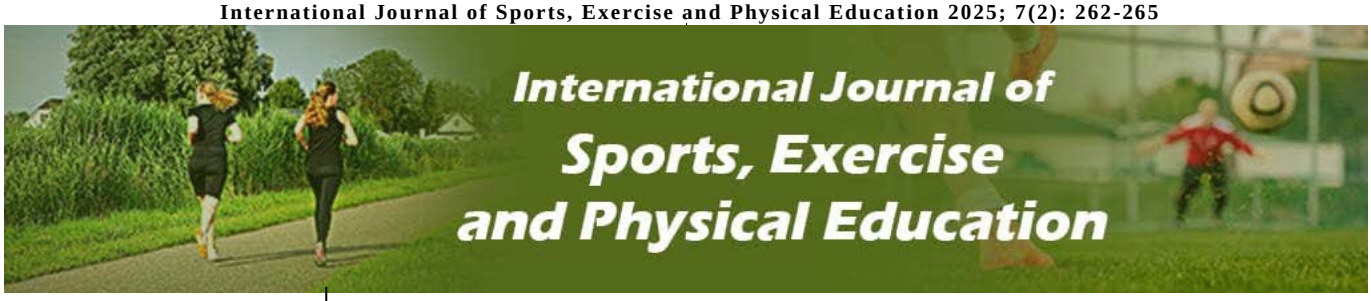

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The efficacy of pilates based therapeutic exercise along with ergonomic interventions in non-specific chronic low back pain among nursing professionals

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Abstract
Background: Low back pain poses serious challenge to nursing profession due to their prolonged standing, improper posture and heavy lifting activities. Thus treating low back pain in nurses is important in order to improve their working efficiency and physical wellbeing.
Aim: To investigate the efficacy of Pilates based therapeutic exercise along with ergonomic interventions with non-specific chronic low back pain in nursing professionals OBJECTIVE: To evaluate the efficacy of the Pilates based therapeutic exercise along with ergonomic interventions in relieving pain and disability.
Methodology: twenty physically active nurses between 20 and 45 years old with chronic LBP were taken into Experimental group. The specific exercise training group participated in a 12-week program consisting of training on Pilates based therapeutic exercise along with ergonomic interventions like posture correction, modified posture for weight lifting and avoidance of prolonged standing. Treatment designed to train the activation of specific muscles thought to stabilize the lumbar – pelvic region. Functional disability outcomes were measured with The Roland Morris Disability Questionnaire and average pain intensity using McGill Pain Questionnaire.
Statistics: PAIRED-T-TESTS: For comparing pre-and post- intervention changes within the group.
Result and Conclusion: Based on statistical analysis and results the study concluded that Pilates based therapeutic exercise along with ergonomic interventions shows significant improvement in pain and functional disability in chronic non-specific low back pain and functional disability in chronic non-specific low back pain among nursing professionals.

Keywords: Low back pain, nursing professionals, Pilates based therapeutic exercise, ergonomic interventions, posture correction

Introduction
Low back pain (LBP) is a leading cause of disability worldwide, affecting up to 84% of adults at some point in their lives and accounting for 60–80% of physician visits [1, 2]. Although often considered age-related, LBP is prevalent across all age groups, with 23% of adults experiencing chronic non-specific LBP and recurrence rates ranging from 24% to 80% annually [2]. Risk factors include poor posture, prolonged sitting, heavy lifting, inadequate physical fitness, and occupational strain [3].
Healthcare workers, particularly nurses, are disproportionately affected due to physically demanding tasks, awkward postures, and prolonged standing. Studies indicate that up to 90% of nurses experience LBP during their career, with 58.1% reporting chronic symptoms and 38% missing work as a result [4]. Addressing LBP in this population is essential for improving both quality of life and workplace productivity.
Conventional management includes NSAIDs, paracetamol, and physiotherapy modalities such as spinal manipulation, massage, and exercise therapy [5]. In recent years, Pilates has gained attention as a rehabilitation strategy that improves core stability, flexibility, posture, and balance while reducing pain and disability [6–8]. Pilates-based interventions are adaptable to varying physical capacities and have shown benefits in musculoskeletal conditions, including chronic LBP.
Ergonomic interventions—such as posture correction, proper lifting techniques, adjustable equipment, and scheduled breaks—further reduce occupational LBP, with studies

reporting a 25–50% decrease in pain and significant improvements in function [9].
This study evaluates the combined effect of Pilates exercises and ergonomic training on chronic non-specific LBP in nurses. Functional disability will be measured using the Roland Morris Disability Questionnaire (RMDQ) [10], and pain intensity will be assessed with the McGill Pain Questionnaire (MPQ) [11].

Materials and Methodology

Materials required

- Towel
- Pillow
- Stop watch
- Treatment table/yoga mat
- Assessment tool
- Paper
- Pen
- Consent form
- Evaluation form

Methodology

Study Design

Quasi-Experimental study

Study Setting

The study was conducted in the department of physiotherapy, Sri Ramakrishna Multi-Speciality Hospital-641044, under the supervision of staff incharge.

Study Population

20 samples

Study Duration

The study was carried out for the period of 6 months.

Treatment Duration

Subject went through the protocol for 20- 30 minutes a day, weekly 3 days for 12 consecutive weeks.

Sampling Method

Non-probability purposive sampling method.

Criteria for sampling

Inclusion Criteria

- Physically active nurses
- Pain present more than 6 weeks of duration
- Age: 20-45
- Female nurses
- Stable vital signs
- Interested and able to cooperate for training

Exclusion Criteria

- Pregnant
- Past history of spinal surgery or fracture
- Inflammatory joint disease
- Systemic metabolic disorder
- Rheumatic disease
- Showed evidence of neurological compromise

Variables

Dependent variables

- Pain
- Functional disability

Independent variables

- Pilates
- Ergonomic intervention

Procedure

This study was conducted on 20 nurses with LBP, They were selected based on selection criteria. The purpose and nature of study were explained to all nurses with LBP and consent form was obtained. 20 nurses assigned in a single group and received Pilates exercise along with ergonomic intervention is given to participants for 30 minutes, 3 days a week for 12 consecutive weeks.

Measurment tools

- Pain intensity is measured using McGill Pain Questionnaire.
- Functional disability is measured using The Roland Morris Disability Questionnaire.

Pilates Exercises

Warm up- (Jumping jacks, cat and camel, body weight squats, self-stretching of hamstrings, quadriceps, abdomen)
Duration- 5 minutes

Pilates Protocol

1. Pelvic curl
2. Swan prep
3. Chest lift
4. Kneeling Arm and Leg Reach
5. Child's Pose
6. Spine Stretches
7. Pilates Saw
8. Swimming

Repetition- 3 to 5 times each exercise
Cool down- (Child pose, lunges, Breathing Exercises**)**

Ergonomic Interventions

Workplace adjustment

- Adjustment of chair height and lumbar support
- Positioning computer monitor and keyboard in comfortable position.
- Optimize bed height and patient handling equipment

Patient handling Techniques

- Proper lifting and transferring methods
- Use of assistive devices (e.g., slide sheet, mechanical lifts)

Break and Stretching exercises

- Regular breaks (every 30-60 minutes)
- Stretching exercises for neck, Shoulder and Back

Education and Training

- Ergonomic principles and biomechanics
- Body mechanics and Posture
- Safe patient handling techniques

Results

Analysis of the McGill Pain Questionnaire and Roland Morris Disability Questionnaire revealed statistically

significant improvements following the intervention. For the McGill Pain Questionnaire, the mean pre-test score of 13.70 decreased to 10.05 post-test, yielding a mean difference of 3.65 (SD = 1.35). The paired t-test showed a t-value of 12.16, exceeding the critical value of 1.729 at the 0.05 significance level, indicating a marked reduction in pain. Similarly, the Roland Morris Disability Questionnaire mean score decreased from 11.40 pre-test to 8.75 post-test, with a mean difference of 2.65 (SD = 0.94). The paired t-test produced a t-value of 12.69, also surpassing the table value of 1.729, signifying a significant improvement in functional ability. These findings suggest that the intervention was effective in both reducing pain and enhancing functional capacity among the study participants ($p< 0.05$ for both measures.

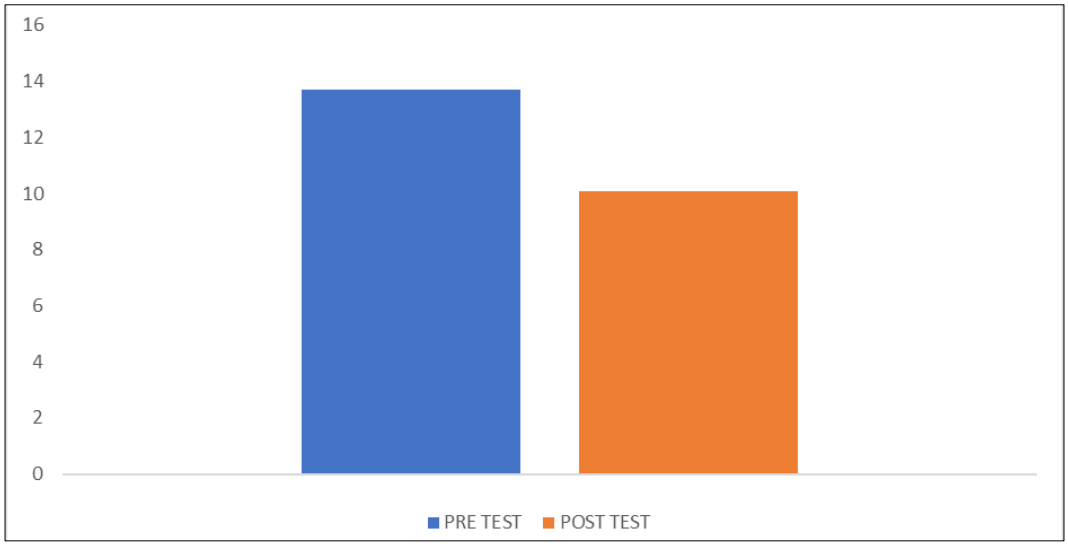

Fig 1: McGill Pain Questionnarie

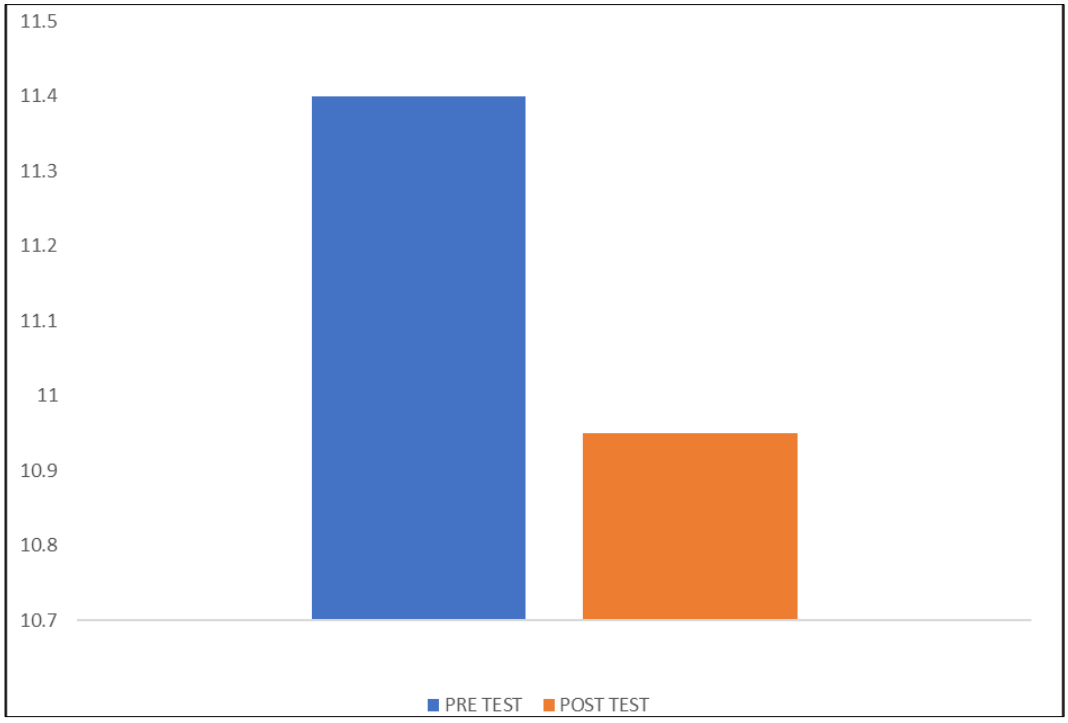

Fig 2: Roland morris disability questionnarie

Discussion

This study found that a 12-week program of Pilates-based therapeutic exercise combined with ergonomic interventions significantly reduced pain and disability in nurses with non-specific chronic low back pain. Pain scores (McGill) decreased from 13.7 to 10.1 and disability scores (Roland Morris) from 11.4 to 10.95, both with $p < 0.05$.

These results align with Patti *et al*., who showed that Pilates effectively improves core strength and reduces chronic low back pain, and with Lindberg's findings that ergonomic interventions lessen musculoskeletal pain by eliminating aggravating work factors. The combined approach in this study supports the idea that strengthening deep stabilizers such as the transversus abdominis and multifidus, alongside workplace modifications, provides synergistic benefits.

The significance lies in the practical application for high-risk groups like nurses: addressing both muscle function and occupational strain may offer a more comprehensive and sustainable strategy for reducing low back pain and its related disability.

Conclusion

Based on statistical analysis and results the study concluded that Pilates based therapeutic exercise along with ergonomic interventions shows significant improvement in chronic non-specific low back pain among nursing professionals. Hence, the study suggested that Pilates based therapeutic exercise along with ergonomic intervention can be effectively used to reduce pain and disability due to low back pain.

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