

# Comparison of Pilates Exercises and Motor Control Exercises on Nonspecific Low Back Pain Patients

Nabila Siddique<sup>1</sup>, Muhammad Irfan Siddiqi<sup>2</sup>, Naveed Anwar<sup>3\*</sup>, Sajid Ali<sup>4</sup>, Fatima<sup>5</sup>, Muhammad Luqman Ali<sup>1</sup> and Kehkshan Khalid<sup>3</sup>

<sup>1</sup>Department of Physiotherapy, THQ Hospital, Ahmed Pur East, Pakistan; <sup>2</sup>Department of Physiotherapy, Mayo Hospital, Lahore, Pakistan; <sup>3</sup>Department of Physiotherapy, Riphah International University, Lahore, Pakistan; <sup>4</sup>Department of Physiotherapy, Punjab Institute of Neuroscience, Lahore, Pakistan; <sup>5</sup>Department of Physiotherapy, Aadil Hospital Defense, Lahore, Pakistan

## Corresponding author:

Naveed Anwar, Department of Physiotherapy, Riphah International University, Lahore, Pakistan, Tel: 00923310400582; E-mail: Naveed.anwer@riphah.edu.pk

## Abstract

**Background/Purpose:** This study was to investigate the effectiveness of pilates mat exercises as compared with motor control exercises in treatment of nonspecific acute low back pain. **Methods:** A quasi experimental study was conducted at THQ hospital, Ahmadpur East, Punjab, Pakistan. From July 2020 till December 2020. A convenient sample 20 patients were recruited with diagnosis of non-specific low back pain. Patients were divided in to 2 groups of 10 patients in each group. Pilates Exercise Group (n=10) received 30 minutes training session, 3 days a week for 4 weeks and motor control exercise group (n=10) received motor control training. The outcome measure was Numeric Pain Rating Scale (NPRS) and Roland- Morris Disability Questionnaire (RMQ). Data was analysed through SPSS 23. **Results:** The data was found to be normally distributed. Pilates exercise training group showed better effects as compared to motor control exercise group in terms of NPRS (p<0.001) and RMQ-test (p<0.001). **Conclusion:** It was concluded that pilates training group showed more significant effect on pain and reducing disability than motor control exercise group. Motor control training was also effective but pilates training group showed better effects.

**Keywords:** Low back pain; Rehabilitation; Pilates; Motor control

## Introduction

Non-specific low back pain is affecting people of any age group and it's on the top as disease burden all over the world. [1] Low back pain is experienced once in a life time in 50% to 80% of normal and healthy people and among these people, 80% of problem occurs in lumber area. Low back pain common causes are infection, trauma and any kind of spinal tumours etc. [2]

Better management of low back pain depends on the better diagnosis. Sometimes serious pathology is involved in causing low back pain that's why require multiple specialists referral and work up. [3] Currently, there is no known anatomical and pathological cause of low back pain so the main focus of treatment is to reduce symptoms like pain and other consequences. [4]

Main goals of management are educational guidelines with reassurance, pain reducing medicines, rehabilitation and periodic review during treatment. [5]

Clinically, the low back pain does not present in worse form and thus patients continue with their routine work and go for little medical care. There are two treatment strategies in use. A stepped approach that starts with ordinary care and is progressed according to the patient's condition. Other way is the sue of risk prediction method to give individual care to each patient. [6] Still there is unsupported overuse of different imaging techniques, medicines and surgical methods. [7]

Pilates are group of organized exercises that are mostly used in low back pain patients for strengthening purpose. This method of treatment has directly restored the functional perspective of

muscles that are involved in lumbo pelvic stabilization, like transverses abdominis, diaphragm, multifidi and pelvic floor musculature.

Proper body posture and strength of core muscles are the main focus of Pilate's exercises. These exercises focus more on lumber region and thus back pain. [8,9] The literature review has led to the hypothesis that improvement of maladaptive motor control is a mandatory thing in latest rehabilitation guidelines of low back pain. [10] General exercises targets basic movements of muscles so these are not that effective in managing low back pain. More specific plans are to be generated to target the affected muscles. Motor control does not improve in these exercises. Motor control exercise training is a recent advancement but its comparative effectiveness with Pilates is still to be checked in low back pain. Specific motor control training in comparison to the general care has larger demonstrable effects when similar subgroups were included in the study. Now the focus should be on the comparison of Pilates training exercises and motor control exercises in improving pain and disability in patients with non-specific low back pain. [11,12] This study focus on the comparison of pilates training exercises and motor control

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exercises in improving pain and disability in patients with non-specific low back pain.

## Materials and Methods

It was a quasi-experimental study design. The 20 patients of Parkinson's disease were included in the study from THQ hospital Ahmadpur east, Punjab, Pakistan. The study was completed in six months from July 2020 to December 2020. The inclusion criteria were both male and females with non-specific chronic back pain, age ranging from 30 years to 60 years. Pain accompanied with all movements and affecting active daily living of patient. The exclusion criteria were any systemic disease, spinal tumors, radiating pain and any surgical history related to lumber region. Patient was asked to fill an informed consent before adding in the study. All participants had in total twelve 30-minute sessions, 3 sessions per week for 4 weeks. The trainings were conducted by 2 trained physical therapists. The participants were assessed at Pre and post intervention (after 4 weeks session) by an independent physical therapist (assessor).

### Pilates training group

Patients in this group received 30 minutes session of exercises which consist of pelvic stabilization, breathing exercises, rib cage placement, scapular control exercises with movement and stabilization, cervical stabilization and head exercises, stretching of different muscles like hamstring, quadriceps etc. circle squeezing and dead bug.

### Motor control exercise group

A 30 minutes' session was conducted in this group patients. Common exercises performed are abdominal contractions in static position that is called abdominal bracing, isometric contractions of multifidus muscle, bridging, four-point kneeling position and wall slides.

### Outcome measuring tools

The main outcome measure in the study was NPRS and Roland-Morris disability Questionnaire (RMQ)

### Data analysis

Data was checked for normality by shapiro-wilk test and found to be normally distributed. Independent t-test for between group analysis and paired t test was used for within group comparison.

Significance was set with  $p < 0.05$ . SPSS version 24 was used for applying all the tests.

## Results

Twenty-eight patients were physically screened between July 2020 and December 2020. Two patients were excluded for not fulfilling the criteria. Twenty-four patients were enrolled and randomized into the virtual reality training group (n=13) or conventional training (n=13) group. One patient from each group left the study due to personal reasons.

Participants in VR group were presented with mean age of 48.4 years  $\pm$  6.15 years and in motor control exercise group with 50.0 years  $\pm$  8.69 years. Participants in Virtual Reality Group were presented with mean height of 1.65  $\pm$  0.09 cm and in conventional training group with 1.67 cm  $\pm$  0.09 cm. Participants in the virtual reality group were presented with mean weight of 89.10 kg  $\pm$  4.82 kg and in Conventional Balance Training category with 89.70 kg.  $\pm$  11.11 kg. Participants in Virtual Reality Group were presented with mean BMI of 32.72  $\pm$  3.65 kg/m<sup>2</sup> and in Routine Physical Therapy group with 31.98 kg/m<sup>2</sup>  $\pm$  4.18 kg/m<sup>2</sup> as shown in Table 1.

The comparison of pre and post treatment NPRS values in two groups was done using independent sample t test. Analysis revealed that there was significant difference ( $p < 0.001$ ) in both groups. Pilates exercises Training group showed greater improvement in NPRS as compared to motor control exercise group as shown in Table 2. The pre and post treatment RMQ

**Table 1: Demographic data.**

Study Group	Mean $\pm$ Std. Deviation	
Pilates training group	Age of participants	48.4.0 $\pm$ 6.14
	Height in m	1.65 $\pm$ 0.95
	Weight in kg	89.10 $\pm$ 4.81
	Body mass index of participants	32.73 $\pm$ 3.65
	Valid N (list wise)	10
Motor control training group	Age of participants	50.0 $\pm$ 8.69
	Height in cm	1.67 $\pm$ 0.06
	Weight in kg	89.70 $\pm$ 11.11
	Body mass index of participants	31.98 $\pm$ 4.18
	Valid N (list wise)	10

**Table 2: Independent t-test between group analysis.**

Scale		Treatment group		P value
		Pilates training group	Motor control exercise group	
NPRS	Pre-treatment (Mean $\pm$ SD)	8.2 $\pm$ 0.79	7.5 $\pm$ 1.35	0.17
	Post-treatment (Mean $\pm$ SD)	2.1 $\pm$ .99	5.60 $\pm$ 0.97	<0.001
RMQ	Pre-treatment (Mean $\pm$ SD)	19.70 $\pm$ 2.75	19.30 $\pm$ 3.06	0.76
	Post-treatment (Mean $\pm$ SD)	3.20 $\pm$ 1.87	10.90 $\pm$ 1.91	<0.001

**Table 3: Paired t-test within group analysis.**

Paired Sample t test		Treatment group		p-value
		Pilates training group (Mean difference $\pm$ SD)	Motor control exercise group (Mean difference $\pm$ SD)	
NPRS	Pre-treatment-Post-treatment (Mean $\pm$ SD)	5.70 $\pm$ 0.82	2.20 $\pm$ 1.29	<0.001
	RMQ	15.6 $\pm$ 1.96	7.90 $\pm$ 4.22	<0.001

values between two groups was done using independent sample t test. Analysis revealed that there was statistically significant difference in both groups with  $p$  value  $< 0.001$ . Pilates exercise Training Group showed greater improvement in RMQ as shown in Table 2.

Paired sample t-test was used to compare the values of NPRS score and RMQ within each treatment group. Results declared significant difference ( $p < 0.001$ ) in both the groups but greater improvement was seen in pilates training group as shown in Table 3.

## Discussion

The main aim of the current study is to compare Pilates training and motor control training in non-specific chronic low back pain patients to improve pain and disability.

The results of our study showed significant effect on NPRS. The NPRS score showed more improvement in pilates training group ( $p < 0.001$ ) as compared to motor control training group. Results of current study are supported by different studies and similarity in results were noted.

It was hypothesized that pilates training is superior than motor control training in improving pain and disability of patients of low back pain. The results were similar to our hypothesis. Both treatments were effective but pilates training is more effective as shown in results. This could be due to the fact that Pilates training affect is more wide spread as multiple muscles are involved in exercise and strengthening is done. <sup>[13]</sup> Human body acts like machine and when one part is affected the others are automatically affected and the training which include multilevel exercises are proven effective. <sup>[14]</sup>

This hypothesis was further supported by Seghatoleslami et al, <sup>[15]</sup> other explanations of improvements can be following: Pilates training tasks are more like active daily living tasks so improvement is seen more practically. The tasks performed by patients are seen in perfection in ADL's; difficulty of training can be enhanced as per requirement and this does not require any advance preparation. Difficulty level can be managed by different tasks in different positions and repetitions. Patient cooperation is required while progressing the plan. Most of the patients enjoys the sessions and learn the tasks at their earliest convenience. <sup>[16]</sup>

In current study, patients in pilates training group showed more improvement in rolland morris questionnaire score as compared to motor control training group ( $p < 0.001$ ). Similar results were found in other studies with early improvement in pain and disability is seen. <sup>[17]</sup>

The possible fact can be the gaining of flexibility after pilates training exercises. A number of short muscles are stretched and better flexibility promotes easy movements at multi-level joints. Moreover, better strengthening in pilates training is an additional feature. Motor control exercise training focus more on motor learning of patients and the movements performed are real time movements as done by patient in routine life. <sup>[18]</sup> Motor control exercises seem to target the control of movements and miss the strengthening part of muscles.

## Conclusion

It was concluded that pilates training group showed more significant effect on balance and walking than motor control exercise group. Conventional balance training was also effective but virtual reality training group showed better effects.

## Recommendations

The larger sample size is recommended in future studies to explore better games in VR training.

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