

Effectiveness of SNAG's Mobilization Versus Lumbar Motor Control Exercises on Pain, Range of Motion, and Functional Disability in Working Nurses with Chronic Non-Specific Low Back Pain

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ABSTRACT

Background and objectives:

Low Back Ache (LBA) refers to pain, stiffness, or discomfort localized between the lower rib margin and the gluteal folds, with or without leg radiation. Chronic nonspecific low back pain more common in healthcare professionals, nurses are more prone to develop low back pain due to heavy workload. lumbar motor control exercises (MCE) and SNAG's mobilization were proven more effective individually but there is no recent comparative study available. The aim of this study is to compare the effectiveness between MCE and SNAG's in reducing pain, improving ROM and reducing functional disability in patients with CNSLBP among working nurses.

Method: An experimental study design, A total of 60 individuals with chronic non-specific low back pain were randomly allocated into two groups: Group A (n=30) and Group B (n=30). Subjects in group A receives lumbar motor control exercises and group B receives SNAG's mobilization. Interventions are given for 3 days per week, 2 sessions per day for 4 weeks. Data were analyzed using a paired t- test to compare variables within group and unpaired t-test is used to compare the variables between groups after completion of 4 weeks of interventions.

Results: At the end of 4 weeks, when compared within groups both groups showed significant difference ($p < 0.05$) but when compared on post test values between groups MCE showed significant improvement than SNAG's in terms of VAS, MMST, MODI scores ($p < 0.05$).

Conclusion: It was concluded that even though both therapeutic modalities are effective, MCE is more effective than SNAG's mobilization in the management of nonspecific low back pain among working nurses.

Key words: Chronic nonspecific low back pain, lumbar motor control exercises, SNAG's mobilization, Visual Analogue Scale, Modified Modified Schober's test, Modified Oswestry Disability Index.

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INTRODUCTION

Chronic nonspecific low back pain is defined as second most common leading musculoskeletal condition that is not attributable to recognizable or a known specific pathology often resulting in physical inactivity and disability that affects all ranges of population. ⁽¹⁾ Low Back Pain is defined as stiffness in the lower back under the costal margin or muscle tension and above the inferior gluteal folds, without or with leg pain. Across the world, low back pain is the most common health issue that causes the greatest amount of misery and incapacity. One of the occupations with the highest risk of low back discomfort is nursing. Worldwide, between 50 and 80 percent of nurses suffer from low back discomfort. ^(2,3) According to some research, 70–80% of people have had low back discomfort at least once in their lifetime. In India, the prevalence of back discomfort was 19.8%, according to 4. In the previous 25 years, the number of persons with lower back pain has doubled to over 540 million worldwide Both male and females are equally affected. in Asia has a point incidence of 28.5% for NSLBP. ^(4,5)

Chronic nonspecific low back pain is a potentially debilitating in recent days, healthcare professionals mainly nurses are more prone to develop nonspecific low back pain due to the work hours, shift work, and the inherent nature of duties like twisting, bending, prolonged posture, and repetitive movement and heavy workloads. ^(10,11) Although there are numerous protocols for treating nonspecific low back pain, lumbar motor control exercises and SNAG's mobilization have been shown to be more successful than the others nevertheless, no recent comparison study has been conducted. This study is done on working nurses to investigate how well lumbar motor control exercises and SNAG's mobilization perform to lessen chronic nonspecific low back pain.

METHODS AND MATERIALS

This study was approved by Institutional Ethical committee of KIMS college of physiotherapy, Amalapuram. The Participants were screened to ensure they met the following inclusion criteria.

INCLUSION CRITERIA: Working female nurses age between 30 to 50 years old, suffering from low back pain for more than 12 weeks. Pain when standing or sitting for a long time and Ability to perform 40 degree of trunk flexion.

EXCLUSION CRITERIA: Osteoporosis, structural deformity, nerve root compression, patients with any previous back surgery, congenital Musculo-skeletal deformity Cardio pulmonary disease and pregnancy, working nurses were recruited for this study from KIMS Hospital, Amalapuram.

OUTCOME MEASURES:

Subjects are assessed pre-test on day one and post-test after 4 weeks to measuring pain level using Visual Analogue Scale, ROM, Modified Schober's test and Modified Oswestry Disability Index for functional disability.

VAS SCALE visual analogue scale measures pain intensity. A 10 cm line marked with numbers 0 to 10 was used where 0 symbolized no pain and 10 as maximum pain. Patient was asked to mark his pain on this line as per severity. ⁽⁶⁾

MODIFIED SCHOBER'S TEST This is a simple, reliable, and cost-effective test to assess trunk mobility. The subject stands with feet shoulder-width apart and knees straight. For **flexion and extension**, movement is measured using a tape placed from the spine (PSIS level) to 15 cm above. The distance change during movement is recorded. For **lateral flexion**, the fingertip position is marked before and after bending sideways, and the difference is measured on the thigh. ⁽⁷⁾

MODIFIED OSWETRY DISABILITY INDEX A set of questionnaires was used to assess the impact of back pain on the patient's daily activities. It includes **10 items**—such as pain intensity, personal care, lifting, walking, sitting, standing, sleeping, social life, traveling, and work/home duties—each scored from **0 to 5** across **6 levels**. The patient marks the most appropriate response. The total score is then calculated, multiplied by 100, and divided by the maximum possible score to determine the level of disability. ⁽⁸⁾

PROCEDURE

A total of 60 working nursing suffering with non-specific low back pain who have met the inclusion criteria were recruited for this study after obtaining informed consent. The subjects were Working nurses at KIMS General Hospital, Amalapuram. These subjects were divided into two groups with 30 subjects in each group. Subjects in Group A received Motor Control Exercises and subjects in Group B received SNAG's Mobilization. Outcome measures were assessed as pre and post measures before and after interventions. Both groups' interventions were scheduled 3 days per week, 2 sessions per day for 4 weeks.

Interventions in Group A: MOTOR CONTROL EXERCISES(MCE)

Subjects in group A were given motor control exercises. These are the isolated exercises of deep spinal muscles (transverse abdominis, multifidus and remaining core muscles) responsible for maintaining the co-contraction and stability of the spine. The motor control exercise program targets specific low back muscles responsible for posture and movement. It focuses on retraining deep core muscles with impaired motor control. The program has two stages: assessment and retraining of poorly controlled muscles.

STAGE 1- Includes trained coordinated activity of trunk muscles including independent activation of deeper muscles and reduce over activity of specific superficial muscles in individual manner. This program continues until they were able to maintain isolated contractions of muscles for 10 seconds and 10 repetitions while maintaining normal respiration

STAGE 2- Implement precision of desired coordination and train these skills in static tasks and incorporate them into dynamic tasks and functional positions

Transverse abdominis activation:

1. Abdominal bracing: keeping the lower back as inward curve, breathe normally throughout, lift and squeeze pelvic floor muscles and abdominal wall together, hold for 10 seconds and then relax.
2. Bracing with heel slides: Patient in supine lying. Find ASIS and contract. Keep one leg in extended position and other leg in flexion. Repeat this process.
3. Bracing with leg lifts: Patient is in supine lying with bracing position and lifts one leg after the other.
4. Bracing with standing: Patient has to be stand straight with shoulders down. Then squeeze abdominals along with diaphragmatic breathing in braced position
5. Bracing with bridging: Patient should be in supine position with knees flex to 90 degrees and then lift the pelvis and feels contraction.
6. Quadruped arm lifts with bracing: Patient is in quadruped position and the arms has to be lifted parallel to the floor alternatively.
7. Quadruped leg lifts with bracing: Patient is in quadruped position and the legs has to be lifted parallel to the floor alternatively.
8. Quadruped alternate arm and legs lifts with bracing: Patients should be in quadruped position and right leg, left hand has to be raised then left leg and right hand.
9. Pelvic floor muscles contraction

Dosage: 3 days per week, 2 sessions per day for 4 weeks. ⁽⁹⁾

Conventional physiotherapy: Hot packs, Pelvic bridging, cat and camel exercises, knee to chest, curlups, static abdominal exercises, pelvic tilts. ⁽¹⁰⁾

Interventions in Group B: SNAG's mobilization technique (Sustained Natural Apophyseal Glide)

SNAG's technique was applied in sitting position of the patient on the edge of the table while both feet are on foot rest. Therapist's position is to stand behind the patient. Specialized mulligan belt was used around patient's waist and therapist's hips. The mobilization force was applied parallel to facet joint plane over spinous process of respective spinal level. The patients were asked to lean forward as much as possible during application of mobilizing force and the return to starting position while the therapist

maintained his mobilizing force until the end. Active and facilitated stretches were included. 10 repetitions of each stretch per session that was performed before conventional program.

Dosage: 3 repetitions for first week. 15 to 20 seconds for each repetition. 10 repetitions from second week. 3 days per week for 4 weeks. ⁽¹¹⁾

Conventional physiotherapy: Hot packs, pelvic bridging, cat and camel exercises, knee to chest, curlups, static abdominal exercises, pelvic tilts. ⁽¹⁰⁾

STATISTICAL ANALYSIS:

Statistical analysis was performed by using SPSS software version 21.0 and Microsoft Excel 2007. Descriptive Statistical data were presented in the form of mean +/- Standard deviation and mean difference percentages were calculated. Between the Groups: Independent student "t" test was performed to assess the Statistically difference in mean value between the groups (MCE and SNAG's). Within the Groups, Paired Student "t" test was performed to assess the Statistical difference with in the groups for MCE and SNAG's.

TABLE 1: ANALYSIS OF PRE AND POST MEAN AND SD OF VAS SCALE, MODIFIED SCHOBERS TEST AND MODIFIED OSWETRY DISABILITY INDEX WITHIN GROUP-A

GROUP -A	TEST	MEAN	SD	P-VALUE
VAS	PRE	7.8	0.78	0.05
	POST	3.17	0.46	
MODIFIED SCHOBERS TEST	PRE	16.5	0.37	0.05
	POST	19	0.01	
MODIFIED OSWETRY DISABILITY INDEX	PRE	51	5.8	0.05
	POST	18.3	5.0	

This above table inference is that was a significant difference between pre-test and post-test that is $p < 0.05$.

TABLE 2: ANALYSIS OF PRE AND POST MEAN AND SD OF VAS SCALE, MODIFIED SCHOBERS TEST AND MODIFIED OSWETRY DISABILITY INDEX WITHIN GROUP-B

GROUP -B	TEST	MEAN	SD	P-VALUE
VAS	PRE	8.3	0.72	0.05
	POST	3.67	0.48	
MODIFIED SCHOBERS TEST	PRE	16.5	0.37	0.05
	POST	17.7	0.25	
MODIFIED OSWETRY DISABILITY INDEX	PRE	51	5.8	0.05
	POST	21	6.1	

This above table inference is that was a significant difference between pre-test and post-test that is $p < 0.05$.

TABLE 3: ANALYSIS OF POST MEAN AND SD OF VAS SCALE, MODIFIED SCHOBERS TEST AND MODIFIED OSWETRY DISABILITY INDEX WITHIN GROUP A AND B

TEST	GROUP A		GROUP B		P- VALUE
	POST TEST VALUES		POST TEST VALUES		
	MEAN	SD	MEAN	SD	
VAS	3.17	0.46	6.67	0.48	0.05
MODIFIED SCHOBERS TEST	19	0.01	17	0.02	0.05
MODIFIED OSWETRY DISABILITY INDEX	11	0.01	11.47	0.51	0.05

This above table inference is that was a significant difference between post-test of group A and B, that is $p < 0.05$.

RESULTS : Within each group individually, both Motor Control Exercises (Group A) and SNAG's mobilization (Group B) demonstrated statistically significant improvements in reducing pain as measured by the Visual Analogue Scale (VAS), increasing lumbar range of motion (ROM), and decreasing functional disability following the intervention. However, when comparing the post-intervention outcomes between the two groups, participants in Group A (motor control exercises) exhibited significantly greater improvements across all measured parameters pain reduction, lumbar mobility, and functional ability compared to those in Group B (SNAG's mobilization). This suggests that motor control exercises are more effective than SNAG's mobilization in managing chronic non-specific low back pain among the study population.

DISCUSSION: This study aimed to evaluate and compare the effectiveness of MCE and SNAG's in managing chronic non-specific low back pain (CNSLBP) among working nurses. Outcomes were assessed using VAS to measure pain, Modified Schobars Test to measure range of motion, and Modified Oswestry Disability Index to measure functional disability. Individuals with non-specific low back pain (NSLBP) commonly show weakness and dysfunction in core muscles, especially deep trunk muscles like the transverse abdominis and multifidus. This weakness is associated with increased pain, reduced function.⁽¹²⁾ Core muscles play an important role in spinal stability, and in the present study, individuals who received MCE showed better improvement in pain, ROM, and functional disability. The primary goal of MCEs is to retrain the deep core muscles of the lumbar spine specifically the transversus abdominis, multifidus, and pelvic floor muscles, to sustain tonic, automatic contractions that support spinal stability.^(13,14)

Evidence suggests that motor control exercise (MCE) training can alter trunk muscle behavior during functional activities. Several mechanisms have been proposed to explain how MCE reduces pain, including decreased mechanical load and enhanced movement quality due to better coordination of trunk muscles. These improvements in motor control may be facilitated by neuroplastic changes within the motor cortex or other components of the motor system. There is evidence that deficits in motor control led to poor control of joint movement, repeated micro trauma and pain. Pain leads to changes in motor control. This also includes changes in excitability at the spinal or cortical level, changes in proprioception or afferent-mediated control, or specific cortical effects imparted by aspects of pain, such as its demand on CNS resources, stress or fear. Motor control exercises activate abdominal muscles. The deficit in feed-forward activation increases the susceptibility of injury to spinal structures. The goal of the motor control program is to retrain the core muscles of the lumbar spine comprising transversus abdominis, multifidus and pelvic floor contraction to maintain tonic and automatic contraction in daily activities. Training should initially focus on the quality of movement and precise isolation of relevant core muscles, which are important in restoring normal motor control in people with low back pain.^(15,16)

Individuals who received SNAG's showed a reduction in low back pain when measured in terms of pain, ROM, and functional disability. The effects are attributed to the correction of capsular strain of lumbar facet joint. Lumbar facet joints are involved in joint stability and pain. Therefore, mobilizing the affected facet using SNAG's could play a role in releasing strain on the capsule and improving the mobility of the joint. A study by **Hussein HM et al.** suggests that correcting mechanical faults of the facet joints can promote pain-free movement. Sustained Natural Apophyseal Glides (SNAG's) may help reduce facet joint capsular strain, thereby decreasing pain. This technique also aids in restoring normal joint mechanics, enhancing muscular function, and improving mobility and flexibility.⁽¹⁷⁾

When compared between groups, Motor Control Exercise (MCE) is more effective than Sustained Natural Apophyseal Glides (SNAG's) in the management of chronic non-specific low back pain (CNSLBP). The superior effectiveness of MCE is attributed to its focus on correcting underlying motor control deficits, thereby addressing the root cause of spinal dysfunction rather than merely improving joint mechanics and specifically retrains the deep stabilizing muscles, such as the transversus abdominis and multifidus, to restore segmental stability and enhance long-term postural control. This targeted retraining promotes neuroplastic adaptations within the motor cortex, improving proprioception, central coordination, and muscle activation during functional tasks, which collectively enhance trunk stability and reduce the risk of recurrence.⁽¹⁶⁾ In contrast, SNAG's primarily provide short-term mechanical relief by facilitating joint mobilization and reducing pain without addressing the underlying neuromuscular dysfunction.^(17,18)

CONCLUSION: Our results suggest that both MCE and SNAG's protocols are effective in reducing pain, improving range of motion, and reducing functional disability. However, MCE was shown to be more effective than SNAG's for chronic non-specific low back pain among working nurses.

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