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Original Research Article

STUDY ON SHORT TERM EFFECT OF MODIFIED LUMBAR SNAGS WITH CONVENTIONAL PROGRAM IN NON-SPECIFIC CHRONIC LOW BACK PAIN PATIENTS

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ABSTRACT

Background: Chronic Non Specific Low Back Pain (CNSLBP) is a common, complex and disabling condition that has been present for longer than three months and is not caused by a serious pathology. Where as mulligan introduced a new technique in manual therapy, which has a great role in the treatment of Low back pain in subjects may experience pain, limited Range of motion , discomfort while bending and lifting, difficulty in walking for a long distance.

Objective: To find out short term effects of mulligan concept in modified lumbar SNAGS with Interferential therapy and McGill stabilization exercise in patients with non specific chronic low back pain.

Methods: 30 subjects (32.77±6.118) were recruited for study. Age group from 21to 40 years. All patients received modified SNAG mobilization at the respective painful site followed by conventional therapy. The outcome measures were assessed pre and post mobilization. The subjects were further treated with conventional therapy for 8 sessions for two weeks.

Outcome measures: Visual Analog Scale (VAS), Lumbar flexion range of motion (ROM) modified modified shober test(MMST)& modified oswestry low back disability questionnaire (MODQ).

Results: Mean difference between pre and post treatment values for Visual Analog Scale Lumbar flexion range modified modified shober test & modified oswestry low back disability questionnaire. were 7.43 ± 2.85, 18.82 ± 22.55 and 59.38 ± 16.96 respectively. All outcome measures were highly significant with $p<0.0001$.

Conclusion: This study concludes that there is significant result on subjects with non specific chronic low back pain by the intervention of modified lumbar snags with (IFT) interferential therapy and Mc Gill stabilization exercises.

KEY WORDS: Non-Specific Chronic Low Back Pain, Mc Gill Stabilization Exercises, Modified Lumbar Snags, Interferential Therapy , Modified Oswestry Low Back Disability Questionnaire, Modified Modified Shober Test.

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INTRODUCTION

The spine is the bony axis of the human body and its stability occurs from the performance of passive systems (ligaments, vertebrae, intervertebral discs and joints), active (muscles and tendons) and neural. The harmony , dysfunctions between resistance, strength, flexibility and mobility of the spine leads to

increased probability of having pain in the lower back [1].

Low back pain (LBP) is a is the most common musculoskeletal problem worldwide with a lifetime prevalence reported to be as high as 84% by World Health Organization (WHO) [2]. It occurs in similar proportions in all cultures, interferes with quality of life and work performance, and is the most common reason for medical consultations [3]. In India occurrence of low back pain is also alarming. The life time prevalence of low back pain is reported to be as high as 84%and 23%with 11-12% of the population being disabled by low back pain[4] Half of the population will have experienced a significant incident of low back pain by the age of 30 years [2].

LBP is also classified as acute, sub-acute, and chronic phases based on the involvement period are introduced by O'Sullivan [5].

Non-specific low back pain is defined as low back pain not attributable to a recognizable, known specific pathology (e.g., infection, tumor, osteoporosis, fracture, structural deformity, inflammatory disorder, radicular syndrome)[6].

The important characteristics of chronic non-specific low back pain (CNSLBP) consist of back pain for more than 3 months, pain between the 12th rib and the top folds gluteus with or without leg pain, and abnormal stability and co-ordination due to spinal muscles imbalance [7].

Research shows that exercises have a great effect in increasing muscle mass and endurance strength. There may be an increasing evidence that in the LBP, lumbar multifidus and transverse abdominal muscles are most commonly affected [8]. Ammer, in 2012, is one of the few studies to examine the effects of the McGill stabilization exercises on function compared with the conventional exercises. The author reported an improvement in the function performing two types of the exercises. However, McGill stabilization exercises significantly improved the function compared with that in the conventional exercise [9].

O. A. Olawale done the study on determine the efficacy of interferential therapy and exercise therapy in the treatment of LBP and Conclusion was the results of this study showed that interferential therapy combined with exercise therapy could help to reduce pain intensity and increase spinal range of motion in patients with low back pain[10].

Anne M in 2008 To determine the reliability and concurrent validity of a visual analogue scale (VAS) for disability as a single-item instrument measuring disability in chronic pain patient and the study and concluded that the reliability of the VAS for disability is moderate to good [11].

Modified Modified Schober Test (MMST): This method is reliable, valid and convenient for both therapist and patient as it does not need any fixation and landmarks are easy to palpate. Unlike radiographic technique which has health risks related to repeated exposure to x-ray radiation, it does not harm the patient [12-14].

Mulligan introduced a new technique in manual therapy, which has a great role in the treatment of LBP. The concept involves the sustained end range overpressure with the active movement in an impaired direction which previously occurs with pain now occurs painlessly. The techniques are called mobilizations with movement (MWM) or sustained natural apophyseal glides (SNAGs). MWM is effective and useful if it reduces pain and increases range of movement (ROM) and provides immediate results. This technique improves the mobility of the restricted joints and decreases symptoms [15].

Maitland mobilization technique are thought to benefit patients with lumbar mechanical pain through the stimulation of joint mechanoreceptors .These receptors are believed to alter the pain-spasm cycle through the presynaptic inhibition of nociceptive fibers in associated structures and the inhibition of hypertonic muscles, which ultimately improve functional abilities [16].

The majority of the research concerned with SNAG techniques has concentrated on the study of peripheral joints [17-19] and the cervical regio[20-25] Few studies have been concerned with the effects of SNAG on the lumbar spine. [26-28]. The rest of the available research was in the form of case reports or case series [29].

Only 5 trials have investigated different effects of the SNAG technique when applied to the lumbar region, none of them concerned with its

effects on proprioception. Range of motion was investigated in 4 out of the 5 studies. It was improved in 3 of them; no change was reported in the fourth trial by Moutzouri et al. The increase in ROM was reported only in the studies performed on LBP patients, and no improvement was reported when applied on healthy participants [30].

Studying the effects of SNAG on different body systems provides more understanding of its underlying mechanism and helps practitioners to properly use it in clinical practice

Only a few studies have focused on neurophysiological effects of SNAG technique the majority have investigated its mechanical effect. Some of the available reports cannot be used for generalization because of the limitations encountered in the study design [30].

Frederikke Bjerregaard Nielsen et al in Denmark in 2012 study on the effectiveness of modified lumbar SNAG in lion on non-specific chronic low back pain patients for flexion deficits with a month follow up. However, the study was concluded that the results were influenced by low sample size, participant's lack of homogeneity and choice of tests. Hence, further studies on the effect of modified SNAG are required [31].

Hence the purpose of the study is to determine the effectiveness of short term effects of mulligan concept of modified lumbar SNAGS with IFT and mcgill stabilization exercise in patients with non specific chronic low back pain.

MATERIALS AND METHODS

In this interventional study, 30 patients were recruited with non-specific chronic low back pain at KIMS Hospital inpatient and outpatient Physiotherapy Departments ,a Study duration:12 months.

Subjects included were inclusion criteria

1) to have clinically diagnosed chronic non-specific low back pain for more than 3 months 2) both genders 3) age group from 21 to 40. Subjects showing score from 2 to 10 on VAS.

Exclusion criteria [32,33]

Traumatic injury to spine, any neurological involvement ex.Radiculopathy,

· Infective conditions of spine , autoimmune disorders, malignancy,

· Any history of spinal surgery,

· loss of lordosis&/or listing suggestive of inter-vertebral disc prolapse, spinal deformity, osteoporosis .

· Cardiopulmonary disease with decreased activity tolerance professional athletes.

· Pacemakers, malignancy, bacterial infections, metallic Implants, thrombosis.

The study was approved by the Institutional Ethical Review Board. The purpose of the study was explained and informed consent was obtained from all patients.

Outcome measures: The outcome measures used in the study were

· Visual Analog Scale.

· Lumbar flexion ROM using the measuring tape.

· MODQ Scale.

Pain assessment Visual Analog Scale: LBP level measured by using the VAS which uses a line of 10 cm, divided from 0 to 10, 0 refers to no pain and 10 refers to the worst pain [34,35].

Lumbar flexion range of motion MMSTEST: The skin was marked along the midline of spine 15cms above the midline sacral and the PSIS. The therapist aligned the tape measure between two skin marks with zero at inferior mark and 15cm at superior skin mark.The distance between these two points was measured using the tape after trunk flexion and increase in the change was noted. This change indicated the amount of lumbar flexion [36].

Modified Oswestry Disability Scale (MODS): A well validated, self-report questionnaire designed for low back pain contains 10 sections. For each section the total possible score is 5. If the first statement is marked the section score is 0, If the last statement is marked the section score is 5. Total score is calculated in percentage, where better functions are indicated by lower scores [37].

Intervention: Subjects were screened based on the inclusion and exclusion criteria. Demographic data was collected with initial assessment of VAS, lumbar flexion ROM ,MMST and MODQ scores. All patients received modified lumbar SNAGS at the respective painful site.

Outcome measures were then reassessed post mobilization. The intervention was followed by IFT,Mc Gill stabilization exercises .

Modified lumbar SNAGS: The patient is in prone lying with hands palm down under the shoulders and knees well apart; then flexes knees and hips so that a quadruped position (LION position) is achieved while stretching out the spine [38] The therapist stands to one side of the patient and applies a sustained natural apophyseal glide (SNAG) centrally to the spinous process of the involved segment while the patient repeats the stretch 3 times with 10 seconds hold. The radial/ medial border of the hand is hooked under the chosen segment while the other arm encircles the trunk to stabilize the upper body [39]. (Figure 1&2) Duration :4days/ week ,8session for 2week.

Interferential current was applied with the subject in prone lying, for 20 minutes, 4 times a week. The 4-poleelectrodes were placed over the painful area and or over the spinal nerve root. Electrodes were placed on the patient's skin to stimulate underlying nerves, including those responsible for carrying pain sensations Duration :4days/week ,8session for 2week.

MCGILL STABILIZATION EXERCISES

The patients will perform

1. Curl up (for trainingthe rectus and obliquesabdominis muscles and controlling pelvic motion).

2. Side Bridge (for training the quadrates lumbarum muscles, as a key muscle in spinal stability).

3. Bird Dog with one hand or one foot and one hand and the opposite leg (for training the anterior and posterior lumbar muscles, especially the transverse abdominis).[7]

Home care :7 days a week and 10 repetitions of each exercise for 2times day a period of 2 weeks and a rest interval of 2 minutes between exercises and exercise booklet and handed to the patients.

Statistical analysis: Statistical analysis was performed using the Graph Pad In Stat 3 software, version 16 Mean, standard deviations and mean difference were calculated for each variable. To calculate the significance between pre and post mobilization, Students' paired t-test was calculated for all the outcome measures with statistical significance level set at $p< 0.05$.

Sample size calculation: The sample size was calculated with the formula:

$n=4pq\div d^2$

Where, n= sample size

p=population at risk

q=population without risk

d=sampling error

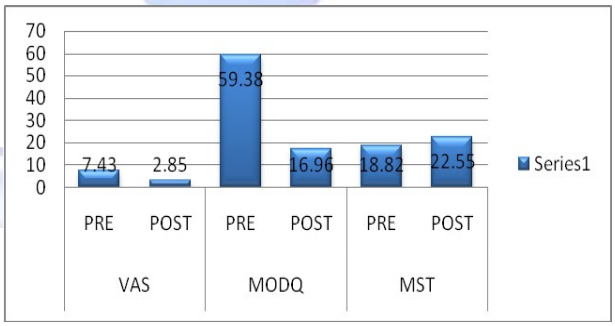
The estimated desired sample size calculated was 30 subjects.

RESULTS

Table 1: Mean Pre, Post, Difference t & p Values of Out Come Measures.

PERIOD	VAS	MODQ	MMST
PRE	7.43±1.17	59.38±12.41	18.82±0.67
POST	2.85±0.89	16.96±9.3	22.55±0.92
Mean Difference	4.58	42.42	3.73
T Value	18.347	16.908	16.193
P Value	<0.001*	<0.001*	<0.001*

Graph 1: Shows the mean: Mean Pre and Post Treatment Values Of Out Come Measures VAS, lumbar flexion ROM MMST and MODQ scores.



30 participants (mean ± SD age, 32.77±6.118), 17females and 13 males participated in this pre and post mobilization interventional study. All the patients agreed to participate and filled the consent form.

The mean ± standard deviation value for Visual analog scale pre treatment was7.43±1.17 which reduced to 2.85±0.89 post mobilizations (Graph 1).

For lumbar flexion Range of motion, MMST the mean value increased from pre- treatment 18.82±0.67 to 22.55±0.92post mobilizations (Graph 1).

While, the mean value of MODIFIED OSWESTRY DISABILITY QUESTIONNAIRE (MODQ) score reduced from59.38±12.41 to16.96±9.3 post

mobilization respectively (Graph 1).

Table 1 shows the mean difference ± SD values of the pre-post treatment for VAS, lumbar flexion ROM MMST and MODQ scores which were 7.43 ± 2.85, 18.82 ± 22.55 and 59.38 ± 16.96 respectively. Pain levels, lumbar flexion ROM and MODQ scores were highly significant post modified SNAG mobilization with p value=0.0001

DISCUSSION

The present study was conducted to determine the effectiveness of mulligans modified lumbar snags technique with conventional therapy , Conventional therapy is effective in reducing pain and increasing functional activities in subjects with nonspecific chronic low back pain .the reduction of pain and increase in the ROM must have occurred due to the concept of 'positional faults' described by Brian Mulligan.

According to Brian Mulligan, there are minute positional faults that can occur from injury or muscular imbalances which have to be corrected and sustained while movements take place. Thus, SNAG which means sustained repositioning of one articular surface on its neighbour while a movement or function is undertaken overcomes and corrects the positional faults occurred in the spine [38]. Once the pain generator is released, normal function returns and the muscle spasm surrounding the affected joint is resolved [39].

There are lot of researches made in the past, which are mentioned below, also discussed different techniques followed to reduce the pain and increase the functional activities as discussed in the present study

The changes seen in the present study showed positive and greater outcomes than a long term 3 week study done by Frederikke et al in 2012 who applied modified lumbar SNAGS in lions on non-specific chronic low back pain patients with flexion deficits. Outcome measures used were Low back pain rating scale disability, Patient specific functional scale and EQ5D health index. Indeed, there were two studies reported the effects of lumbar SNAG application on the ROM of the LBP patients. Hidalgo et al. conducted a placebo-controlled trial with similar SNAG and placebo intervention groups.[31] They reported that significant improvement in all trunk ROM directions (exception of lumbar extension) might happen following the SNAG technique application[40]However, the method of trunk ROM assessment in Hidalgo study was different from our study.

These researchers measured trunk ROMs in sitting position by an advanced system and did not measure extension. Konstantinou et al. in another placebo-controlled trial reported that trunk flexion ROM may significantly increase following the SNAGS on the NSCLBP. These researchers didn't also measure lumbar extension ROM [41].

Our results supported these study results on trunk flexion after the SNAG application. The last proposed mechanism suggests that the SNAG technique might share the same effects with postero anterior passive mobilization technique, including restoring the normal mechanics [42] and improving muscular function, mobility, and flexibility, as well as psychological response. One recent study by Kostantinou et al. investigated the immediate effects of MWM's in ROM and pain levels in 26 LBP patients with pain and flexion ROM limitations. The treatment consisted of SNAG mobilizations of using 2–3 sets of 4–6 repetitions (at 3 levels), whereas, the placebo consisted of adoption of a comfortable position for around 3minutes time. Results showed that 73% of the intervention condition and 35% of the placebo condition had improvements in flexion-extension ROM measured with an inclinometer and/or pain scores. However, placebo group, and a crossover design carries the risk of a residual effect from the intervention and could be a limiting factor. Nevertheless, the study was the first investigating Mulligan MWM's effect in asymptomatic LBP population [42].

Given above, it is questionable whether the SNAGS given utilize purely biomechanical or any other more mechanisms in order to produce pain free range of motion Several studies have reported that along with the biomechanical changes, there are certain neurophysiological changes that occur at the spinal level. These potential physiological changes include changes in descending pain inhibitory systems and changes in central-pain processing mechanisms. Thus combining the joint glide with

a physiological joint movement performed overcomes the biomechanical and neurophysiological joint problems that may cause the symptoms.

Visual Analogue Scale is a reliable tool for acute as well as chronic pain. In the present study VAS reduction reporting better improvements [43]. The reported improvement in VAS scores was previously reported by Hidalgo et al and Heggannavar et al. This response could be attributed to multiple factors including the relief of the mechanical fault of the facet joint, which may allow easier and more pain-free movement.

SNAG might have a relieving effect of the facet joint capsular strain, which might decrease the pain sensation experienced by the patients. [30]The observed effects might be attributed to the correction of the capsular strain of the lumbar facet joint. Such a strain increases during the flexion movements of the lumbar spine. As known, lumbar facet joints are involved in joint stability, pain, and proprioception. Therefore, mobilizing the affected facet joints using SNAG could play a role in releasing strain on the capsule and improving the mobility of the joint [44].

Davidson M, Keating JL et al stated MODQ as a tool which was most reliable and responsive means to obtain responses from the patients related to their pain and daily life events out of the five low back disability questionnaires [37]. The present study showed significance indicating ROM flexion improvement. Correlation of MMST flexion values with age was also found to be non significant. As mentioned in the study by Fitzgerald et al (1983) that variations in spinal ROM occurs after an interval of 20 years. This present study divided the age from 21 to 40 years in only two strata that too at an interval of 10- years. This could be one of the possible reasons for not getting the desired correlation [45].

Jorge p.fuentes et al. Interferential current as a supplement to another intervention seems to be more effective for reducing pain. Zambito in 2016 clinical study and reports that, the randomized double-blind controlled study provides the first evidence that IFT and HT therapy are significantly effective in alleviating both pain and disability in patients with CLBP [46].

Arsalan Ghorbanpour in 2018 study was to compare the effects of “McGill stabilization exercises” and “conventional physiotherapy” on pain, functional disability and active back flexion and extension range of motion in patients with chronic non-specific low back pain and was the results of this study provided approximately similar improvement in out come.

However, it appears that McGill stabilization exercises provide an additional benefit to patients with chronic non-specific low back, especially in pain and functional disability improvement. However, our study was done on interventions of combination treatment determining the short term effect of modified lumbar snags with conventional program So, appreciation of each intervention’s effect is totally out of discussion. With the statistical data parameters and using the mean score of VAS, ROM (modified modified Schober’s test), and MODQ in non-specific chronic low back pain gave more significant result.

Limitations: Limitations of this study were that the level of spinal involvement was not noted which varied in all the participants.

Similarly, duration of study was short which leads to investigate short term effects only.

The normative values of MMST flexion established in this study may not be generalized to all Indian population. In this study, lumbar rotation and lateral flexion, extesion were not measured, which are also necessary measurements of spine flexibility.

Suggestions and Further Recommendations: Further studies are recommended to conduct on subjects having chronic low back pain due to hamstring muscle tightness and core muscle weakness with assessment. To find out the confounding factor for LROM, further studies are recommended to take into account the effect of height, weight, BMI, hamstrings tightness, standing-to sitting height ratio (trunk height), and body built, occupation.

Practical Applications: This study showed that Mulligan lumbar SNAG may decrease the repositioning error. Found in patients with chronic nonspecific BP. The findings suggest that lumbar SNAG, if added to the conventional treatment for LBP, may provide better results

than using the conventional treatment only regarding repositioning error, pain, and function. The present study may provide a new dimension in the understanding of the physiological effects resulting from applying SNAG to the lumbar spine

CONCLUSION

The present study results provides evidence effectiveness of short term effects of mulligan concept of modified lumbar SNAG in lion's position reduced pain and activity limitations while it increased the lumbar flexion ROM, a conventional program consisting with IFT and McGill stabilization exercise is more effective in the treatment of in patients with non specific chronic low back pain.

Conflicts of interest: None

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