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Anjali Atmaram More
P.E.S Modern College of
Physiotherapy, Shivajinagar,
Pune, Maharashtra, India

Sanket Nagarale
P.E.S Modern College of
Physiotherapy, Shivajinagar,
Pune, Maharashtra, India

Sucheta Golhar
P.E.S Modern College of
Physiotherapy, Shivajinagar,
Pune, Maharashtra, India

Corresponding Author:
Anjali Atmaram More
P.E.S Modern College of
Physiotherapy, Shivajinagar,
Pune, Maharashtra, India

Effectiveness of William's flexion exercises in undergraduate physiotherapy students with chronic non-specific low back pain: An experimental study

Anjali Atmaram More, Sanket Nagarale and Sucheta Golhar

Abstract

Objective: To observe the effectiveness of William's flexion exercises on pain, function and lumbar range of motion in Undergraduate Physiotherapy students with chronic non-specific low back pain.

Background: There is limited study available that supports that William's flexion exercises can be used in treatment of chronic non-specific low back pain in Undergraduate Physiotherapy students.

Study Design: Experimental Study

Method: Ethical clearance was taken from college and consent was taken from the 30 subjects diagnosed with chronic non-specific low back pain. Pre and Post outcome measures of VAS (Visual Analogue Scale) for pain, RMDQ (Roland-Morris Disability Questionnaire) for functional disabilities and Lumbar ROM (using Schober's test) for lumbar ranges were taken. All the subjects underwent 7 exercise

Result: Mean values for VAS were 5.6 ± 0.74 and 3.04 ± 0.74 , RMDQ were 4.63 ± 1.40 and 1.86 ± 1.0 and lumbar ROM –

Lumbar flexion: 54.76 ± 2.83 and 64.08 ± 2.63

Right lateral flexion: 57.13 ± 2.57 and 67.21 ± 2.24

Left lateral flexion: 57.25 ± 2.33 and 63.07 ± 2.11

Conclusion: In the present study it was found that Williams flexion exercises yielded significant effect in managing chronic non-specific low back pain in Undergraduate Physiotherapy students.

Keywords: William's flexion exercises, VAS, RMDQ, lumbar ROM, undergraduate physiotherapy students, schober's test, chronic non-specific low back pain (CNLBP)

1. Introduction

- Low back pain is the leading cause of disability and inability to work, and expected to affect upto 90% of the population at some point in their lives ^[1].
- Lifetime prevalence of LBP has been suggested to be approximately 84% ^[5].
- Non-specific LBP is a condition in which the origin of back pain cannot be determined ^[8].
- It can also be defined as low back pain not attributable to a recognizable, known specific pathology, such as infection, tumor, osteoporosis, fracture, structural deformity, inflammatory disorder, radicular syndrome, or cauda equina syndrome ^[8].
- It is commonly treated by Physiotherapists. However, studies show that they themselves suffer from it ^[5].
- NLBP is categorized into 3 types ^[8]:
 - Acute : less than 3 weeks
 - Sub-acute : 3 weeks – 3 months
 - Chronic : more than 3 months
- Many physiotherapists report the onset of LBP during undergraduate course. In fact, physiotherapy students are potentially exposed to the same LBP occupational risks as graduates, such as poor working postures and frequent manual handling activities, often undertaken in difficult environments and with variable training regarding personal safety. ^[4]
- Roland Morris Disability Questionnaire (RMDQ), Physiopedia in sports is especially important for women because it has a number of mental and physical benefits that can

- William's flexion exercise also called as "lumbar flexion exercise", program was developed in 1937 for patients with chronic LBP for men under 50 and females under 40 years, who had exaggerated lumbo-sacral lordosis^[1].
- The goals of these exercises are to open the intravertebral foramina and stretch the back extensors, hip flexors, and facets; to strengthen the abdominal and gluteal muscles; and to mobilize the lumbosacral junctions^[4].

2. Need of Study

- CNLBP has been found common in UG Physiotherapy students.
- Prevalence was found to be high (approx. 60%)^[4]
- Studies have shown that William's flexion exercises were found to be effective on management of LBP to reduce intensity of pain and increase in lumbar ROM.^[1]
- There were no studies on effectiveness of Williams flexion exercises on chronic non-specific low back pain in Undergraduate Physiotherapy students.
- Hence, the present study has been conducted.

3. Aim

- To study the effectiveness of William's Flexion exercises on CNLBP in Undergraduate Physiotherapy students.

4. Objectives

- To observe the changes in pain with VAS in Undergraduate Physiotherapy students suffering from CNLBP at the end of 4 weeks.
- To observe the changes in lumbar ROM in Undergraduate Physiotherapy students suffering from CNLBP at the end of 4 weeks.
- To observe functional disability changes with RMDQ scale in Undergraduate Physiotherapy students suffering from CNLBP at the end of 4 weeks.

5. Hypothesis

Null Hypothesis

- H0 - There will be no difference on CNLBP in UG Physiotherapy students with William's flexion exercises.

Alternate Hypothesis

- H1- There will be an effect only on pain in CNLBP with UG Physiotherapy students with the help of William's flexion exercises.
- H2 - There will be an effect only on Lumbar ROM in CNLBP with UG Physiotherapy students with the help of William's flexion exercises.
- H3 - There will be an effect only on functional disability with CNLBP in UG Physiotherapy students with the help of William's flexion exercises.
- H4 - There will be an effect on decreasing pain, increasing lumbar ROM and decreasing functional disability with CNLBP in UG Physiotherapy students with the help of William's flexion exercises.

6. Materials

- Pen
- Paper
- Consent form

- Exercise mat
- Measuring tape
- Outcome Measures - Visual Analogue Scale (VAS)
- Lumbar ROM using Measuring tape
- Roland-Morris disability questionnaire (RMDQ)^[2]

7. Methodology

- Study Design: Experimental Study
- Study Type: Pre and Post
- Sample Size: 30
- Sampling Method: Purposive
- Study Population: UG Physiotherapy students
- Study Setting: In and around clinics in the city
- Duration of Study: minimum 6 months
- Study intervention: total 4 weeks (1st week for adaptation of intervention and 3 days per week for the next 3 weeks; all under supervision)

8. Inclusion Criteria

- Both male and female students, of age between 20-25 years
- Pain only in lumbar region for more than 3 months
- VAS 3-7cm
- Limitation of lumbar active ROM (forward flexion, lateral flexion, or extension using measuring tape)
- Exaggerated lumbar lordosis
- Not undergoing any other concurrent treatments for pain other than routine analgesics

9. Exclusion Criteria

- Congenital or acquired musculoskeletal or neurological conditions
- Recent trauma
- Structural kyphosis or scoliosis
- Abdominal hernia
- Previous spinal surgeries
- Pregnancy
- LBP as a result of new spinal fracture
- Radiological evidence of spondylolysis, spondylolisthesis, hemi vertebra or other vertebral deformities including those associated with systemic disease
- Malignancy
- Inflammatory joint disease
- Bowel or bladder dysfunction
- Decreased reflexes
- Paresthesia
- General health problems that prevent the patient from participating in exercise program

10. Procedure

- The study was commenced with a presentation of the synopsis to the ethical committee and accordingly clearance was taken from P.E.S Modern College Of Physiotherapy, Shivajinagar, Pune 5.
- The subjects were selected according to inclusion and exclusion criteria and accordingly samples were informed. Samples were explained the whole procedure. Informed consent from the samples was taken.

Prior to the intervention

- VAS was recorded
- RMDQ was recorded

- Lumbar ROM was recorded

Post intervention

- VAS was recorded
- RMDQ was recorded
- Lumbar ROM was taken

The pre and post scores were compared and data and statistical analysis were done.

11. Interventions

The subjects were taught 7 exercises and they were to be performed actively by them:

1. Pelvic tilt

- Lie on the back with knees bent and feet flat on the mat. Flatten the small of your back against the mat, without pushing down with the legs.
- Hold for 5-10 seconds. Relax.



2. Single knee to chest

- Lie on the back with knees bent and feet flat on the floor. Slowly pull your right knee towards your shoulder and hold for 5-10 seconds.
- Lower the knee and repeat with the other leg.



3. Double knee to chest

- Begin as in the previous exercise. After pulling left and right knees to the chest hold the position for 5-10 seconds.
- Slowly lower one leg at a time.



4. Partial sit-up

- Do the pelvic tilt (exercise 1) and while holding this position, slowly curl your head and shoulders off the floor. Hold briefly.

- Return to the starting position.



5. Hamstrings stretch

- Start in long sitting with toes directed towards the ceiling and knees fully extended, arms outstretched over the legs, and eyes focus ahead.
- Hold for 5-10 seconds



6. Hip flexor stretch

- Place one foot in front of the other with the left (front) knee flexed and the right (back) knee held rigidly straight.
- Flex forward though the trunk until the left knee contracts the axillary fold (armpit region).
- Repeat with right leg forward and left leg back.



7. Squat

- Stand with both feet parallel, about shoulder's width apart. Attempting to maintain the trunk as perpendicular as possible to the floor, eyes focused ahead, and feet flat on floor, the subject slowly lowers his body by flexing his knees.



12. Outcome Measures

- Visual Analogue Scale (VAS)
- Roland-Morris disability questionnaire (RMDQ) [2]
- Lumbar ROM, using measuring tape (Schober's test) [9]

13. Review of Literature

- A. Mohan Kumar. G, Revathi Ramachandran S. et al.** [1] conducted Effectiveness of William's exercises in the management of low back pain. A total no of 30 patients of both males and females of age group were selected from ACS Medical College and hospital-77. The design of this study was experimental study design. And the study was done in the OPD of the same college. The period of study was twice in a day for 4 weeks. Outcome measures VAS and ODI were used, pre and post treatment. The study concluded that a 4 weeks William's flexion exercise program yielded significant reduce of pain and improvement of spinal range of motion in patients with low back pain.
- B. Asdrubal Falavigna, Allison Roberto Teles, Thais Mazzocchin et al.** [2] conducted study on increased prevalence of low back pain among Physiotherapy students compared to Medical students. A cross sectional-study was carried out. Four hundred and sixteen students were evaluated, 207 being medical and 209 physiotherapy students. The majority of the students were women, and the mean age was 21.68 years. First, it was noted that the prevalence of LBP was higher in physiotherapy students compared with medical students. When the variables course, length of study and female gender were put into a logistic regression model, it was observed that undergraduate physiotherapy study was independently associated with having LBP. This was the first study that clearly demonstrated the association between undergraduate physiotherapy students and LBP. All statistical analyses were conducted with SPSS 16.0. Hence it was concluded that the physiotherapy students were 2.51 times more likely to have LBP in a sample composed of medical and physiotherapy students. The length of course exposure also was associated with the presence of LBP, with a risk of 2.55 times.

- C. David Joseph Ponte, Gail Jensen, Barbara E Kent et al.** [3] studied the use of Mckenzie Protocol versus Wiliam's Protocol in the treatment of low back pain. The purpose of this study was to determine whether the Williams or McKenzie protocol of treatment was more effective in both decreasing pain and hastening the return of pain-free range of lumbar spine movement. Twenty-two subjects underwent an initial evaluation which involved six measurements: subjective pain, comfortable sitting time, forward flexion, right and left lateral flexion, and straight leg raise. Subjects required to perform Williams' protocol were assigned accordingly, while those referred as "evaluate and treat" were placed in the McKenzie group. Following the completion of treatment, a second evaluation was performed taking the same six measurements. A comparison of the improvement scores of the two groups indicated that those receiving the McKenzie protocol improved to a significantly ($P < 0.001$) greater extent than did the subjects in the Williams group, and that these changes came about in a significantly ($P < 0.01$) shorter period of time

- D. Asdrubal Falavigna, Alisson Roberto Teles, Thais Mazzocchin et al.** [4] studied the increased prevalence of low back pain among physiotherapy students compared to medical students. The students were asked if they have ever suffered LBP at some point of their lives (lifetime prevalence), if they suffered LBP in the last year (1-year prevalence), and if they were suffering LBP at the moment they were fulfilling the questionnaire (point prevalence) this study clearly demonstrated an association between undergraduate physiotherapy study and LBP.

14. Discussion

- In the present study, 30 subjects both males and females between the age of 21 to 25 years were selected according to the inclusion and exclusion criteria.
- The outcome measures used were VAS for pain, RMDQ for function and Lumbar Range of Motion for lumbar ranges.
- The 30 subjects were taught 7 exercises according to the William's protocol and progression was made week by week for 4 weeks.
- After the end of fourth week, results showed that there was a significant decline in pain (mean & sd 5.6 ± 0.74 and 3.04 ± 0.74 resp.), increase in function (mean & sd 4.63 ± 1.40 and 1.86 ± 1.0 resp.) an

Lumbar range of motion

Lumbar Flexion (mean & sd 54.76 ± 2.83 and 64.08 ± 2.63 resp.) Right Lateral Flexion (mean and sd 57.13 ± 2.57 and 67.21 ± 2.24 resp.)

Left Lateral Flexion (mean and sd 57.25 ± 2.33 and 63.07 ± 2.11 resp.)

- Effectiveness of William's flexion exercise in the management of low back pain was carried out previously by Mohan Kumar G. The exercises included were pelvic tilt, single knee to chest, double knee to chest, hamstring stretch, partial sit-up, curl-up and quadriceps stretch. The protocol given was for 4 weeks. It strengthened the back and abdominal muscles which

maintained the all structures and prevented the over-loading of the posterior element of the lumbar spine.

- In our study, as well we found that the lumbar ranges increase :

Lumbar flexion (54.76 ± 2.83 and 64.08 ± 2.63 resp.) right lumbar flexion (57.13 ± 2.57 and 67.21 ± 2.24) and left lumbar flexion (57.25 ± 2.33 and 63.07 ± 2.11)

- During sit-up exercise, the pelvis was found to be tilted and put the spine in hypertension before forward trunk displacement.
- The posterior pelvic tilt required moderate activity of internal and external oblique muscles, thus helped to generate the intra abdominal pressure.
- Curl ups exercise produced lumbar flexion and provided maximum activity of external and rectus abdominals muscle.
- Pain intensity, functional limitations and lumbar restrictions were observed via VAS, RMDQ and Measuring tape respectively before the intervention and after the intervention.
- The mean values of VAS (pre & post 5.6 ± 0.74 and 3.04 ± 0.74 resp. RMDQ (pre and post 4.63 ± 1.40 and 1.86 ± 1.0 resp.) and Lumbar ROM (lumbar flexion pre and post 54.76 ± 2.83 and 64.08 ± 2.63 resp. right lateral flexion pre and post 57.13 ± 2.57 and 67.21 ± 2.24 resp. left lateral flexion pre and post 57.25 ± 2.33 and 63.07 ± 2.11 resp.) are significant.
- Along with improvement in pain intensity there was also improvement in lumbar flexion and right and left lateral flexion.

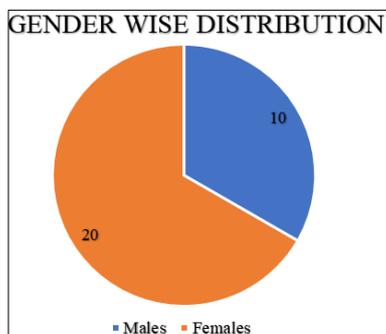
15. Conclusion

- The present study revealed that there was a significant improvement in terms of pain and improvement in terms of spine range of motion.
- Hence, the present study concluded that a four weeks Williams Flexion Exercise program yielded significant reduction in pain and improvement in function and lumbar range of motion (flexion, right & left lateral flexion) in UG Physiotherapy students with chronic non-specific low back pain

16. Statistical Analysis

Table 1: Gender-wise distribution

Males	Females
10	20

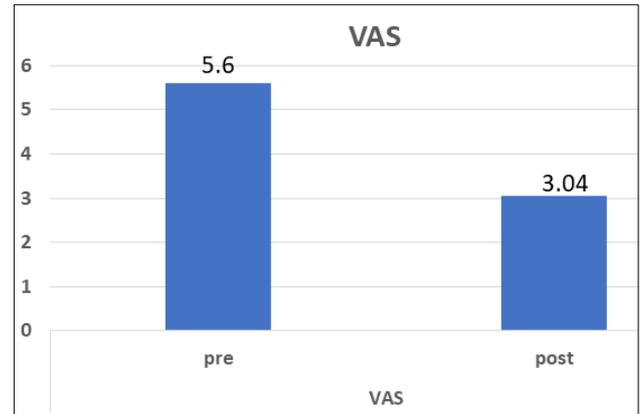


Pie Chart 1: Gender-wise distribution

Pre and Post values of VAS

Table 2: Pre and post intervention values of VAS

	PRE	POST
MEAN	5.6	3.04
SD	0.749	0.749
P VALUE	P<0.001	

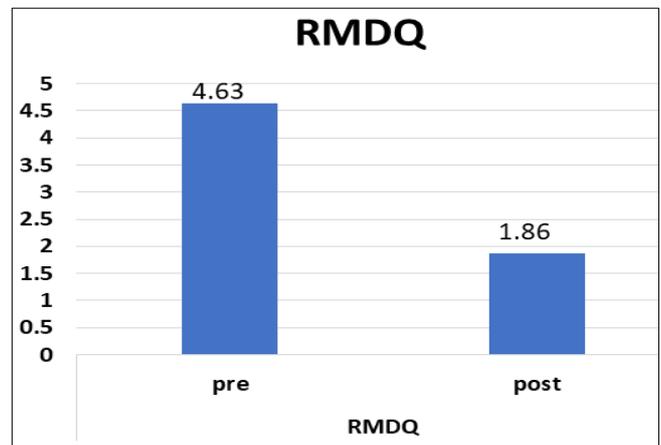


Graph 1: Graph shows the pre and post intervention values of VAS

Pre and post values of RMDQ

Table 3: Pre and post values of RMDQ

	PRE	POST
MEAN	4.63	1.86
SD	1.402	1.008
P VALUE	P<0.0001	

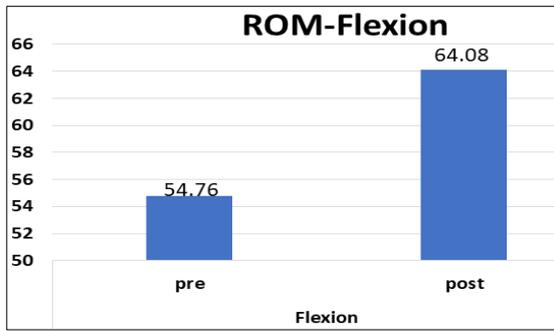


Graph 2: Graph shows the pre and post intervention values of RMDQ

Pre and post values for Lumbar Flexion

Table 4: Pre and post intervention values of Lumbar Flexion

	PRE	POST
MEAN	54.76	64.08
SD	2.834	2.634
P VALUE	P<0.0001	

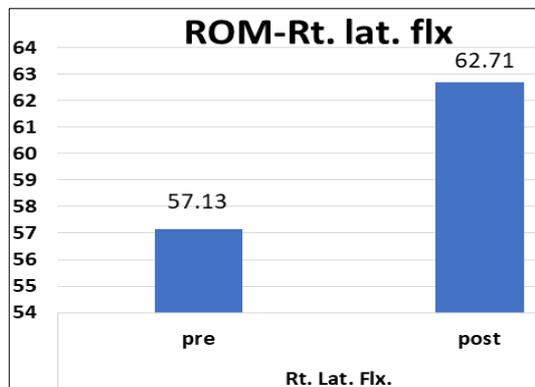


Graph 3: Graph shows the pre and post intervention values of Lumbar flexion

▪ **Pre and post intervention values of Right Lateral Flexion**

Table 5: Pre and post intervention values of Right lateral flexion

	PRE	POST
Mean	57.13	62.71
SD	2.57	2.24
P Value	$P < 0.0001$	

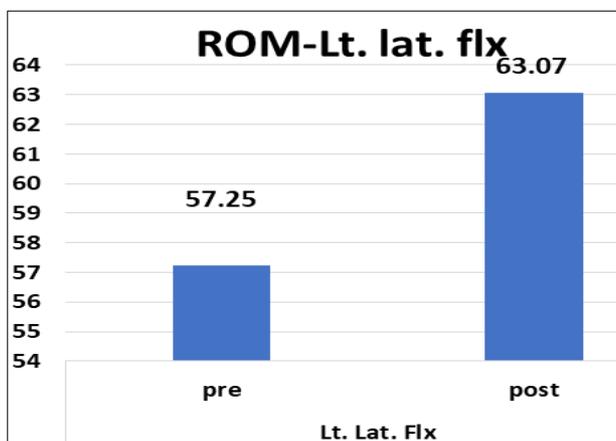


Graph 4: Graph shows the pre and post intervention values of Right lateral flexion

▪ **Pre and post values of Left Lateral Flexion**

Table 6: Pre and post intervention values of Left lateral flexion

	PRE	POST
Mean	57.25	63.07
.SD	2.38	2.11
P Value	$P < 0.0001$	



Graph 5: Graph shows the pre and post intervention values of Left lateral flexion

17. Result

- The present study was conducted to observe the effectiveness of William’s flexion exercises on pain, function and lumbar ROM in Undergraduate Physiotherapy students with chronic non-specific low back pain.
- The statistical analysis was done using using Primer of Biostatistics version 7.0. The intra group analysis of VAS, RMDQ and Lumbar ROM was done using paired t test.
- Mean values for VAS pre and post were 5.6 ± 0.74 and 3.04 ± 0.74 respectively.
- P value is < 0.0001 (highly significant)
- Mean values for RMDQ pre and post are 4.63 ± 1.40 and 1.86 ± 1.0 respectively.
- P value is < 0.0001 , (highly significant)
- Mean values for lumbar flexion pre and post are 54.76 ± 2.83 and 64.08 ± 2.63 respectively.
- P value is < 0.0001 , (highly significant)

Mean values for right lumbar flexion pre and post are 57.13 ± 2.57 and 62.71 ± 2.24 respectively.

P value is < 0.0001 , (highly significant)

Mean values for left lumbar flexion pre and post are 57.25 ± 2.33 and 63.07 ± 2.11 respectively.

P value is < 0.0001 , (highly significant)

18. Limitations

- Study involves only a particular age group
- Also it involves a particular profession
- Study has a small sample size.

19. Future Scope

- The study can be conducted separately in males and females.
- Further studies with larger sample size can be conducted.
- Study can be conducted in a different profession.

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