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COMPARATIVE STUDY OF SNAGS AND MAITLAND'S MOBILIZATION IN CHRONIC LOW BACK PAIN

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Abstract:
Objectives: Comparative Study of Snags and Maitland's Mobilization in Chronic Low Back Pain. **Design:** Randomized Control Trial. **Methodology:** A total of 60 patients were included as per pre define inclusion and exclusion criteria and randomly assigned into two groups each having 30 patients. Group A was given SNAG consisted of stretching strengthening and postural correction exercises while Group B was given Maitland's mobilization consisted of stretching strengthening and postural correction exercises for 4 weeks, 3 sessions per week one session per day. The patient's outcome measures were assessed by visual analog scale, ODI and Goniometry of Lumbar Range of Motion. Measurements were recorded before and after the end of the treatment period. **Results:** Results revealed that means and S.D of both group were significant (*p=.000)* statically but clinically the Group of patients treated with SNAGS along with stretching strengthening and postural correction exercises managed pain (pre=7.81±1.16, post=0.35±0.37), ODI (pre=40±19.18, post=9±4.39) and range of motion (flexion pre=30±6.05, post=51±10.15, extension pre=16±2.33, post=30±5.21 Rt side flexion pre=10±2.15, post=20±4.15 and lt. side flexion pre=10±2.75, post=20±4.53, Rt side rotation pre= 9±1.57, post=18±2.35) lt. side rotation pre=8±2.09, post=17±2.45 better than group of patient treated with Maitland's mobilization along with stretching strengthening and postural correction exercises in terms of pain (pre=6.27±1.31, post=2.73±1.19), ODI (pre=42±20.52, post=24±11.7) and range of motion (flexion pre=24±5.85, post=36±10.66, extension pre=14±2.35, post=20±5.42, Rt side flexion pre=10±2.45 post=16±2.48, lt Side

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flexion pre=12±2.85, post=18±2.46, Rt side rotation pre=9±1.80 post=15.±2.81, lt Side rotation pre=8±1.75, post=16±3.27. **Conclusion:** The result of study suggests that both SNAG and Maitland's improves the symptoms of chronic low back pain. Better improvement was shown by SNAG group than Maitland's group. Based on these results SNAG and Exercise should be the treatment of choice for chronic Low back pain rather than Maitland's with Exercise.

Keywords: SNAGS, chronic low back pain, Maitland's, exercise

1. Introduction

Low back pain is a condition that continues to place a great deal of stress on the healthcare system. Globally one out of three people suffer from low back pain. Lifetime prevalence of low back pain is estimated to be at least 60-70%[1]. Low back pain (LBP) is a major health problem because of its high prevalence worldwide[2]. It affects almost every adult person at least once throughout his or her life span[3]. Low back pain is considered a multidimensional medical problem having multiple risk and causative factors[4,5]. Pain in region between bottom of ribs and buttock crease is referred as low back pain (LBP). Low back pain is umbrella of conditions. 80% of adults estimated to experience LBP at some point during their life[6]. More than 60% of consultation in private physiotherapy clinics is because of low back pain[7]. Male and female individuals are affected equally[8] It is a major problem that causes activity restriction, work absence and financial burden on families, communities, industries and government. Diagnostic triage is use to differentiate between non spinal or serious spinal disorder and those with pain of musculoskeletal cause by means of history and examination with special emphasis on red flags[9]. Clinical presentation can differ but majority of patients will complain pain that either centralizes or radiates to lower extremities[10].

Mechanical low back pain is a general term used to refer pain that does not have any specific cause or that is not related to any serious spinal pathology[11]. 90% of patients presenting to primary care are sufferers of mechanical low back pain and these are the majority of the individuals that present to physiotherapy. Common symptom is the pain that gets worse with activity and relieved by rest[12].

A wide range of managements is available, with different treatments specifically targeted toward different causes. A balanced approach, which deals with patient psychosocial factors and includes multidisciplinary care, increases the probability of success from back pain interventions[13]. Medication, physical therapy, and surgery are most commonly used managements of mechanical low back pain.

Posture involvement is evident in back pain rule of thumb is that pain leads to bad postures and bad postures further aggravates pain[13]. When bad posture is fixed it decreases pain significantly.

Usually LBP treatment strategies focus on pain area and neglect proximal or distal areas to pain. But according to emerging concept of Regional Interdependence it is necessary to treat proximal and distal area too for better outcomes[14].

Involvement of thoracic spine posture in chronic low back pain is proved from literature but rare evidence is present on treatment of posture correction to low back pain. This study is conducted to add to literature the effects of posture correction on low back pain Effects of lumbar Mulligan sustained natural apophyseal glides on patients with nonspecific low back pain is evident in literature[15]. SNAG involves application of accessory passive glide to lumbar vertebrae by physiotherapist while patient will simultaneously perform an active movement. Glide given is in the direction of plane of facet joints and technique is usually performed in weight bearing position like standing, sitting[9,12,16].

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[17].

2. Material and Methods

The study was designed as Randomized Control Trial and has two groups Group A was given SNAG consisted of stretching, strengthening and postural correction exercises while Group B was given Maitland's consisted of stretching, strengthening and postural correction exercises. It was conducted at Physical Therapy Department of Prince Sultan Military Medical City- Riyadh Saudi Arabia.

2.1 Inclusion criteria[1,17]:

- Duration of illness more than three months
- Ability to perform at least 40° of trunk flexion.
- Aged 17 to 45 years.
- Suffering from chronic LBD based on referral from orthopedic surgeon

2.2 Exclusion criteria[29,30]:

- 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.

A total of 60 patients were included as per inclusion criteria. Patient was randomly assignment into two groups A and B with 30 patients in each group. Baseline assessment using Visual analog Scale (VAS), Oswestry Disability Index (ODI) and

Goniometry was done respectively for Pain, Function and Lumbar range of motion for both groups.

SNAGS were applied in flexion, extension and rotation. SNAGS were applied for few seconds with 3 repetitions on first day and 10 repetitions from next visit. Study also included active as well as therapist facilitated stretches. Stretches were maintained for 15 -20 seconds with 10 repetitions of each stretch per session[12]. Maitland's mobilization Frequency: 6 repetitions to 3 spinous processes were given once in a day. Sessions were given 4 weeks, 3 sessions per week one session per day to both groups. Home plan consisted of exercise therapy i.e. knee to chest, bridging, back extension exercises for both groups for once a day with 10 repetitions of each exercise every day.

2.3 SNAGS Technique

SNAG technique was applied from a sitting position on the edge of the table while both feet were on a foot rest. A specialized Mulligan belt was used around the patient's waist and therapist's hips. The mobilizing force was applied parallel to the facet joint plane (cephalic direction) and over the spinous processes of the respective symptomatic spinal levels (Fig.1). The patients were asked to lean forward as much as possible during application of the mobilizing force and then return to the starting position while the therapist maintained his mobilizing force until the end. The symptomatic level was determined clinically by using the standardized objective examination combining active trunk movements and posteroanterior mobilization of the lumbar vertebrae. The SNAG dose for each level was SNAGS were applied in flexion, extension and rotation. SNAGS were applied for few seconds with 3 repetitions on first day and 10 repetitions from next visit 3 times per week for 4 weeks. Study also included active as well as therapist facilitated stretches. Stretches were maintained for 15 -20 seconds with 10 repetitions of each stretch per session. It was performed before the conventional program[12,18].

2.4 Maitland's Mobilization procedure and technique

Patient–Prone with hands either by his side or above his head & with head turned comfortably to one side.

Position of therapist: Standing on right side of patient with ulnar border of hand between pisiform & hook of hamate directly over the spinous process. The therapist shoulder were directly over the point of contact of spinous process & full wrist extension was maintained with forearm in neutral between supination & pronation (fig 2)[1,19].

Direction: The direction of mobilization was posteroanterior. Grade I and II joint oscillations for 30 seconds each. Grade I joint mobilizations were administered consecutively to the 3 spinous processes that surround the pathologic area with 30 seconds of rest in between, followed by grade II joint mobilizations performed[1,19].

Frequency: 6 repetitions to 3 spinous processes were given once in a day.

After mobilization each patient received hydrocollator pack to lumbar area for 10 min.to reduce the pain that may be produced as a result of increased paraspinal muscle activity due to mechanical force application with mobilization[26].

Follow-up: The treatment was given 4 weeks 3 visits per week once a day.

2.5 Maitland's grades of oscillatory mobilizations[20]:

- Grade 1: Small amplitude movement performed at the beginning of motion.
- Grade 2: Large amplitude movement performed within the range.
- Grade 3: Large amplitude movement performed up to the limit of the range.
- Grade 4: Small amplitude movement performed at the limit of range.
- Grade 5: High velocity thrust performed at the limit of the range.

2.6 Exercise therapy

Exercise therapy appears to be slightly effective for decreasing pain and improving function in adults with chronic LBP. The intervention included 12 stretching exercises (i.e., gastrocnemius, soleus, quadriceps, posterior and inferior shoulder, upper trapezius, hip flexor, back extension, back rotation, hamstrings, hip external rotators, back flexion), plus 3 additional stretches (hip internal rotators, hip adductors and hip flexors). Each stretching exercise was held for approximately 60 seconds and repeated once. In addition to a complete set (15) of full-body stretches, the class began with five minute warm-up period consisting of basic aerobics steps (i.e., one minute each of walking in place, marching, lateral shuffling, turning and reaching, and box step) and also included four exercises to strengthen back, abdomen and hips (i.e., squats, crunches, oblique crunches, back extensions)[12,21] .

2.7 Posture correction exercises included

Correction of sitting posture by teaching him 'slouch overcorrect procedure'. Maintenance of corrected posture was achieved by advising the lumbar roll while sitting & active control of the lordosis. Correction of standing posture by teaching posterior pelvic tilt exercise with tightening of abdominal muscles. Correction of lying posture was achieved by using a lumbar roll. Posture correction was given once a day with 15-20 times in each session till the corrected posture became automatic. Patients were given flexion or extension exercises depending on their 'directional preference[1,22]. Patients preferring extension over flexion received[1,23] Lying prone 10 min Lying prone in extension for 10 min Extension in lying extension is progressed to maximum possible extension range, repeated about 10 times Sustained extension with couch inclined at 1 to 2 inches for 5 to 10 min & then lowered & slowly returned to horizontal Extension in standing If patient was free of pain after 5 days, flexion exercises were commenced followed by extension. Patients preferring flexion over extension received Posture correction exercises Flexion in lying repeated for 10 times Flexion in standing: The patient bent forward to touch his toes about 10 times .It was ensured that patients return to neutral standing after flexion. If patient was free of pain after 5 days, extension exercises were commenced followed by flexion[1]. (Fig. 3, 4, 5, 6)

Follow-up: The treatment was given over a period of 4 weeks 3 visits per week once a day.

2.8 Data Analysis

Data was analyzed with SPSS 20. Outcome measures were calculated as mean and standard deviation and compared by using paired and independent sample t-test. P-value of less than 0.05 was taken as significant. The study was approved by PSMMC Ethical Review Committee and Physical Therapy Department of PSMMC. Informed consent was taken from all patients before enrollment in the study to assure willingness, confidentiality of information and to aware the patients about all procedure and interventions.

3. Results

In this study, 60 patients participated with a mean age of 45.25±14.30 in group A and 45.35±15.40 in Group B ranging from 17 to 45 years. (Table 1)

3.1 Mean reduction in VAS

Both groups had significant difference in pre R_x to Post R_x values as t and p values for group A and B were t=17.76, p=0.000 and t=11.27,p=0.000 respectively. (Table 2)

3.2 Mean reduction in ODI

Both groups had significant difference in pre R_x to Post R_x p=0.000 respectively (Table 3)

3.3 Mean reduction in ROM

Both groups had significant difference in pre R_x to Post R_x p=0.000 respectively (Table 4)

4. Discussion

A study was done to investigate effects of SNAGs mobilization consisted of stretching strengthening and postural correction exercises to lumbar stabilization exercises in patients of chronic low back pain. 60 subjects with chronic low back were recruited. Balance, stabilization and pain were assessed. Results of this study concluded that there are greater effects on SNAGs of lumbar region, pain relief and improvement of function consisted of stretching strengthening and postural correction exercises combined with thoracic mobilization were given to patients of CLBP. Results of this study favors this study results of decrease of pain levels and increase in functional levels when SNAGs mobilization consisted of stretching strengthening and postural correction exercises was given for back pain[12,24].

Another study conducted to find out effects of thoracic manipulation and mobilization on function and mental state of patients of CLBP. Thirty-six subjects were randomly divided into mobilization group, manipulation group and control group. Outcome of study showed that mobilization or manipulation to thoracic lumbar vertebrae has a positive effect on function, mental state, and ROM in patients with lower back pain. Conclusion of this study also supports current study that ROM and functional level increases when thoracic intervention was given for LBP[12,25].

The results on RE agreed with previous a previous recommendations. This study investigated the effects of another manual technique (Gong's mobilization) on RE. The comparison between both studies was not accurate because the Gong study was performed on healthy participants, whereas the present study was conducted on chronic nonspecific LBP patients.[12,26]

Lumbar degenerative kyphosis (LDK) is condition in which there is kyphosis or marked loss of lumbar lordosis. It is common in middle aged and elderly population due to degenerative conditions. A retrospective study was done to establish post-surgical co relation between thoracic and lumbar sagittal curves in LDK. Reciprocal relationship was found between lumbar lordosis and thoracic kyphosis. Surgical correction of lumbar lordosis in LDK shows significant improvement in thoracic kyphosis[12,27].

Exercise therapy is one promising treatment option, but there is still no consensus upon which kind is the most effective[12,28] .

The significant decrease in pain in Maitland group could be due to42the stimulation of mechanoreceptors at the facet joint and within the joint capsules of the facet which inhibits the nociceptive fibres in the area, thereby disrupting the pain-spasm cycle. Therefore, manual therapy techniques may influence the joint receptors and disrupt or modulate the pain-spasm cycle[1,19].

This study shows that both the Maitland protocols are effective in improving the PPT and ROM. They are equally effective in improving the PPT but 3 repetitions of 1 minute were more effective in improving the ROM than 1 repetition of 3 minutes. Mobilizations produce a multitude of beneficial effects through stimulation of peripheral mechanoreceptors, inhibition of nociceptors, and an increase in synovial nutrition, thus helping to reduce pain[29,30].

Oscillatory movements performed during mobilization are believed to produce mechanical effects, such as the realignment of collagen, increase in fiber glide, and the breakup of adhesions, which help to restore normal mobility[29,31]. Maitland mobilization is effective in improving ROM in Subjects with Unilateral Tibiofemoral Osteoarthritis[29,32].

This study was designed as a double blinded randomized controlled pilot research to compare effects of SNAG and PA mobilization manual methods on flexion and extension ROMs of people with chronic nonspecific low back pain. The results revealed that SNAG technique on lumbar spine might improve flexion ROMs better than the PA mobilization. In contrast, the Maitland PA mobilization might improve extension ROM in these patients[33].

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. They reported that significant improvement in all trunk ROM directions (exception of lumbar extension) might happen following the SNAG technique application[33,34].

Briefly it can be summarized that there exist evidence on SNAGs consist of stretching and strengthening exercises involvement in low back pain.so if SNAGs along with stretching and strengthening exercises treatment for low back pain is given it will lead to better outcome measures. This study favors same conclusion that when SNAGS consist of stretching and strengthening exercises were given better results were obtained in terms of pain reduction, improved function and increased ranges of lumbar spine.

5. Conclusion

This study provides evidence that adding lumbar SNAG to a conventional LBP program consisting of stretching strengthening and postural correction exercises is more effective in the treatment of chronic LBP in terms of RE, pain, and functional level.

5.1 Limitations

However, there were few limitations that hindered more accurate results such as the sample size was small consisting of only male patients. Similarly, duration of study was short which leads to investigate short term effects only.

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Appendix

Figure 1: Start and end positions for lumbar sustained natural apophyseal glide (SNAG)

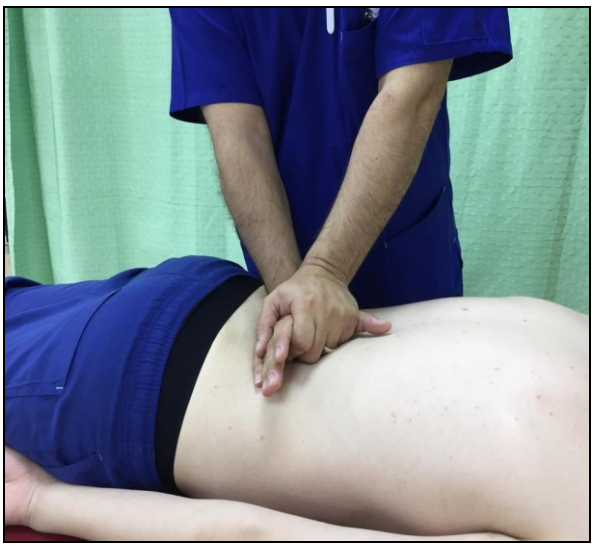

Figure 2: Maitland mobilization

Figure 3: Extension in lying

Figure 4: Sustained extension

Figure 5: Flexion in lying

Figure 6: Flexion in standing

Table 1: Mean and SD of age between group A and B

	Group A (N=30) Mean±SD	**Group B (N=30) Mean±SD**
Age (Yrs)	45.25±14.30	45.35±15.40

Table 2: Mean reduction in VAS values between group A and B. Mean and standard deviation at pre Rx, Post Rx and pre Rx to Post Rx with t and p values

Groups	**Pre Rx**	**Post Rx**	**Pre Rx to Post Rx**		
			Mean±SD	**Paired t value**	**p value**
Group A (N=30) Mean±SD	7.81±1.16	0.35±0.37	6.31±1.21	17.56	0.005
Group B (N=30) Mean±SD	6.27±1.31	2.73±1.19	2.86±0.74	11.20	0.010

Table 3: Mean reduction in ODI values between group A and B. Mean and standard deviation at pre Rx, Post Rx and pre Rx to Post Rx with p values

Groups	**Pre Rx**	**Post Rx**	**P Value**
Group A (N=30) Mean±SD	40±19.18	9±4.39	0.000
Group B (N=30) Mean±SD	42±20.52	24±11.7	0.000

Table 4: Mean reduction in ROM values between group A and B. Mean and standard deviation at pre Rx, Post Rx and pre Rx to Post Rx with p values

ROM	**Group A (N=30) (Mean±S.D)**		**Group B (N=30) (Mean±S.D)**		**p-value (<0.05)**
	Pre Rx	**Post Rx**	**Pre Rx**	**Post Rx**	
Flexion	30±6.05	51±10.15	24±5.85	36±10.66	.001
Extension	16±2.33	30±5.21	14±2.35	20±5.42	.000
Rt. Side flexion	10±2.15	20±4.15	10±2.45	16±2.48	.001
Lt. Side flexion	10±2.75	20±4.53	12±2.85	18±2.46	.000
Rt. Rotation	9±1.57	18±2.35	9±1.80	15±2.81	.005
Lt. Rotation	8±2.09	17±2.45	8±1.75	16±3.27	.000