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Original Article

IMMEDIATE EFFECT OF MODIFIED LUMBAR SNAGS IN NON-SPECIFIC CHRONIC LOW BACK PATIENTS: A PILOT STUDY

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ABSTRACT

Background: Non-specific low back pain is prevalent in 23% with an incidence of 11-22% of general population. A modified lumbar SNAG is an existing Mulligan mobilization technique performed with a combination of joint glide and physiological spinal movement i.e. the lion exercise.

Objective: To find out the immediate effect of modified lumbar SNAG on pain, range of motion and Back performance Scale in non-specific chronic low back patients.

Methods: 30 subjects (mean age=36.9±10.07) were recruited for study. All patients received modified SNAG mobilization at the respective painful site followed by conventional therapy on the 1st day. The outcome measures were assessed pre and post mobilization. The subjects were further treated with conventional therapy for 10 sessions.

Outcome measures: Visual Analog Scale (VAS), Lumbar flexion ROM & Back performance scale.

Results: Mean difference between pre and post treatment values for VAS, Lumbar flexion ROM and Back Performance Scale were 2.58±1.44, 0.26±0.19 and 4.4±1.71 respectively. All outcome measures were highly significant with p=0.0001.

Conclusion: The results conclude that modified lumbar SNAG has an immediate effect on reducing pain and Back performance scale score and an improvement in lumbar flexion ROM.

KEY WORDS: Non-specific chronic low back pain, modified lumbar SNAGS, Back performance scale.

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INTRODUCTION

Low back pain is an extremely common problem experienced by most people at some point of their life. It is a major condition which causes activity limitation, work absence and economic burden on families, communities, industries and government [1].

'Non-specific low back pain' is defined as low back pain which is not attributable to recognizable or a known specific pathology such as bone disorder in the spine(fracture), radicular nerve compression, slipped intervertebral disc, lumbar canal stenosis, inflammatory disorder of spine(ankylosing spondylitis), cauda equine syndrome, congenital back disorder, infection in the spine(discitis), tumour and osteoporosis [2,3].

There is no much evidence on the prevalence of non-specific chronic low back pain, but best estimates suggest that the prevalence is

approximately 23% with an incidence of 11-22% of the general population [2]. Diagnostic triage is used to distinguish between non spinal or serious spinal disorder and those with pain of musculoskeletal origin by means of history and examination with particular emphasis on red flags [4,5]. The prognosis for an acute non specific low back pain is relatively favourable. A significant percentage of sufferers, probably over 50 %, do not consult a health care professional for the problem. Among those who seek care, most will experience rapid improvement in pain and disability within the first 3 months. Beyond this time the majority of the sufferers no longer consults and will continue to experience low levels of pain and disability[6].

In a small group of acute patients, the problem fails to resolve. Approximately 10% will go on to develop chronic and disabling low back pain. It is this group that utilizes the majority of the resources and there has been a considerable research effort to develop and evaluate effective treatments for this group [6].

Physiotherapy has been commonly used for the treatment of low back pain (CSAG 1994; Milienz et al 1997). This typically involves a variety of interventions, but commonly involves exercises, advice, Maitland mobilization, the McKenzie technique, abdominal exercises, TENS, short wave diathermy, interferential therapy, ultrasound as well as numerous less commonly used intervention (Foster et al., 1999; Jackson, 2001; Gracey et al., 2002; Hamm et al 2003; Poitres et al 2005; Byrne et al., 2006; Schmidt et al 2007; Casserley-Feeney et al 2008; Liddle et al., 2009) [7].

Mulligan's mobilization with movement technique (MWM) is gaining increasing popularity in its use in musculoskeletal conditions, such as the low back pain. Brian Mulligan pioneered one of the most important MWM technique described as 'sustained natural apophyseal glide' synonym as SNAG. SNAG is described as involving the application of an accessory passive glide to the lumbar vertebrae while the patient simultaneously performs an active movement. The direction of the glide is argued to be along the plane of the facet joints and the technique is performed in a weight bearing position (e.g. sitting, standing) [8].

The basic principle of a SNAG is cessation of pain and an increase in lumbar range of motion thereby reducing the disability and ability to perform the restricted movement/ activity. According to Mulligan, the effect of MWM is based on the fact that pain is associated with a 'positional fault' in joints with resultant 'biomechanical changes' like joint restriction and stiffness. Thus, combining this joint glide with a physiological spinal movement is performed to overcome the biomechanical joint problems that may cause the symptoms [9, 10].

A modified lumbar SNAG is an existing Mulligan mobilization technique performed with a combination of joint glide and physiological spinal movement i.e. the lion exercise. The glide can be applied to the spinous processes, facets or unilaterally over the transverse processes with the radial border of your hand while the patient performs the Lion exercise [11].

A three week experimental non-controlled pre-post test pilot study was done by Frederikke Bjerregaard Nielsen et al in Denmark in 2012 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. A total of 10 participants were recruited for 5 day treatment twice a week spread over 3 weeks. Outcome measures used were Back Performance Scale, Patient Specific Functional Scale, EuroQOL EQ5D and Low Back Pain Rating Scale. The study showed significant results in Low Back Pain Rating Scale and EQ5D health index. However, the study 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 [12].

Various theories and studies support the use of joint mobilization in the spine as an integral part of the treatment and rehabilitation process after low back injury. There have been reports of long term pilot studies and randomized clinical trials which have described the success of modified MWMs with lion exercise in the management of non-specific chronic low back pain.

However, yet the results did not assign of any

value as they were influenced by various factors. Thus, further research on its effectiveness is required. Hence, the purpose of the study is to evaluate the immediate effects of modified lumbar SNAGS in lions stretch position for non-specific low back pain patients on pain, lumbar flexion range of motion and Back Performance Scale.

METERIALS AND METHODS

Participants: In this Pilot study, 30 patients were recruited with non-specific chronic low back pain at a Tertiary care centre, Belagavi from October 2014-December 2014.

Subjects included were 1) to have clinically diagnosed chronic non-specific low back pain for more than 3 months 2) both genders 3) age group from 20 to 50.

Subjects excluded if they had 1) any previous surgery of spine 2) history of pathology of spine (eg. Spondylosis, spondylolisthesis, spine tumours, cauda equine syndrome, signs of neurological deficit, slipped intervertebral discs, ankylosing spondylitis, spinal infection) and 3) pregnant women.

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 1) Visual Analog Scale 2) Lumbar flexion Range of motion using the measuring tape 3) Back Performance Scale.

Visual Analog Scale (VAS) was used to evaluate the pain intensity which represents a line of 10 cm ranging from 0 cm to 10 cm will be drawn, where the subjects were asked to mark a point according to their perceived pain level, where 0 represents No Pain and 10 represents Unbearable Pain. The scale has been found to be reliable and valid measure of pain [13,14].

Lumbar flexion range of motion was assessed using the measuring tape introduced by Schober. The skin was marked along the midline of spine 10cms above and 3cms the PSIS. 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 [15].

Back Performance Scale (BPS) assessed the activity limitation which consisted of 5 performance tests of activities requiring mobility of the trunk. The tests included were: Sock test, Roll test, Finger-tip to floor test, Pick up test and Lift test.BPS is a 16 point scale ranging from 0-15. The ordinal scores (0-3) from the five tests are summarized to give a broader measure of the scale. The scale showed excellent inter-tester agreement and a high test-retest reliability [16, 17].

Intervention: Subjects were screened based on the inclusion and exclusion criteria. Demographic data was collected with initial assessment of VAS, lumbar flexion ROM and BPS scores. All patients received modified lumbar SNAGS at the respective painful site. Outcome measures were then reassessed post mobilization. The intervention was followed by Hot moist pack [18], Transcutaneous Electrical Nerve Stimulation (TENS) and exercises. [19] The subjects will be further treated with hot moist pack, TENS and exercises for the next 10 days.

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 [9] 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 [10]. (Figure 1&2)

Fig. 1: Starting Position for Modified Lumbar SNAG.

Fig. 2: End Position for Modified Lumbar SNAG.

Statistical analysis: Statistical analysis was performed using the GraphPad InStat 3 software, version 3.1. [20] 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 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

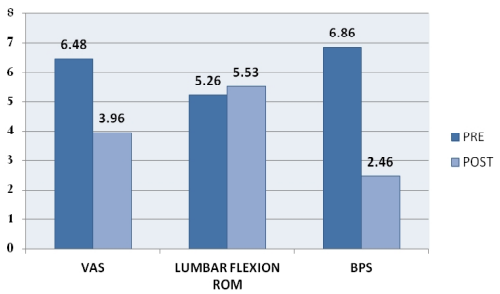
The estimated desired sample size calculated was 30 subjects.

RESULTS

30 participants (mean ± SD age, 36.9±10.07), 19 females and 11 males participated in this pre and post mobilization experimental study. All the patients agreed to participate and filled the consent form.

The mean ± standard deviation value for Visual analog scale pre treatment was 6.48 ± 1.81 which reduced to 3.96 ± 2.39 post mobilizations (Graph 1).

Graph 1: Mean Pre and Post Treatment Values Of Out Come Measures.



For lumbar flexion Range of motion, the mean value increased from 5.26 ± 0.81 pre- treatment to 5.39 ± 0.86 post mobilizations (Graph 1).

While, the mean value of Back performance scale score reduced from 6.86 ± 3.36 to 2.46 ± 2.51 post mobilization respectively (Graph 1).

Table 1 shows the mean difference ± SD values of the pre-post treatment for VAS, lumbar flexion ROM and BPS scores which were 2.58 ± 1.44, 0.26 ± 0.19 and 4.4 ± 1.71 respectively. Pain levels, lumbar flexion ROM and BPS scores were highly significant post modified SNAG mobilization with p value=0.0001.

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

Period	VAS	Lumbar Flexion ROM	Back Performance scale
Pre	6.48±1.81	5.26±0.81	6.86±3.36
Post	3.96±2.39	5.53±0.68	2.46±2.51
Mean difference	2.58±1.44	0.26±0.19	4.4±1.71
t value	9.415	7.186	14.228
p value	0.0001*	0.0001*	0.0001*

DISCUSSION

The present study was conducted to determine the immediate effects of modified lumbar SNAGS in non-specific chronic low back pain patients. Following mobilization, there were significant reduction in the pain and activity limitation while a significant increase in lumbar flexion ROM. 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. The study reported except for the patient specific functional scale there were no statistical significant differences in the outcome measures. However, the results reported only minor improvements and were not clinically relevant [12].

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 [9]. Once the pain generator is released, normal function returns and the muscle spasm surrounding the affected joint is resolved [10].

According to Chaitow (1998), moving further into flexion and sustaining this position for a short while followed by slowly returning to the normal resting position allows time for the proprioceptor functions of the trunk muscles to reset themselves [21].

A case report was done by Bedardet al on lumbar facet dysfunction and the use of Mulligan's SNAG technique on an 18 yr old collegiate volleyball player with chronic low back pain. The study concluded that applied mobilizations released entrapped meniscoid within the joint. Thus it proved that facet joint dysfunction respond well to Mulligan SNAG technique [22].

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 3 minutes 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 a symptomatic LBP population [23]. 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.

Limitations: Limitations of this study were that the level of spinal involvement was not noted which varied in all the participants. The second limitation was that there were subjects who complained of pain but had no range of motion restriction. This made no significant changes in the Back performance scale as their level of activity was not affected.

CONCLUSION

The study concluded that modified lumbar SNAGS in lion's position reduced pain and activity limitations while it increased the lumbar flexion ROM in patients having non-specific chronic low back pain.

FUTURE SCOPE OF STUDY: Future studies should include a larger number of populations, examine long term effects of modified lumbar SNAGS and compare this technique to other forms of manual or exercise intervention.

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Conflicts of interest: None

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