Efficacy of SNAGs on dynamic balance level and pain intensity on chronic non-specific low back pain

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Abstract:

Background: Low Back Pain (LBP) is a common medical problem in both developing and developed countries.LBP has a major impact on life style, socioeconomic status, and functional abilities. Due to its effects on proprioceptors and muscle performance, LBP can disturb balance. This research aimed to investigate the effect of the Mulligan's lumbar sustained natural apophyseal glides "SNAGs" on dynamic balance and pain in patients with chronic nonspecific low back pain (CNSLBP). **Methods**: randomized clinical trial was conducted on 30 participants with CNSLBP. They were randomly allocated into two groups; the study group (n= 15) received lumbar "SNAG" on the symptomatic lumbar level(s), and the control group (n=15) received the sham "SNAG". Balance measures as well as pain level were assessed before and immediately after interventions. Biodex balance system (BBS) and visual analogue scale (VAS) were used to assess balance and pain respectively. **Results**:paired t-test revealed that there was a significant improvement in pain and balance after treatment regarding study group (p= 0.0001, p= 0.0014 respectively), while, the control group has showed no statistical significant difference (p= 0.1223, p= 0.1426 respectively). Unpaired t-test showed that lumbar SNAG resulted in significant improvement in pain when compared to sham treatment (p=0.0046). There was no statistical significant difference between lumbar SNAGs and sham treatment regarding dynamic balance (p= 0.1953). **Conclusion**: This study showed that lumbar SNAGs can immediately improve pain but its immediate effect on dynamic balance is limited.

Key words: SNAGs; Sham; Dynamic; Balance; Low Back Pain

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Introduction

Low back pain (LBP) is the most common musculoskeletal complaint. The prevalence of back pain in most countries had been with high rates. The majority of LBP cases were the non-specific type [1-3]. LBP has a major impact on life style, socioeconomic status[4].

LBP is subdivided into different categories, one of them was nonspecific which was our main concern in this article. Non-specific low back pain (NLBP) affects people of all ages and is a leading contributor to disease burden worldwide .NLBP is defined as LBP which is not attributable to recognizable, known specific pathology. NSLBP is usually categorized in 3 subtypes; acute, sub-acute and chronic low back pain [5].

Chronic non-specific low back pain (CNSLBP) can be caused by postural strain and poor biomechanics. Since many recent studies proved that CLBP patients have low dynamic postural stability than healthy subjects. A decrease in somatosensory information had been suggested as a possible mechanism affecting postural balance [6-9].

Many people have problems with dynamic balance as a main partner with back pain. The two seemingly different concerns are often connected. Balance problems may simply hinder the patient ability to stand to do basic activities of daily living[10,11]**.**Chronic back pain can cause balance problems due to its effect on the somatosensory system[12]. Dynamic Balance problems can be evaluated and treated by assessing the visual, somatosensory (feeling from the joints and skin) and vestibular systems (inner ear) [13].

Poor balance was a frequent concern reported by patients with CLPB in previous studies.The increased displacement of the center of pressure while standing upright**,** in addition to greater medial-lateral postural sway were the main causes [14-17].

Traditional treatment course of the NSLBP consists of physical activity, manual therapy, hydrotherapy and electrotherapy. Manual therapy techniques were among different therapeutic procedures that were used successfully in the treatment of CLBP[18]**.** Manipulation[19-21],

passive mobilization[22],and Mulligan Mobilization with movement (MWM)[23] have been showed improvement in proprioception functions as well as reduction in pain [24].

Sustained natural apophyseal glides SNAGs represents the most successful way when symptoms were provoked by a movement. Although SNAGs were usually performed in weight bearing positions they can be adapted for use in non-weight bearing positions [25,26]. Previous studies showed that adding SNAG to conventional programs in the treatment of CNSLBP may result in greater improvement of repositioning error, pain perception, and function [23].

The majority of the research concerned with SNAG techniques has focused on the study of peripheral joints, and cervical region. Few studies have been concerned with the effects of SNAG on the lumbar spine[27,28].

So the purpose of this study was to investigate the immediate effect of SNAG techniques on pain and balance in patients with CNLBP. The study hypothesis was SNAG techniques have no effect in pain and dynamic balance in patients with CNLBP.

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Subject, materials and methods

Study design

Randomized clinical trial.

Participants:

30 patients (18-25 years) of both genders diagnosed with CNLBP were recruited from Misr University outpatient clinic. All patients were diagnosed by their physician. Patients were assigned randomly into 2 equal groups using the permuted block method; SNAG group of fifteen patients received “SNAG” on the symptomatic lumbar vertebrae and control group of another fifteen patients received sham “SNAG” for lumbar spine.

Inclusive criteria were; patients suffering from continuous or intermittent LBP for 3 months or more, pain with no obvious organic or pathologic cause. Exclusive criteria were; back pain due to a definite cause (radicular pain, disc herniation, spinal stenosis, serious spinal complications, arthritis, degenerative joint diseases, disk lesion, inflammation or facet joint disease), obese patients, pregnant females, balance problems due to vestibular or visual systems impairments, patients who experienced

increase in pain and or reduction in ROM after 3 repetitions of lumbar SNAG were excluded too.

Each patient was screened for inclusion criteria and the eligibility to Mulligan technique. Participants were asked to sign a consent form. Demographic data including age, weight, and height were recorded. Outcome measures were measured before and immediately after application of the SNAG or sham SNAG.

Measurements procedures:

Procedures

During the first meeting, demographic data (age, weight, height, body mass index) were collected. Screening for inclusion and exclusion criteria were performed, then clinical examination was done to detect the symptomatic levels. Pain intensity was measured by the numerical Visual Analogue Scale (VAS) through asking the participant to report his current level of pain by placing a mark over the horizontal line. Dynamic balance test was examined by the BBS after performing the Initial calibration.

Brief explanation about the required tasks was done, then participants were asked to remove their feet wear, and stand on both legs on the BBS's locked platform. They were instructed to place arms across the chest and look at the quadrant and zones on the LCD screen. The platform was unlocked and participants were asked to adjust the position of the supporting foot to maintain platform stability. Testing was initiated as the platform release for a 20 sec tests on static platform and participants were asked to maintain an upright standing position on their both feet while the stability level was at 6 dynamic platform [31].

Pain and balance were assessed before and immediately after applying the appropriate intervention for each group.

Treatment procedures:

Mulligan technique:

Mulligan SNAG technique for lumbar spine were applied for patient in the experimental group only. Participants were assuming stride standing. The therapist was standing behind the participant as described by Mulligan to support the patient during application of the technique and allow easy performance of the required movement[32]. The therapist applied the mobilizing force parallel to the facet joint plane (cephalic direction) and over the

spinous processes of the respective symptomatic spinal levels in a sustained manner over the spinous process while the patient performing trunk flexion. Flexion position was maintained for few seconds then the participant returned to starting position while the therapist maintaining the mobilizing force. Three sets of six repetitions were performed on each symptomatic lumbar spinal level immediately before balance assessment [33].

Sham technique:

The Patient's and therapist's positioning and grasp were the same as in the study group, while the patient was asked to lean forward, the therapist pretended that he applied a mobilizing force over the spinous processes of the respective symptomatic spinal levels during movement. The repetitions were the same three sets of six repetitions were used.

Statistical Analysis

Descriptive statistics were used to determine mean, median, and standard deviation of the data. Paired and unpaired t-tests were used to examine within groups and between groups differences. Alfa level was set to (0.05) for all tests.

Results

Table 1, showed the demographic data for both groups. There were no statistical significant differences between study group and control group regarding age, weight, height, and BMI.

Table (1): Physical characteristics of patients in both groups

Variables	Study Group	Control Group	Comparison	
	Mean ± S.D	Mean ± S.D	*t*	*p*
Age (Years)	22 ±1.46	22 ±1.36	0.000	1.000
Weight	73.5±9.097	70.347 ±9.53	0.9270	0.3619
Height	171.2±6.36	166.87±7.1	1.7606	0.0892
BMI	24.95±1.8	25.205±2.36	0.3296	0.7442

S.D: Standard deviation, P: Probability value, ***t***: t value

As shown in table (2) paired t-test revealed that there was a statistical significant difference in VAS, Dynamic/6/both limbs between pre-treatment and post treatment data in the study group. Control groups

showed no statistical significant difference in pain and Dynamic/6/both limbs test after sham treatment.

Table (2): Paired t-test results for study and control groups:

Variable	group	Pre-treatment Mean ± S.D	Post-treatment Mean ± S.D	*T*	*P*	Percentage of change
VAS	study	7.6±0.91	3.93±1.1	14.55	0.0001	48.29%
	control	6.87±1.41	5.73±1.98	1.6446	0.1223	16.59%
Dynamic/6/both limbs	study	1.467±1.006	0.713±0.484	3.955	0.0014	51.4%
	control	1.013±0.304	0.9±0.251	1.5537	0.1426	11.15%

S.D: Standard deviation, P: Probability value, t: t test

According to the results of unpaired t-test, there was a pretreatment similarities between both groups regarding VAS (p=0.1013), and dynamic/6/both limbs test (p=0.106). As shown in table (3), comparison between groups after intervention revealed that there was a statistical significant difference between groups regarding VAS (p=0.0046), while there was no statistical significant difference regarding Dynamic/6/both limbs (p = 0.1953).

Table (3): Unpaired t-test for post-treatment data of study and control groups

Variable	study group Mean ± S.D	control group Mean ± S.D	t value	P value
VAS	3.93±1.1	5.73±1.98	3.0769	0.0046
Dynamic/6/both limbs	0.713±0.484	0.9±0.251	1.3267	0.1953

S.D: Standard deviation, P: Probability value, t: t test

Discussion

Up to the authors' knowledge, this is the first trial concerned with the effects of lumbar SNAGs on dynamic balance in patients with CNSLBP. The results of the present study have showed improvements in pain intensity and dynamic balance immediately following the application of lumbar SNAGs, on the other hand, the improvements recorded after sham treatment was not statistically significant. The percentage of change of

dynamic/6/both limbs test was higher in SNAG group compared with sham group but it did not reach a statistical significant level.

According to the current results, the improvements obtained in dynamic balance test was obvious (percentage of change = 51%) compared with sham (11%) but they failed to reach a statistical significant level. This may be explained firstly by the small size of the sample which may be not adequate to reavel the actual changes in the balance status, in the current experiment, secondly, the authors have studied the immediate effect, and they did not added a standard treatment to Mulligan SNAGs so that the dose and duration of intervention may be not sufficient to produce significant improvement in proprioception, sensorimotor function, and dynamic balance. In the previous study carried out by Hussien et al, the conclusion that lumbar SNAGs can affect proprioception and sensorimotor control was based on adding SNAGs to a standard treatment, and for a longer period of treatment duration [23], finally, the placebo effect of the sham treatment as well as the trunk movements incorporated as a procedure in it might have a role in reducing perception of pain, increase patients confidence to move and improve muscular and sensory motor performance. This can explain why the balance test results were statistically similar after intervention between groups.

The effect of lumbar SNAGs on pain was investigated in different studies, Hidalgo et al 2015 have studied the immediate and short term effect of SNAGs on LBP, and they found that SNAGs have favorable results in reduction of pain either at rest or during flexion [28]. Similar results were also found by Heggannavar et al, when they applied a modified form of lumbar SNAGs on a group of patients with CNLBP [34].

Hussien et al, have investigated the effect of adding lumbar SNAGs to a standard treatment on CNLBP, there results were similar to the current study although they used a 1 month treatment program [23]. Wagger et al [39] found that lumbar SNAGs can reduce pain in mechanical back pain but their effects were less when compared with that experienced after Mckenzie treatment.

On the other hand, SNAGs were found to have no effect on pain compared to placebo in a study conducted by Konstantinou et al [41]. In this study, they reported immediate but small improvement in range of motion while no changes were noticed in pain.

The improvement in pain perception reported in the current study could be attributed to multiple factors including; the relief of the mechanical fault of the facet joint, which may relief the stresses on the facet joint capsule, and periarticular structures [35-38].

This study had the following limitations: small sample size, only one balance test was investigated, static balance was not tested.

Conclusion:

This study concluded that using Mulligan SNAGs as a treatment for CNLBP can immediately reduce pain intensity but cannot improve dynamic balance levels.

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