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# A comparative study between conventional physiotherapy exercises and Pilates for low back pain in the postnatal women

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**Abstract**
**Objective:** To compare the effectiveness of Conventional Physiotherapy exercises and Pilates on low back pain in the postnatal women.
**Background and Need of Study**: Certain studies based on Conventional Method of Physiotherapy for treatment of low back pain in the postnatal period have been carried out.
Very few studies have been carried out on the effectiveness of Pilates on low back pain in the postnatal period.
Hence it is necessary to study the effect of Pilates on low back pain in postnatal period; and to compare its effect with the Conventional Physiotherapy Treatment.
**Subjects and Methods**: Total 24 samples fulfilling the inclusion criteria were selected for the study. Women with low back pain persisting after pregnancy with no pathological condition, degenerative changes of spine, congenital abnormalities of spine, nerve root compression. The selected samples were divided into 2 groups of 12 samples each. Group 1 received Conventional Physiotherapy Exercises and Group 2 received *Pilates* exercises.
Result: The mean value of NRS pre-treatment was 5.583 ± 0.7930 and post treatment was 3.417 ± 0.9960 and the p value was <0.0001 with a *t* value 8.900 which is very significant.
Mean value of ODI pre-treatment was 34.667±3.229 and post treatment was 18.500 ±3.317. Therefore p value is <0.05 and *t* value is 10.951 which is very significant.
The mean value of NRS pre-treatment was 5.750±0.6216 and post treatment was 2.417±0.6686. Therefore p value was<0.0001 and *t* value was 14.832 which is very significant.
The mean value of ODI pre-treatment was 33.925 ±3.955 and post treatment was 11.333± 2.146, the p value was <0.001 and *t* value was 62.719 which is very significant.
The comparison between pre-treatment and post treatment values of each component of ODI revealed that the pain relief observed after Pilates exercises was more than the pain relief after Conventional exercise Therapy. Also *Pilates* exercises is more effective than conventional exercises to improve patients social life, sitting, standing and travelling than before. The acquired results showed that Pilates exercises were superior to conventional exercises in reducing low back pain in the postnatal women.
It is postulated that inhibition of deep Proprioception, because of pain or habit, may lead people to development of compensatory movement patterns, which prolongs the healing process because of ineffective biomechanics after injury. Pilates involves closed kinetic-chain exercises, which may provide the necessary compressive and decompressive forces to foster nutrition to joints and cartilage to reduce degenerative risk.
**Conclusion:** *Pilates* technique was more effective than Conventional Physiotherapy exercises.

**Keywords:** postnatal women, transverse abdominus, low back pain, pilates exercises, conventional exercises

## Introduction

Core strength has been defined as the muscular control which is required around the lumbar spine to maintain its stability. Posture of an individual is highly dependent on this part of the body, and lack of core muscular development can result in low back pain, especially in postnatal period. A woman's body undergoes profound changes during pregnancy. This causes a change in the posture to enable the body to carry the weight of the baby as well as the fat distribution in the different parts of the body. Hormones like Relaxin, Progesterone, and Estrogen causes relaxation of the joints, ligaments and muscles, to make them more supple for the expanding uterus and mobilize the hips for delivery. As the uterus expands the abdominals stretch and back muscles shorten leading to lumbar Lordosis and incidence of low back in during pregnancy. Unfortunately, these changes do not go away as soon as childbirth occurs. The postnatal period is the time when the woman has not totally recovered from the stress and strain placed on her body by pregnancy and labor. The postnatal recovery period comes with its own set of physical changes. Decreased lumbar stability, muscular strength, and altered motor control are thought to be possible causes of low back pain in the postnatal period. The postnatal period is the time when the woman has not totally recovered from the stress and strain placed on her body by pregnancy and labor. The postnatal recovery period comes with its own set of physical changes. Decreased lumbar stability, muscular strength, and altered motor

control are thought to be possible causes of low back pain in the postnatal period. "Pilates Exercise Technique" was founded by Joseph Pilates during the 1920s. Joseph Pilates developed a comprehensive method of stretching and strengthening exercises that together aim to create a strong core, for restoration of the woman's body in the postnatal period. Pilates is an exercise technique which is currently being used to treat patients with weak core muscle strength. Pilates based Exercise have been used for low back pain prevention or rehabilitation as this kind of conditioning exercise which may activate deep trunk muscles, providing greater spine stability. Pilates exercise could have a potential role in women's body in restoration in the postnatal period. Pilates training is focused training of back extensors and abdominal musculature, referred to as core strengthening. Conventional exercise therapy is a management strategy that is widely used in low back pain in postnatal period. Conventional exercise include abdominal drawing in manuver spine lower extremity extender.

This exercise can activate the deep abdominal muscles which help to increase muscle strength and hence reduce low back pain in postnatal period.

**Materials**

1. Paper
2. Ballpoint Pen
3. Mat
4. Numerical Pain Rating Scale
5. Oswestry Disability Index
6. Consent Form
7. Evaluation Form

**Methodology**

1. Sample Size:24
2. Sample Design: Comparative Study
3. Sampling Method: Purposive Sampling
4. Study Population: females with age between 25-35years
5. Study Setting: In and around hospitals and OPD's in Pune
6. Exercise Protocol: 4 weeks

**Procedure**

**Outcome Measures**

1. Oswestry Disability Index (validity: 0.71; reliability: 0.877)[1]
2. Numerical Pain Rating Scales (validity: 0.95; reliability: 0.96)[1]

The study began with the presentation of synopsis to the ethical committee of PES Modern college of Physiotherapy.

- After obtaining clearance from the ethical committee; Subjects were selected on the basis of the inclusion and exclusion criteria.
- Procedure was explained to the patients and consent form was taken from those subjects who wish to participate in the study
- The subjects were divided into 2 groups: Group A and Group B
- These groups were divided by the even-odd method.
- For the subjects of Group A: Conventional Physiotherapy Method will be used.
- For the subjects of Group B: Pilates Method will be used.
- Prior to the Treatment Protocol and after completion of the Treatment protocol after 4 weeks NPRS Score and Oswestry Disability Score was done.

**The exercise Protocol will be divided into 3 phases**

- Warm up Exercises (5-10 minutes)
- Exercise Protocol
- Cool down Exercises (5-10 minutes)
- Total Exercise Protocol: 4 weeks

**Group A:** (Conventional Physiotherapy Exercises)

Exercise Protocol

1. Static Abdominal Exercise
2. Pelvic Tilting Exercise
3. Bridging
4. Leg slides
5. Lumbar Erector Spine Stretching

**Conventional Exercise Protocol**

| | | | |
|---|---|---|---|
| **1.** | **Static Abdominal Exercise** | | |
| | 5 repetitions with 10 seconds hold | ⇨ | 10 repetitions 15 seconds hold |
| 2. | Pelvic Tilting Exercise: 5 repetitions with 10 seconds hold | ⇨ | 10 repetitions 15 seconds hold |
| 3. | Bridging Exercise: 5 repetitions with 10 seconds hold | ⇨ | 10 repetitions 15 seconds hold |
| 4. | Leg Slides: 5 repetitions with 10 seconds hold | ⇨ | 10 repetitions 15 seconds hold |
| 5. | Lumbar erector Spine Stretching 5 repetitions with 10 seconds hold | ⇨ | 10 repetitions 15 seconds hold |

**Group B:** (Pilates Exercises)

Exercise Protocol

1. The One Hundred
2. One leg Stretch
3. Scissors
4. Roll up
5. One leg Circle
6. Clam
7. Single leg kick

**Pilates Exercise Protocol**

Start of the protocol with teaching the patients activation of core Progression From week 1 to week 4 (from 1 to 2 repetitions to 8 to 10 repetitions)

1. The One Hundred: Repeat 1 to 2 times (8-10 repetitions per 1 time)
2. One Leg Stretch: Repeat 8-10 times
3. Scissors: Repeat 8-10 times
4. Roll up: Repeat 8-10 times
5. One leg Circle: Repeat 8-10 times
6. Clam: Repeat 8-10 times
7. Single Leg kick: Repeat 8-10 times

**Statistical analysis**

**Findings**

Improvement in low back pain and functional status was measured and analysed using NPRS and Oswestry Scale, in women having low back pain in the postnatal period. The data was entered into the Excel Spread Sheet, tabulated and subjected to the statistical analysis.

The data entered was analysed with the Fig pad Instat, checking the effectiveness of conventional and *Pilates* protocol in postnatal women having low back pain

**Table 1:** Age Distribution Chart

| Age Group | Number |
|---|---|
| 25 to 28years | 12 |
| 28 to 30years | 8 |
| 30 to 35 years | 4 |

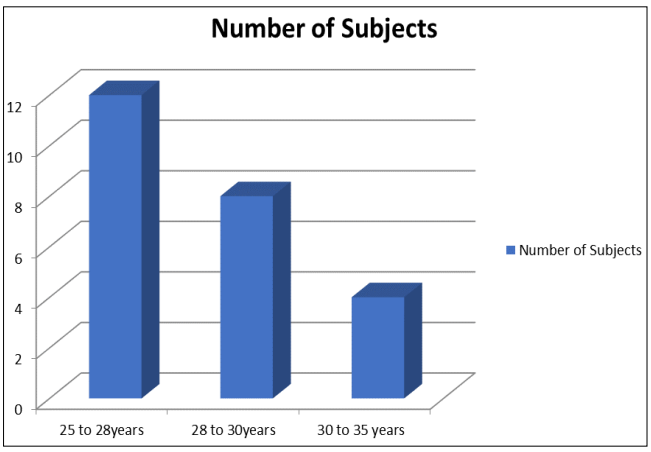


**Fig 1:** Age Distribution

## Analysis

1. Data analysis was done of group 1 and group 2 for outcome measures such as NPRS and Oswestry Scale.
2. Pre and post data analysis of NPRS for group 1 was done by paired *t* test.
3. Pre and post data analysis of Oswestry Scale for group 1 was done by paired t test.
4. Pre and post data analysis of NPRS for group 2 was done by paired t test.
5. Pre and post data analysis of Oswestry Scale for group 2 was done by paired t test.
6. Group 1 and group 2 data was analysed for NPRS and Oswestry Scale by unpaired t test.

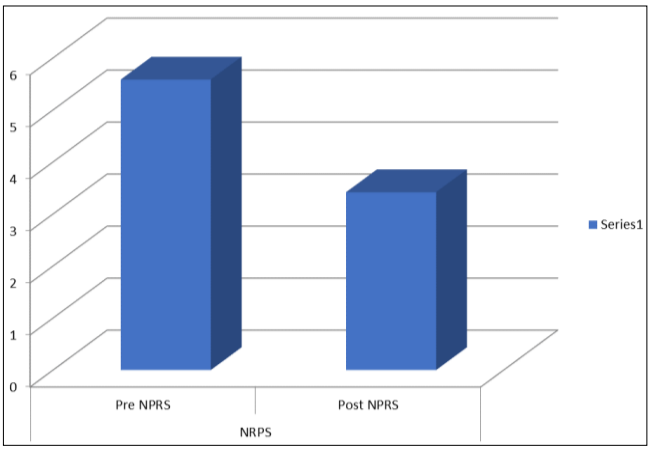


**Fig 2:** Pre and Post NPRS Values of Conventional Protocol

## Intragroup (Conventional) Comparison

**Table 2:** Group 1-Pre and Post values of Conventional Exercise Protocol

| | | Mean ± SD | *t* value | P value | Significance |
|---|---|---|---|---|---|
| NRPS | Pre NPRS | 5.583±0.7930 | 8.990 | <0.0001 | Extremely Significant |
| | Post NPRS | 3.417±0.9960 | | | |
| Oswestry Index | Pre ODI | 34.667±3.229 | 10.951 | <0.0001 | Extremely Significant |
| | Post ODI | 18.500±3.317 | | | |

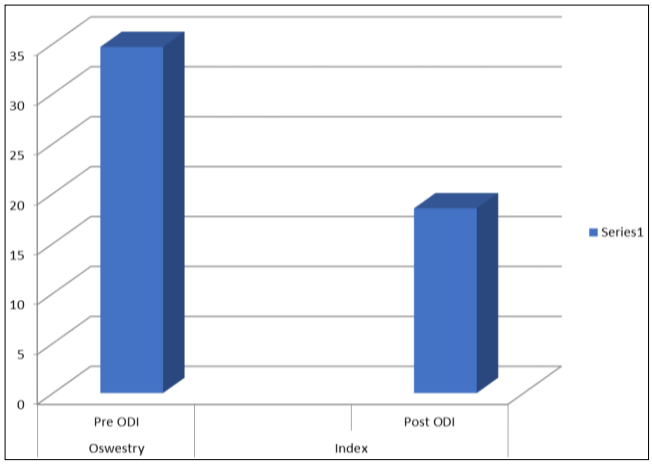


**Fig 3:** Pre and Post ODI Values of Conventional Protocol

## Intra group (Pilates) Comarision

**Table 3:** Group 2-Pre and Post Values of Pilates Protocol

| | | Mean ± SD | *t* value | P value | Significance |
|---|---|---|---|---|---|
| NRPS | Pre NPRS | 5.750±0.6216 | 14.832 | <0.0001 | Extremely Significant |
| | Post NPRS | 2.417±0.6686 | | | |
| Oswestry Index | Pre ODI | 37.083±1.730 | 62.719 | <0.0001 | Extremely Significant |
| | Post ODI | 11.333±2.146 | | | |

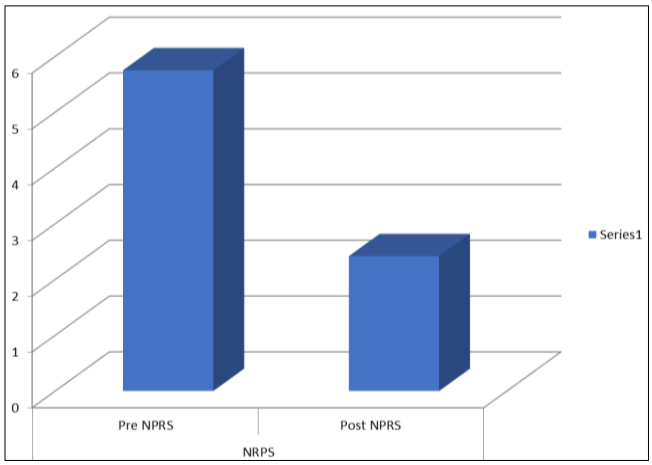


**Fig 4:** Pre and Post NPRS values of Pilates Protocol

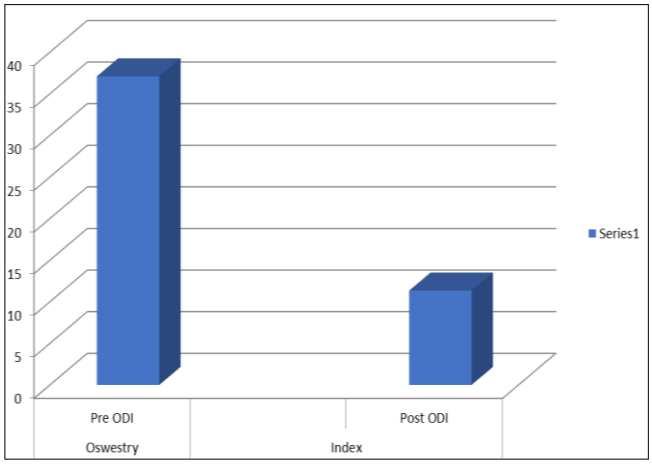


**Fig 5:** Pre and Post ODI values of Pilates Protocol

### Intergroup Comparison

**Table 4:** Comparison between Conventional and Pilates Therapy

| | | Mean ±SD | *t* value | P value | Significance |
|---|---|---|---|---|---|
| NPRS | (Group1)Post NPRS | 3.417±0.9962 | 2.872 | 0.0152 | Significant |
| | (Group2)Post NPRS | 2.417±0.6686 | | | |
| Oswestry Index | (Group1)Post | 18.500±3.317 | 6.599 | <0.0001 | Extremely Significant |
| | (Group2)Post | 11.333±2.146 | | | |

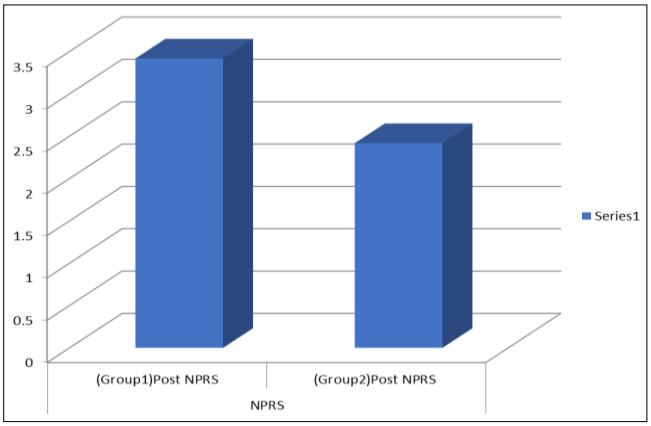


**Fig 6:** Comparison between NPRS values of Conventional and Pilates Therapy

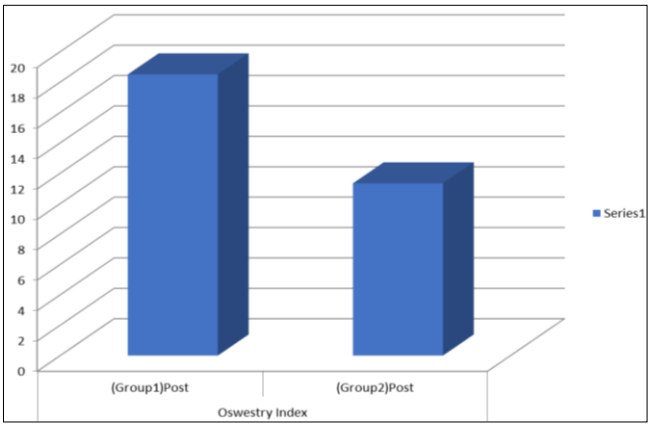


**Fig 7:** Comparison between ODI values of Conventional and Pilates Therapy

### Result

The project was conducted with 24 subjects, having 12 subjects in age group 25 to 28 years, 8 subjects in 28 to 30 years and 4 subjects 30 to 35 years.

12 subjects were selected to perform conventional Physiotherapy Exercises and 12 subjects were selected for performing Pilates Exercises.

- Pre And Post Comparison of NPRS and Oswestry Disability Index in Conventional Physiotherapy Exercise Group
  - i) The mean value of NRS pre-treatment was 5.583 ± 0.7930 and post treatment was 3.417 ± 0.9960 and the p value was <0.0001 with a *t* value 8.900 which is very significant.
  - ii) Mean value of ODI pre-treatment was 34.667±3.229 and post treatment was 18.500 ±3.317. Therefore p value is <0.05 and *t* value is 10.951 which is very significant.
- Pre And Post Comparison of NPRS and Oswestry Disability Index in Pilates Exercise Group
  - i) The mean value of NRS pre-treatment was 5.750±0.6216 and post treatment was 2.417±0.6686. Therefore p value was<0.0001 and *t* value was 14.832 which is very significant.
  - ii) The mean value of ODI pre-treatment was 33.925 ±3.955 and post treatment was 11.333± 2.146, the p value was <0.001 and *t* value was 62.719 which is very significant.

### Discussion

Total 24 samples fulfilling the inclusion criteria were selected for the study. Women with low back pain persisting after pregnancy with no pathological condition, degenerative changes of spine, congenital abnormalities of spine, nerve root compression.

The selected samples were divided into 2 groups of 12 samples each. Group 1 received Conventional Physiotherapy Exercises and Group 2 received *Pilates* exercises.

The conventional exercise protocol included Static Back Exercise, Pelvic Tilts, Leg Slides, Bridging Exercises, Lumbar Erector Spine Stretch were given with 5 repetition each with 10 second hold and were progressed to 10 repetitions with 15 seconds hold. Low back pain is often correlated to back strength, therefore strengthening exercises have been incorporated in the conventional exercise protocol.[9] Stretching exercises were used to improve flexibility and function of the subjects. The *Pilates* exercise protocol included exercises like The One hundred, One leg stretch, Scissors, Rollup, One leg Circle, Clam, Single leg Kick. *Pilates* exercises also aim at improving body awareness and posture. *Pilates* exercise protocol was designed to improve spinal stability using deep spinal muscle strengthening and reducing the use of superficial muscles of back. Both exercises protocols were given for 4 weeks. On the first day the subjects were taught their respective exercises based on their group and a follow up was taken every 3 days for compliance. The Pilates Group was also taught Imprinting, which helps maintain the alignment of the spine throughout the protocol. Primary outcome measures used were Numerical Rating Scale (NRS) and Oswestry Disability Index (ODI). Both outcome measures were selected based on their reliability and validity. Pre-treatment scores on both outcome measures and post 4 week exercises scores were recorded. Individual Components of ODI like Pain, personal care, lifting, walking, sitting, standing, sleeping, social life, and travelling were also observed to undergo change.

The comparison between pre-treatment and post treatment values of each component of ODI revealed that the pain relief observed after *Pilates* exercises was more than the pain relief after Conventional exercise Therapy. Also *Pilates* exercises is more effective than conventional exercises to improve patients social life, sitting, standing and travelling than before. The acquired results showed that *Pilates* exercises were superior to conventional exercises in reducing low back pain in the postnatal women.

### Conclusion

Pilates Exercise protocol is more effective than Conventional Physiotherapy Exercises for reducing low

back pain in the post natal period (initial 6 weeks after pregnancy.) Hence,
(H1): Pilates is more effective in treating low back pain in the postnatal period (initial 6 weeks after pregnancy)
Is proven.

**Limitations**

1. The study was done using very small sample size, a bigger study with a larger sample size could be done.
2. The study was not done on regular supervision.

**Future Scope of Study**

1. The study was done in a limited location i.e. Pune. It could be done by including more cities and more Physiotherapists.
2. The study could be done on people of other categories like geriatrics, adults, students, women in postmenopausal period different age group people etc.
3. The study can be done to compare Pilates Technique with another form of exercise program.
4. Taking a larger sample size, a study can be conducted with more than 2 exercise protocols.

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