4 weeks history of CMLBP, while patients with acute and sub acute low back pain and trauma were excluded from the study. A total of 37 patients in which there were 20 male and 17 female patients were screened out as per inclusion criteria and randomly placed into two groups.

Twenty patients in group A were treated with Mulligan SNAGS in sitting, standing and prone position by applying anterocranial glide in the direction of treatment plane over the spinous or transverse process at 6 to 8 repetitions per sessions, and 17 patients in group B were treated with McKenzie active EEP in prone position with repeated movements along with standard protocols. Both groups were treated for four weeks at two session per week and single session per day and total 8 sessions. Treatment was applied at different lumber levels from L1 to L5. Both groups were given electrotherapy treatment such as hot pack and Transcutaneous Electrical Nerve Stimulation TENS.

The self reported Visual Analogue Scale (VAS), Oswestry Disability Scale (ODI) and lumber Range of Motion (ROM) were used as an assessment tools and were measured at baseline and at the mid intervention (2 weeks) and completion of 4 weeks intervention. The lumber ROM for flexion and extension was measured by inclinometer, side bending with finger – tip to floor method, and rotation with help of measuring tape. The data was analyzed with SPSS version 20 to draw the statistical and clinical significance of both interventions.

RESULTS

The mean age of participants in group A was 50.25 ± 9.56 and in group B was 49.12 ± 12.47. Statistically there was no significant difference between the mean ages of participants in both the groups (P=0.762), as shown in Table-I.

The pre and post interventional analysis revealed that clinically the patients in group B treated with McKenzie EEP improved pain slight more (mean pain from 9.12±0.48 to 1.46±1.73) as compared with the patients in group A treated with mulligan SNAGS (mean pain from 8.85±0.87 to 2.55±2.65), while statistically both the interventions were equally effective in both group for pain as assessed by VAS. as shown in Table-II.

The pre and post interventional analysis revealed that clinically the patients in group B treated with McKenzie EEP improved function slightly
The results of this study showed that both techniques were statistically effective, but clinically have slight difference in the management of pain, disability and ROM in patients with chronic low back pain. Furthermore at the completion of four weeks intervention the pre and post statistical analysis revealed that clinically the McKenzie EEP improved pain and disability slightly more than Mulligan SNAGs, while the Mulligan SNAGs improved lumbar ROM more effectively than McKenzie EEP in all directions including flexion, extension, side bending and rotation.

The result of our study showed that there is reduction in pain through McKenzie approach and long term increase in ROM through Mulligan SNAGs. In 2013 Shum GL et al. conducted a study on patient with lumbar pain and decreased ROM, after the application of postero-anterior mobilization technique on lumbar spine there was immediate reduction in pain and decrease in stiffness.11 Our results also showed early reduction in pain and long term increase in all ROM.

Descending M and colleagues in 2004 conducted a study on spinal manipulation, in which they

### Table III: Participants Oswestry Disability Index (ODI).

| Study Groups       | Pre ODI Mean (SD) | Post ODI Mean (SD) | Mean Difference | p-value |
|--------------------|-------------------|--------------------|----------------|---------|
| Group A (Mulligan SNAGs) | 73.75±7.58        | 7.05±5.835        | 66.7           | 0.000   |
| Group B (McKenzie EEP)   | 73.82±7.812       | 6.24±5.890        | 67.58          | 0.000   |

### Table IV: Participants Lumber flexion.

| Study Groups       | Pre Mean (SD) | Post Mean (SD) | Mean Difference | p-value |
|--------------------|---------------|---------------|----------------|---------|
| Group A (Mulligan SNAGs) | 4.00±2.902    | 56.25±3.932   | 52             | 0.000   |
| Group B (McKenzie EEP)   | 4.88±3.059    | 37.94±13.35   | 32.25          | 0.000   |

### Table V: Participants Lumber extension.

| Study Groups       | Pre Lumber Extension Mean (SD) | Post Lumber Extension Mean (SD) | Mean Difference | p-value |
|--------------------|--------------------------------|--------------------------------|----------------|---------|
| Group A (Mulligan SNAGs) | 3.80±1.542                 | 31.80±3.286                 | 27.99          | 0.000   |
| Group B (McKenzie EEP)   | 3.12±1.764                 | 18.76±4.726                 | 15.64          | 0.000   |

### Table VI: Participants Lumber side bending.

| Study Groups       | Pre Lumber side bending Mean (SD) | Post Lumber side bending Mean (SD) | Mean Difference | p-value |
|--------------------|----------------------------------|-----------------------------------|----------------|---------|
| Group A (Mulligan SNAGs) | 3.50±1.670                        | 19.15±1.496                        | 15.65          | 0.000   |
| Group B (McKenzie EEP)   | 3.65±1.935                        | 13.536±3.625                       | 9.886          | 0.000   |
proved that spinal manipulation is effective for the treatment of LBP. Also they suggested that care after spinal manipulation is beneficial for patient to maintain subjective post intensive treatment disability levels. In our result pre and post intervention showed no significant difference on ODI but in mid intervention showed significant difference.

According to a recent study done by Dunning J et al. in 2015, flexion-distraction manipulation technique is an effective treatment technique for pain and disability in patient with lumbar stenosis. A study conducted by Nagrale AV and colleagues demonstrated that slump stretching and home exercises along with lumbar spine mobilization and stabilization exercises are more effective for rate and magnitude of recovery of self reported disability, pain and fear-avoidance behaviour compared to treatment without slump stretching. 

Another recent study in 2014 done by Mbada CE and colleagues demonstrated that slump stretching and home exercises along with lumbar spine mobilization and stabilization exercises are more effective for rate and magnitude of recovery of self reported disability, pain and fear-avoidance behaviour compared to treatment without slump stretching. 

**CONCLUSIONS**

McKenzie Extension Exercise Program is clinically slightly more effective in the management of pain and disability as compared with Mulligan SNAGs, while Mulligan SNAGs are more effective in the improvement of lumbar ROM as compared with Mechanize Extension Exercise Program in the management of Chronic Mechanical Low Back Pain. Our recommendations are to conduct further studies with large sample size and long duration of intervention for the investigation of long term effects of both interventions in chronic mechanical and other types of low back pain.

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**Table-VII: Participants Lumber rotation.**

| Study Groups            | Pre lumber rotation Mean (SD) | Post lumber rotation Mean (SD) | Mean Difference | p-value |
|-------------------------|-------------------------------|--------------------------------|----------------|---------|
| Group A (Mulligan SNAGs)| 5.00±1.5                      | 16.30±2.105                    | 11.3           | 0.000   |
| Group B (McKenzie EEP) | 3.00±1.3                      | 10.41±2.124                    | 7.41           | 0.000   |

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