

Comparison between Mulligan Sustained natural apophyseal glides (SNAGS) VS McKenzie exercises in Chronic Mechanical Low back pain

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ABSTRACT

Background: Low back pain is a common musculoskeletal problem of the modern society as 70-80% people of any age and gender get affected by this in their lifetime which affect their normal activities of daily living.

Aim: To compare the efficacy between Mulligan SNAGs and McKenzie exercises in improving pain level, range of motions and functional status in chronic mechanical low back pain patients.

Method: A randomized control trial study was conducted on 45 patients suffering from chronic mechanical low back pain at Physiotherapy Department of Mayo Hospital Lahore from 16th December to 21st January 2021. The patients were randomly allocated in three groups i.e; Conventional and two trial groups by computerized generated list. In Conventional group; 15 patients were treated with conventional therapy. In trial groups; one was treated with Mulligan SNAGs and Conventional therapy and the other trial group were treated with McKenzie exercises and Conventional therapy 3 sessions per week. Pain measured by Numeric Pain Rating Scale (NPRS), Lumbar spine's ranges measured by Goniometer and functional status measured by Oswestry Disability Index (ODI) at the completion of the 4 weeks treatment session.

Results: NPRS scoring and Ranges showed significant improvement in all groups but NPRS significantly improved in McKenzie exercises group and significant improvement in ROM showed in Mulligan SNAGs group in all movements but there was no significant difference found between three groups comparison in improving the functional status with p-value = 0.243.

Practical implication: The study provides the opportunity to the patients to consider physiotherapy as an effective treatment for the mechanical low back pain. It also provides the statistical knowledge about these physiotherapy techniques and their effectiveness in treating the low back pain.

Conclusion: Both the Mulligan SNAGs and McKenzie exercises are effective in treatment of Chronic lumbar pain as pain is most reduced through McKenzie exercise (3.33 ± 1.29 , $p < 0.000$) while ranges of spine is improved through Mulligan SNAGs mobilization in all directions.

Keywords: Chronic Mechanical Low back pain, Mulligan SNAGs mobilization, McKenzie exercises

INTRODUCTION

Low back pain is the leading cause of disability which affect most of the people throughout their lives with the 39% lifetime prevalence¹. It is the major health problem as according to the Global Burden of Disease study concluded that LBP is the major musculoskeletal condition which develop a huge health and economic burden worldwide². LBP is more prevalent among females mostly in 35 to 49 years of age as compared to males³.

Low back pain is mechanical and non – mechanical in nature. Mechanical low back pain is the medical condition developed due to the continuous strain produced by the vertebral column and abdominal structures on the back muscles⁴. Chronic low back pain is prolonged pain more than 2 weeks leads restriction in mobility, effect normal daily activities and work quality⁴. The more common chronic mechanical low back pathologies are spondylosis, disc herniation, spinal stenosis, repetitive trauma, vertebral compression fractures and overuse^{5,6}. Chronic low back pain affect 23% people globally with 24% to 80% have history of recurrence per year⁷.

There are multiple treatment strategies like Spinal injection therapy, surgery like spinal fusion surgery, opioid and epidural corticosteroid injections used for the chronic mechanical low back pain but all these strategies does not produce the significant improvement in the clinical outcomes^{6,8}. Among all interventions, physical therapy is used for the treatment including different exercises, isometrics, spinal manual therapy, Mulligan mobilization (SNAGs), McKenzie exercises, kinesio taping and so on^{4,5}.

Among all physical therapy techniques; Mulligan Mobilization with movement (MWM) is the most used technique applied

sustainably on the peripheral and spinal joint while the patient perform active movement simultaneously called as SNAG or sustained natural apophyseal glide⁹. McKenzie exercises is another protocol which mainly focused on the treatment of symptoms through repeated movement and sustained posture⁹. Recent studies showed that McKenzie exercises helped in diagnosis and treating the chronic mechanical low back pain instantly while Mulligan (SNAG) improve the pain and functional level in the patients^{4,8}. Previous literature mostly focused on the effectiveness of the Mulligan SNAG mobilization with conventional treatment including Mackenzie exercise. However, still, there is the gap about the individual effects of Mackenzie exercise and Mulligan SNAG mobilization in low back patients.

Therefore, purpose of the study is to compare the efficacy between Mulligan SNAGs and McKenzie exercises in improving pain level, range of motions and functional status in chronic mechanical low back pain patients.

MATERIAL AND METHODS

The randomized control trial study conducted in the Physiotherapy department of the Mayo hospital Lahore after getting the ethical permission from the research committee with the reference number JIPS-SPT-2020-08. In this study; 60 patients were evaluated; referred from the orthopedic department; from 16th December to 21st January 2021 with general examination which include demographic data, mode of onset, and duration of symptoms and location of symptoms. According to the inclusion criteria of both genders of 22-70 years age having no exercises or physical activity on a daily basis suffered from chronic low back pain. Participants were excluded from the study who was having any history of systemic disease, cancer, pregnancy, infection and acute low back pain history. After collecting the data, the

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experimental study was conducted. 45 patients were selected by using Simple convenient sampling technique according to the predefined criteria and they are randomly allocated in three groups as 15 individuals in each group for study for 4 weeks duration. **Group A** were treated with *Conventional Therapy* include hot pack, isometrics of back, William flexion exercises and pelvic bridging as a control group whereas **Group —B** were treated with *Conventional therapy and Mulligan SNAG's mobilization* and **Group — C** were treated with *Conventional therapy and McKenzie exercises*.

Pain, ranges, and functional status were assessed at the beginning of the study and at the end of the intervention protocol as on the last day of the 4th week. Pain was assessed by using Numeric pain rating scale (NPRS) which is 11 point scale range from "no pain at 0" to "extreme pain at 10" as it is having the moderate to high reliability, validity and feasible tool for assessing the low back pain with test-retest reliability ICC =0.99^{9,10}. Ranges were assessed by Goniometer and functional status was assessed by using Oswestry Disability Index which is having 6 levels from 0 to 5 shows disability level with test-retest reliability ICC =0.871 made it most reliable and valid tool for LBP¹⁰. The difference in the improvement and reduction in symptoms was noted and compared before and at the end of the treatment session with no drop out from the study.

Intervention protocol: In Group A; *Conventional therapy* was in which hotpack was applied for 10 minutes, all back isometrics, William flexion exercises and Pelvic bridging were performed and guided to the patient. In Group B; hotpack was applied for 10 minutes then *Mulligan SNAGs mobilization* which is a sustained glide was applied on the facet joint simultaneously on both side in postero-anterior direction for the flexion as patient bend forward after

sustained glide. For other movements; postero-anterior glide was applied on the one opposite side facet joint and patient was asked to move in extension, side flexion or rotations. In Group C; hotpack as it applied for 10 minutes. After this, *McKenzie exercises* were performed include *back arching, cow-cat posture, forward bending* in sitting and standing position. Home guided exercise program was instructed to each patient of the group which includes *Conventional therapy* and patient was advised to perform each guided exercise three times in a day for almost 15 minutes.

Statistical analysis: The sample size was calculated by using G power program by the research center of King Edward Medical University by using the effect size of the past studies. According to the past studies, the estimated size was 52 with 95% confidence interval. The statistical analysis was done by the SPSS version 26. Paired sample t-test and ANOVA were used to analyze results. Demographic data were shown by bar chart and other factors such as marital status, socioeconomic status, gender, duration with behavior of pain and education are analyzed through descriptive statistics and shown by pie and bar charts.

Table I: Baseline characteristics of participants of all groups:-

Variables	Result		
	Group A	Group B	Group C
Age:-	42.87±15.624	36.67±10.761	39.93±13.177
Gender	Male = 9 Female = 6	Male = 3 Female = 12	Male = 5 Female = 10
Mode of pain	night = 1 rest = 6 on movement=8	night = 3 rest = 4 with movement= 8	night = 4 rest = 2 with movement=9
Behavior of pain	Localized = 5 Radiating = 10	Localized = 3 Radiating = 12	Localized = 4 Radiating = 11

Table II: NPRS and ODI Between group difference of all groups:-

Outcome Measure	Group A			Group B			Group C		
	Pre	Post	p	Pre	Post	p	Pre	Post	p
NPRS	7.3± 1.7	6.0 ± 1.6	0.00	7.2±1.1	4.8±1.14	0.00	6.8±1.7	3.3±1.2	0.00
ODI	38.6±18.7	36.9±18.8	0.00	38.5±13.2	30.6±12.5	0.00	33.8±9.8	31.1±9.7	0.00

Table 3: Range of motions Between group difference of all groups

Ranges	Group A post	Group B post	Group C post	p value
Flexion	36.9±15.5	42.2±11.60	44.8± 9.1	0.020
Extension	16.1±4.30	21.7±3.51	18.6±4.57	0.003
Right side flexion	15.73±4.3	20.8±5.69	17.3±4.9	0.25
Left side flexion	15.0±4.1	20.6±5.913	16.6±4.9	0.012

RESULTS

In the study the mean age of patients were 45 as it varied among all three groups. The baseline characteristics of the patients were described in Table 1. There was no significant difference among the baseline characteristics of all groups. Table II shows that Pain was reduced by all three techniques in all groups according NPRS scoring with 6.0±1.6, 4.8±1.14 and 3.3±1.2 but significant reduction in pain intensity was observed in-group treated with McKenzie exercises with p-value 0.00. Table II shows that there is improvement in ODI score among all groups with 36.9±18.8, 30.6±12.5 and 31.1±9.7 but there is no significant difference among all groups as p-value = 0.243 which described that more time is required for treating disability completely and to determine the significant difference among groups. Table III shows that Active flexion, extension and side flexion improved in all groups with group A flexion (36.93±15.59), extension (16.133±4.30), right side flexion (15.73±4.300) and left side flexion (15.00 ±4.14). While in Mulligan SNAG flexion (42.26±11.60), extension (21.733±3.51), right side flexion (20.80±5.69) and left side flexion (20.60±5.913) and McKenzie exercises in flexion (44.800± 9.174), extension (18.66±4.57), right side flexion (17.33±4.908) and left side flexion (16.60±4.968) but the significant improvement in all ranges are shown by group of patients treated with Mulligan SNAG's.

DISCUSSION

The recent study was conducted to determine the effectiveness between Mulligan (SANG) mobilization and McKenzie exercises on the chronic mechanical low back pain in improving the pain, ranges of lumbar spine and functional status. The results showed the significant improvement in all the outcome measures. NPRS scoring shows significant improvement in the pain among all three groups but McKenzie exercises showed immediate and long lasting effects than Mulligan (SNAG) mobilization.

As the past studies concluded that McKenzie exercises are the most effective exercises in reducing the pain and improving the ranges in the patients and these effects were maintained in patients more than 12 weeks after the treatment session.

The systematic review conducted on the treatment of the mechanical low back concluded that McKenzie exercises are the most beneficial and superior rehabilitation program in reducing the pain in the patients of the Chronic Low back pain¹¹. According to the recent results, McKenzie exercises shows quicker and long lasting results in the patients within two to three sessions. The study conducted by Hosseinifar explained that this is due to maintaining the sustained and repeated position for prolonged period of time which eventually lead to develop postural correction¹².

SNAG also played beneficial role in reducing the pain intensity but according to the past studies SNAG is mostly related to improve the ROM and the functional status in the patients which decrease the level of fear of avoidance of activities which are related to the pain. But SNAG also decreased pain by using the desensitization of the presynaptic nerve impulses¹³. The recent study results showed that there is reduction in the pain intensity by using SNAG but prolonged effects still needed a lot of work.

The results of the study shown that SNAG played an important role in the increasing all ranges of the lumbar spine as compared to McKenzie exercises. Study conducted by the Hussien described that ranges are restricted due to the continuous strain which is applied on the capsule and its surrounding structures. By using SNAG mobilization the affected joint easily mobilized which eventually released the capsular strain and improve the ranges of the affected facet joint¹⁴. Seo concluded in the study that SNAG showed significant improvement in ROMs of the lumbar spine especially in the lumbar flexion⁸. The results of recent study also showed that SNAG improved all ranges especially the flexion of the lumbar spine.

Sánchez conducted a systematic review which described that McKenzie exercises played an important role in the reduction of the pain but improvement in the ranges of the lumbar spine is not observed. As McKenzie exercise are basically extension exercises which not increased the flexion of the spine which is the preferred movement for the daily activities¹⁵. The current study results also shown that McKenzie exercises not improved the ranges of the spine.

Buran conducted a study on SNAG mobilization which confirmed that SNAG improved muscle endurance, flexibility and reduce the stiffness which eventually reduce the disability and improve the functional status¹⁶. Seo in study concluded that SNAG reduce nociceptor, improve positional fault, reduce the fear of avoidance of repeated movements which eventually decrease the disability⁸. Study confirmed that McKenzie exercises cause improvement in the posture which also improved the disability level¹². However, the results of the recent study showed that there is significant improvement within the groups but between group the results are not statistical significant this is due to the shorter time of the study.

CONCLUSION

Chronic Low back pain is the main social medical problem which affects personal, professional and social life of mankind. Physiotherapy plays important role in treating low back pain especially chronic pain according all techniques; SNAG and McKenzie both produce beneficial effects in the low back pain. Mulligan Mobilization (SNAG) improve ROM and disability whereas McKenzie exercises showed immediate improvement in pain, improve disability but have short effect. So both techniques should be the part of the treatment protocol to improve patient's daily life. But still further work needed with adequate time duration for determining the better results in improving the functional status.

Limitation: The study was conducted for shorter time duration of research as for significant improvement in disability require more time for finding better result.

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