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Effectiveness of pelvic floor exercise versus mulligan concept lumbar snag on chronic non-specific low back pain and functional disability in postpartum women at the end of 8 weeks: A comparative study

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Abstract
Purpose: The study was conducted to compare the effectiveness of Pelvic floor exercise versus Mulligan concept lumbar SNAG on Chronic Non-specific low back pain and functional disability in postpartum women.
Introduction: Low back pain is a common musculoskeletal condition and one of the leading causes of functional disability. Non-specific low back pain is defined as low back pain not attributable to a recognizable, known specific pathology (e.g., infection, tumor, osteoporosis, lumbar spine fracture, structural deformity, inflammatory disorder, radicular syndrome, cauda equina syndrome). Non-specific low back pain is persistent 2-3 years after delivery and which interferes with their activities of daily living. Pelvic floor exercise are done to improve the strength of the pelvic floor muscles. Mulligan concept Lumbar SNAG (Sustained Natural Apophyseal Glide) is one of the techniques performed from a weight bearing position, with the mobilizing force applied over the affected spinous process while the patient is enacting the painful or limited movement
Objective: The objectives of the study were to evaluate and compare the effects of pelvic floor exercise and mulligan concept lumbar SNAG on chronic non-specific low back pain at the end of 8 weeks in postpartum women.
Method: 30 subjects within the age group of 30-35 years were selected on the basis of inclusion and exclusion criteria. After taking their written consents they were divided into 2 groups. Group "A" received pelvic floor exercises and conventional protocol for 8 weeks. Group "B" received mulligan concept lumbar SNAG for 8 weeks. Pre and post intervention readings were taken using the VAS scale (pain) and the outcome measure ODI (functional disability)
Result: The study showed that the Group B had significantly better results than the
Group A with p values 0.0039 and 0.0031 for pain and functional disability respectively
Conclusion: This study concludes that Mulligan concept lumbar SNAG is more effective than Pelvic floor exercises in improving pain and functional disability in post-partum women with chronic non-specific low back pain.

Keywords: Pelvic floor exercise, Mulligan concept lumbar SNAG, chronic non-specific low back pain, functional disability

1. Introduction

Low back pain is a common musculoskeletal condition and one of the leading causes of functional disability. Chronic low back pain is a common musculoskeletal condition that often results in significant physical and psychological impairments [1].

Non-specific low back pain is defined as low back pain not attributable to a recognizable, known specific pathology (e.g., infection, tumor, osteoporosis, lumbar spine fracture, structural deformity, inflammatory disorder, radicular syndrome, cauda equina syndrome). It lacks a definite pathologic cause and represents about 85% of the LBP population [2, 3].

Non-specific low back pain is persistent 2-3 years after delivery and which interferes with their activities of daily living [4].

Causative factors for non-specific low back pain in postpartum period are:

- Due to weight gain during pregnancy and increase of the abdominal sagittal diameter, there is resultant change in the centre of gravity anteriorly; which increases the stress on lower back.
- Weight gain during pregnancy causes axial loading of the spine resulting in decrease in the intervertebral disc height along with increased vertebral body pressure.
- The passage of the fetus through the pelvis, and the resultant stretching and movement of the lax joints.
- Abdominal muscle stretching due to enlarging uterus causes muscle fatigue [5, 6, 7].

Pelvic floor is the area underneath the pelvis which consists of muscles and connective tissues a complex structure. It provides support to the abdominal viscera including uterus, bladder and other viscera.

The pelvic floor muscles are – Levtaor Ani and Coccygeous muscle.

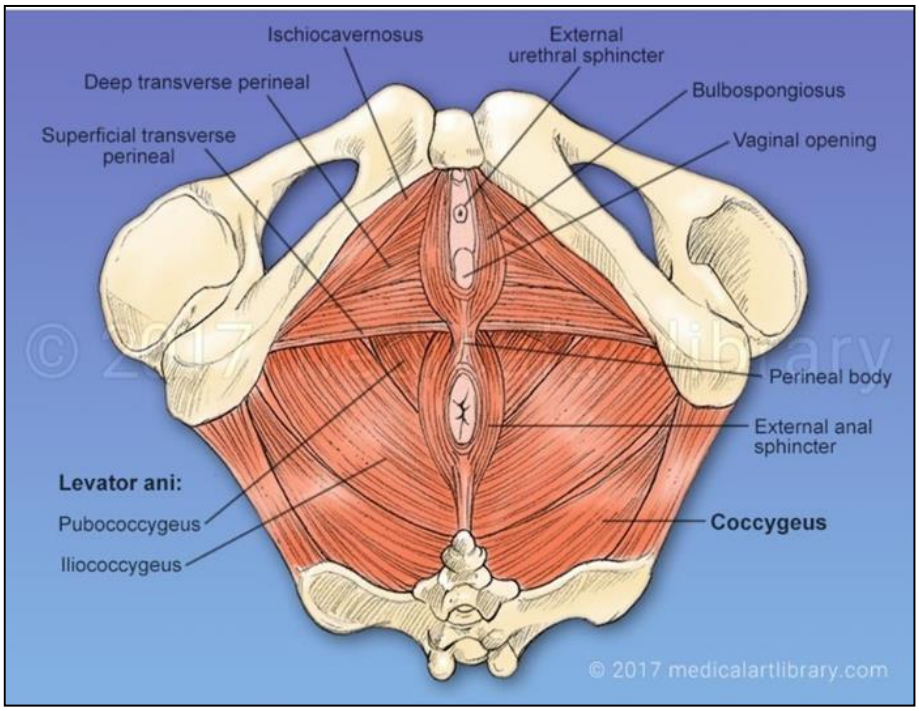


Fig 1: Pelvic floor muscles.

According to Mulligan, the effect of mobilization with movement (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.
Mulligan concept Lumbar SNAG (Sustained Natural Apophyseal Glide) is commonly used in the treatment of low back pain.
It is one of the techniques performed from a weight bearing position, with the mobilizing force applied over the affected spinous process while the patient is enacting the painful or limited movement.
SNAG when indicated, can provide immediate pain relief and improvement in range of motion (ROM) as it corrects the positional fault in facet joint.
The direction of glide is argued to be along the plane of the facet joints.
The basic principle of a SNAG is cessation of pain and an increase in lumbar range of motion thereby reducing the disab

2. Materials and Method

Materials

Pen
- Paper
- Consent form
- VAS scale
- Oswestry Disability Index
- Mulligan belt

Methodology

Sample Size: 30
Study Design: Comparative study
Sampling Method: Convenience sampling
Study Population: Post-partum women (30-35 years)
Study Setting: hospitals and opd in and around pune
Study Duration: six months
Treatment Duration: 8 weeks

2.1 Criteria

2.1.1 Inclusion Criteria

1. Post-Partum Women (Duration : 2-3 years)
2. Age - 30 to 35 years
3. Mild to moderate pain- VAS score of less than 7

Exclusion criteria

Mechanical low back pain- unilateral pain with no referral below the knee
Traumatic back pain
Specific low back pain due to:
Spine fractures
Patients with underlying pathology of infection, tumor, ankylosing spondylitis
Degenerative disorders of spine
Congenital deformity of spine

Outcome Measures

2.2.1 Pain-VAS (Visual Analogue Scale) (Reliability: literate-0.94 illiterate-0.71)
It is a horizontal 10cm line with words anchored as "no pain" at one end and "worst pain that the patient can" at other end. The examiner scores the instrument by measuring the distance, in millimetres, from the "no pain"
Anchor to the mark, which the patient identified as their level of pain.

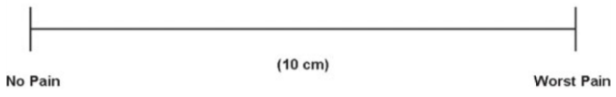
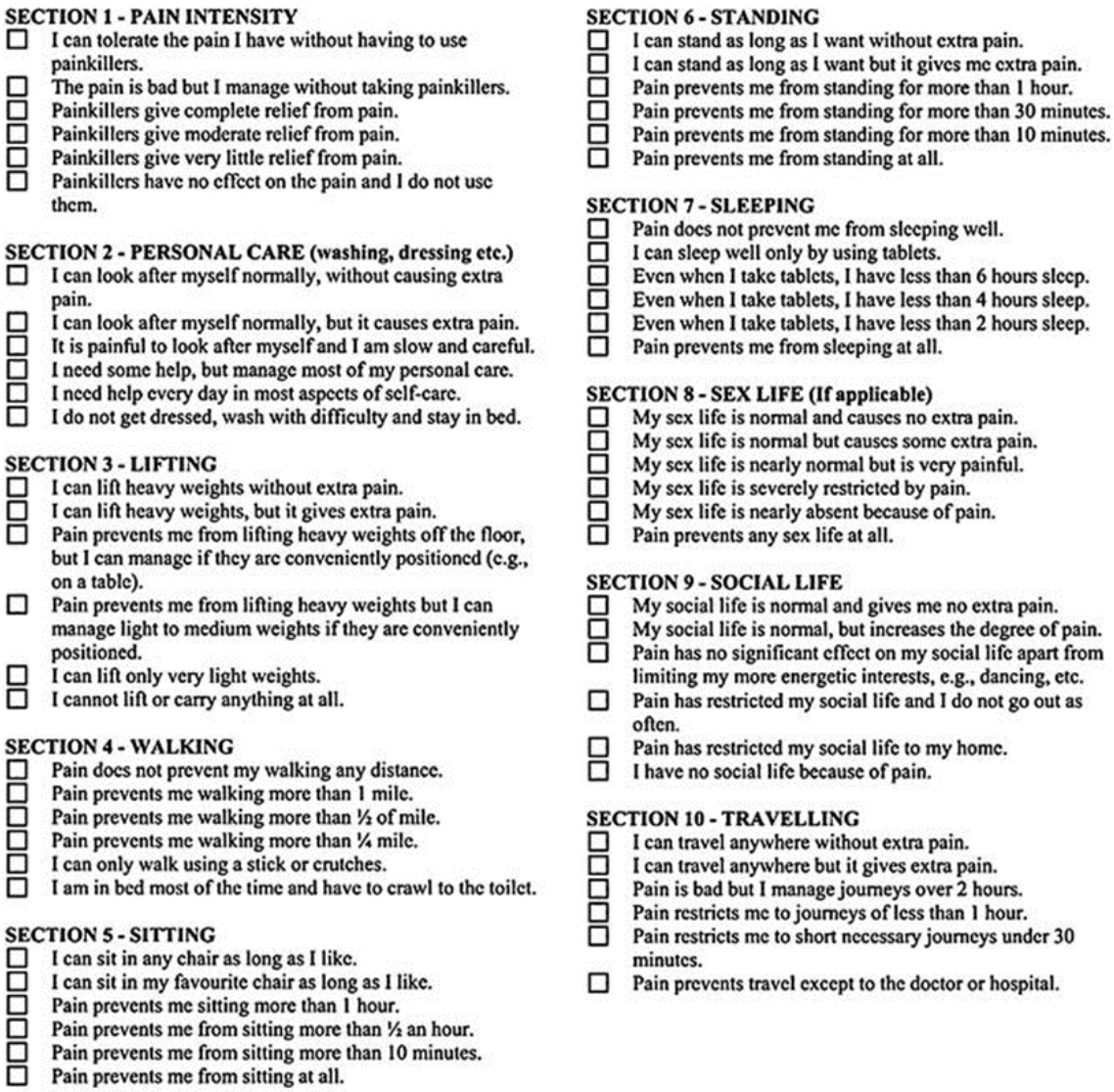


Fig 2: Vas scale

2.2.2 Functional Disability- Oswestry Disability Index (reliability-0.87, validity-0.71) [9]

1. It consists of 10 components with subpoints. The point total is divided by 50 and multiplied by 100 and the disability percentage is calculated.
2. Oswestry scores are categorized as –

- 81%-100% : bed bound
- 61%-80% : crippled
- 41%-60% : severe disability
- 21%-40% : moderate disability
- 0%-20% : minimal disability



SECTION 1 - PAIN INTENSITY
- ☐ I can tolerate the pain I have without having to use painkillers.
- ☐ The pain is bad but I manage without taking painkillers.
- ☐ Painkillers give complete relief from pain.
- ☐ Painkillers give moderate relief from pain.
- ☐ Painkillers give very little relief from pain.
- ☐ Painkillers have no effect on the pain and I do not use them.

SECTION 2 - PERSONAL CARE (washing, dressing etc.)
- ☐ I can look after myself normally, without causing extra pain.
- ☐ I can look after myself normally, but it causes extra pain.
- ☐ It is painful to look after myself and I am slow and careful.
- ☐ I need some help, but manage most of my personal care.
- ☐ I need help every day in most aspects of self-care.
- ☐ I do not get dressed, wash with difficulty and stay in bed.

SECTION 3 - LIFTING
- ☐ I can lift heavy weights without extra pain.
- ☐ I can lift heavy weights, but it gives extra pain.
- ☐ Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned (e.g., on a table).
- ☐ Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned.
- ☐ I can lift only very light weights.
- ☐ I cannot lift or carry anything at all.

SECTION 4 - WALKING
- ☐ Pain does not prevent my walking any distance.
- ☐ Pain prevents me walking more than 1 mile.
- ☐ Pain prevents me walking more than ½ of mile.
- ☐ Pain prevents me walking more than ¼ mile.
- ☐ I can only walk using a stick or crutches.
- ☐ I am in bed most of the time and have to crawl to the toilet.

SECTION 5 - SITTING
- ☐ I can sit in any chair as long as I like.
- ☐ I can sit in my favourite chair as long as I like.
- ☐ Pain prevents me sitting more than 1 hour.
- ☐ Pain prevents me from sitting more than ½ an hour.
- ☐ Pain prevents me from sitting more than 10 minutes.
- ☐ Pain prevents me from sitting at all.

SECTION 6 - STANDING
- ☐ I can stand as long as I want without extra pain.
- ☐ I can stand as long as I want but it gives me extra pain.
- ☐ Pain prevents me from standing for more than 1 hour.
- ☐ Pain prevents me from standing for more than 30 minutes.
- ☐ Pain prevents me from standing for more than 10 minutes.
- ☐ Pain prevents me from standing at all.

SECTION 7 - SLEEPING
- ☐ Pain does not prevent me from sleeping well.
- ☐ I can sleep well only by using tablets.
- ☐ Even when I take tablets, I have less than 6 hours sleep.
- ☐ Even when I take tablets, I have less than 4 hours sleep.
- ☐ Even when I take tablets, I have less than 2 hours sleep.
- ☐ Pain prevents me from sleeping at all.

SECTION 8 - SEX LIFE (If applicable)
- ☐ My sex life is normal and causes no extra pain.
- ☐ My sex life is normal but causes some extra pain.
- ☐ My sex life is nearly normal but is very painful.
- ☐ My sex life is severely restricted by pain.
- ☐ My sex life is nearly absent because of pain.
- ☐ Pain prevents any sex life at all.

SECTION 9 - SOCIAL LIFE
- ☐ My social life is normal and gives me no extra pain.
- ☐ My social life is normal, but increases the degree of pain.
- ☐ Pain has no significant effect on my social life apart from limiting my more energetic interests, e.g., dancing, etc.
- ☐ Pain has restricted my social life and I do not go out as often.
- ☐ Pain has restricted my social life to my home.
- ☐ I have no social life because of pain.

SECTION 10 - TRAVELLING
- ☐ I can travel anywhere without extra pain.
- ☐ I can travel anywhere but it gives extra pain.
- ☐ Pain is bad but I manage journeys over 2 hours.
- ☐ Pain restricts me to journeys of less than 1 hour.
- ☐ Pain restricts me to short necessary journeys under 30 minutes.
- ☐ Pain prevents travel except to the doctor or hospital.

Fig 3: Oswestry disability index (ODI)

2.3 Procedure

Ethical clearance was taken from P.E.S Modern College of physiotherapy, Shivajinagar, Pune-05

The participants were selected according to the inclusion and exclusion criteria.

The subjects were explained about the study. Consent was taken from the patients who wished to participate in the study.

Total 30 subjects were taken.

The subjects were divided in 2 groups according to random allocation by chit method.

Two groups were group A and group B, were explained about the procedure.

Pre-intervention outcome measures were taken.

2.3.1 Group A - Pelvic Floor Exercises:

Patient position- varied according to week

Technique:

1. The patients were taught to contract their pelvic floor muscles and to squeeze with maximum applied effort and hold for 3 to 4 seconds without holding the breath
2. 1st Phase- the patients were asked to complete 15 to 20 repetition in sitting and lying for two to three sets in a day for first 3 weeks in Crook lying positions
3. 2nd Phase- for 4 to 6 week onwards the repetition were increased nearly double and as for the comfort of the patient completing two to three times in a day patient was advised to practice the session in two positions that is sitting and lying
4. 3rd phase- 7th week onwards the patients were asked to increase the number of repetition 40-50 with same number of sets in a day and continued till end of 8th week patient were advised to continue the exercises in lying, sitting and standing.

2.3.2 Group B - Mulligan concept lumbar snag

Patient position- high sitting with feet supported

Therapist position- standing at the back side of the patient

Technique:

1. SNAG technique was applied from a sitting position on the edge of the table while both feet on a footrest.
2. A specialised Mulligan belt was used around the patients

waist and therapist hips.
3. The mobilizing force was applied parallel to the facet joint plane (Cephalic direction) and over the spinous processes of the respective symptomatic spinal levels.
4. 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 mobilising force until the end.
5. The SNAG dose was performed before the conventional program.
6. The SNAG dose for each level was 3 sets of 6 repetitions 3 times per week for 8 weeks.

Fig 4 and 5: Start position and end position of lumbar snag

2.3.4 Conventional Protocol

- Manual passive stretching exercises of- Hamstrings, Iliopsoas, back extensors for 30 seconds and 3 repetitions each.
- Progressive strengthening exercises for abdominals and back extensors:

1. Abdominals-patient was placed in supine position with both hips and knees semi flexed. The therapist stabilizer feet and the patient was asked to cross his hands over the chest and raise his head and shoulders of the bed before relaxing.
2. Back Extensors-asking the patient to raise the head and shoulders off the table then relax while the therapist stabilized the patients lower limbs and pelvis. Pelvic rocking (anterior and posterior pelvic tilt) was performed from crook lying positions. The patient was asked to arch the low back, hold then relax, and repeat and then press the low back against the treatment table and hold then relax and repeat.

Fig 6: Manual stretching of hamstrings

Fig 7: Manual stretching of iliopsoas

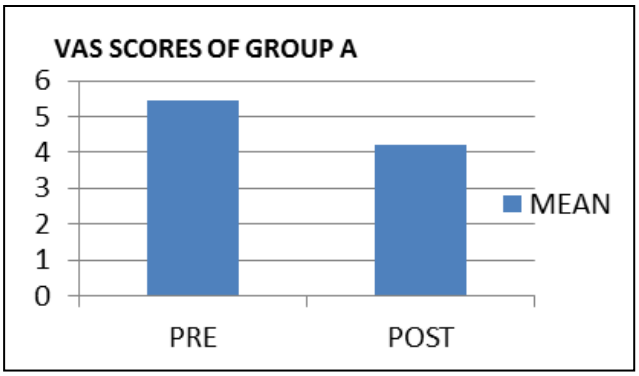
Fig 8: Manual stretching of back extensors.

Fig 9: Stretching of back extensors

2.4 Data analysis and statistical analysis

Reduction in pain was assessed by VAS, improvement in functional disability was assessed by Oswestry Disability Index (ODI).
The data was entered in excel spreadsheet, tabulated and subjected to statistical analysis.
Data entered was analyzed with the help of GraphPad Instat, checking effectiveness of pelvic floor exercises and Mulligan concept lumbar SNAG respectively in postpartum women with chronic non-specific low back pain.
The data passed the normality test when demographic data was analyzed.
Pre and post data (VAS and ODI scores) of Group A and Group B was compared using the 'paired t test'.
Group A and Group B intergroup analysis of VAS and ODI scores was compared using the 'unpaired t test'.

Intragroup vas scores: Group a- pelvic floor exercises and conventional protocol.

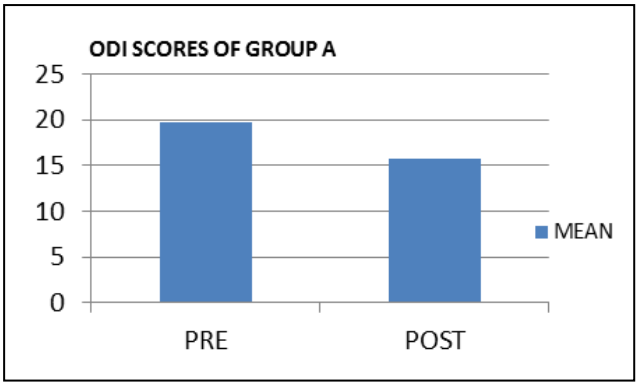


Graph 1: Pre and post VAS scores of group A

Intragroup Odi Scores: Group a (pelvic floor exercises and conventional protocol)

Table 2: ODI scores of group A

VAS	PRE	POST
MEAN	19.63	15.76
SD	5.902	5.494
P VALUE	<0.0001(Considered extremely significant)	
T VALUE	9.259 with 14 degrees of freedom	

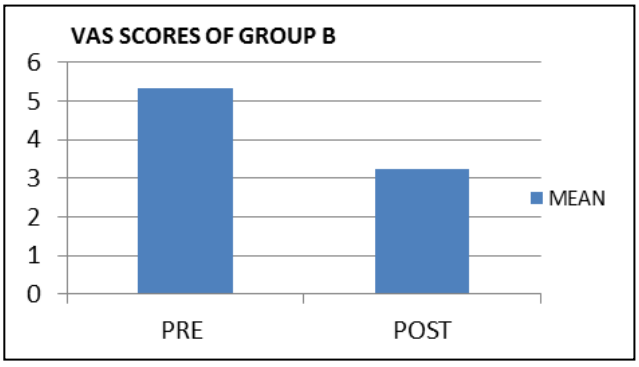


Graph 2: Pre and post ODI scores of group A

Intragroup Vas Scores: Group B-mulligan concept lumbar snag and conventional protocol

Table 3: VAS scores of group B

VAS	PRE	POST
MEAN	5.27	3.22
SD	0.81	0.75
P VALUE	<0.0001(Considered extremely significant)	
T VALUE	16.091 with 13 degrees of freedom	

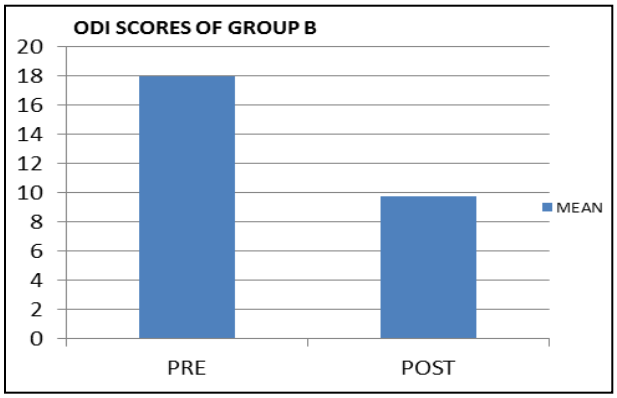


Graph 3: Pre and post VAS scores of group B

Intragroup Odi scores: Group B- mulligan concept lumbar snag and conventional protocol

Table 4: ODI scores of group B

VAS	PRE	POST
MEAN	17.96	9.79
SD	7.012	4.302
P VALUE	<0.0001(Considered extremely significant)	
T VALUE	6.875 with 13 degrees of freedom	

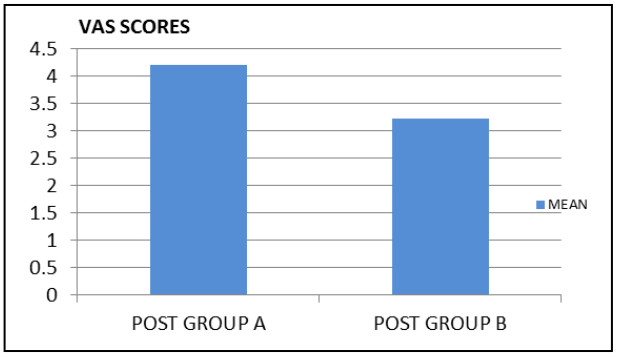


Graph 4: Pre and post ODI scores of group B

Intergroup Analysis
Vas scores- group a and group B

Table 5: VAS scores of group A and group B

VAS	POST GROUP A	POST GROUP B
MEAN	4.22	3.22
SD	0.92	0.75
P VALUE	<0.0039(Considered very significant)	
T VALUE	3.161 with 27 degrees of freedom	

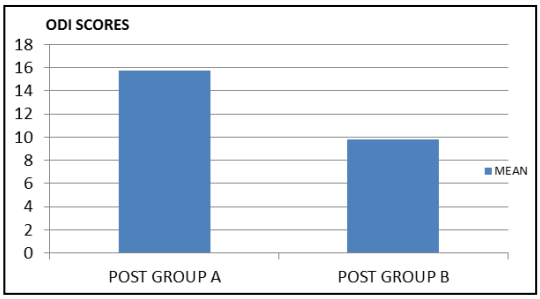


Graph 5: VAS scores of group A and B

Intergroup Analysis
Odi scores group a and group B

Table 6: ODI scores of group A and group B

VAS	POST GROUP A	POST GROUP B
MEAN	15.76	9.79
SD	5.49	4.30
P VALUE	<0.0031(Considered very significant)	
T VALUE	3.243 with 27 degrees of freedom	



Graph 6: ODI scores of group A and group B

2.5 Ethical Issues
Entire process of this research project was done by following the guidelines of Maharashtra University of Health Science. Synopsis proposal including procedure and methodology was approved by the Ethical committee of PES modern college of Physiotherapy at institution level. The safety of the participant was ensured by the researcher and strict confidentiality was maintained regarding patient information, their condition and the treatment.

2.6 Informed Consent
The researcher obtained informed written consent from all the participants those were the part of the study. All the participants were explained about the study and the nature of the assessment and treatment. They were given the liberty to quit being part of the study at any time if they wish to without having to give any reason for doing so.

3. Result
Vas score
The findings of this study revealed significant difference in reduction of pain with the mean values of VAS scores 4.222 ± 0.92 and 3.22 ± 0.75 for Group A and Group B respectively (t value=3.161 and the p value was 0.0039, considered very significant.)

Odi score
The findings of this study revealed significant difference in reduction of functional disability with the mean values for ODI scores being 15.76 ± 5.49 and 9.79 ± 4.30 for Group A and Group B respectively(t value=3.243 and the p value was 0.0031, considered very significant.)

4. Discussion
- Non-specific low back pain is defined as low back pain not attributable to a recognizable, known specific pathology (e.g. Infection, spine fracture, inflammatory disorder, deformity) [1, 5]. Due to weight gain during pregnancy and increase of the abdominal sagittal diameter, there is resultant change in the centre of gravity anteriorly; which increases the stress on lower back [4, 6]. The passage of the foetus through the pelvis, and the resultant stretching and movement of the lax joints may all be causative factors [3].
- The present study was done to compare the effects of pelvic floor exercises with Mulligan concept lumbar SNAG on chronic non-specific low back pain and functional disability in Postpartum women. This study included 30 subjects in the age group 30-35 years. Among the 30 subjects, 1 subject left the study in the 2nd week of the treatment duration. Thus, the data analysis was carried out for 29 subjects. The subjects were grouped under 2 treatment groups, Group A was given pelvic floor exercises with conventional protocol and Group B was given Mulligan SNAG with conventional protocol. The treatment duration was 8 weeks.
- When pre and post analysis was done within Group A (Pelvic floor exercises with conventional protocol) it showed that it was effective in improving pain and functional disability. The data was analyzed by paired t test within the group, which showed significant statistical difference in the two outcome measures. Bi x *et al*. and Mohammad A *et al* in their respective studies stated that pelvic floor exercises are effective in reducing the nonspecific low back pain and lowering the functional disability. Pelvic floor exercises make up a large part of body's core and thus activating them resulted in better improvements in pain and ODI scores.
- When pre and post analysis was done within Group B (Mulligan SNAG with conventional protocol) it showed that it was effective in improving pain and functional disability. The data was analyzed by paired t test within the group, which showed significant statistical difference in the two outcome measures. Benjamin Hidalgo *et al*. and Hegganavar A *et al*. in their respective studies stated that adding lumbar SNAG to a conventional LBP program is effective in reducing the pain and ODI scores. Mobilizing the lumbar facet joint with SNAG plays role in releasing the strain on the capsule and in turn influencing pain and ODI scores.
- The inter group analysis was done which showed that while both the treatment protocols were individually effective in improving pain and ODI scores, Mulligan SNAG with conventional protocol was more effective as compared to Pelvic floor exercises according to the statistical analysis. Mulligan SNAG includes combining joint glide with physiological spinal movement, thus overcoming the biomechanical changes caused due to the positional faults. Thus it reduces the pain scores and improves the functional disability.
- Thus, the alternate hypothesis (H2, A and B) is accepted for improving pain and ODI scores in post-partum women with chronic non-specific low back pain.

4.1 Limitations
Absence of follow-up after the duration of study ended

4.2 Future scope of the study
This study can be conducted in different population.

5. Conclusion
This study concludes that Mulligan concept lumbar SNAG is more effective than Pelvic floor exercises in improving pain and functional disability in post-partum women with chronic non-specific low back pain.

6. Acknowledgement
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