Effectiveness of Swiss Ball Exercise Compared to Mat Exercise on Pelvic Girdle Pain in Antenatal Women

Sangeetha Annamalai¹, Saravankumar Jayakumar², Jeslin Godwin Nirmala³

¹Post graduate, ²Assistant Professor, ³Tutor, Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences, Thandalam, Chennai, Tamil Nadu, India.

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Abstract

Background: Pelvic girdle pain (PGP) is pain that occurs frequently in the sacroiliac joint (SIJ), which connects the gluteal fold and the posterior iliac crest, and can spread to the hips and thighs. Pubic symphysis discomfort and PGP can either occur simultaneously or separately. The symptoms of pelvic girdle pain (PGP) include pain and impairment.

Purpose: To assess the effectiveness of Swiss ball exercises against mat exercises in alleviating Pelvic Girdle pregnancy-related pain.

Materials and Methods: After receiving a thorough description of the study’s objectives, 30 Women were chosen from Saveetha Medical College and Hospital based on the inclusion and exclusion criteria. Oswestry Disability Index 2.0 (ODI) and Pelvic Girdle Questionnaire (PGQ) measurements of pain and disability were utilised as outcome measures. Subjects were divided randomly into groups Swiss ball exercises (n=15) and Mat exercises (n=15).

Results: The statistical evaluation of Swiss ball exercises and mat exercises yields the following results: We discovered a substantial decrease in Impairment and discomfort, ODI scores (p=0.0029), and PGQ scores (p=0.0001) in the Swiss ball exercise group.

Conclusion: At the end of the study, it shows that Swiss ball exercises can be used to treat individuals who have pelvic girdle pain when pregnant.

Key Word: Pregnancy, Disability, Low back pain, Symphysis pubis diastasis, Training

Introduction

Pain which occurs in the pelvic girdle, more specifically around the sacroiliac joint (SIJ), surrounds the gluteal fold and the posterior iliac crest, and may extend to the hips and thighs. Reduced ability to stand, walk, and sit; pain or functional disruption is repeated in clinical testing¹. Groin girdle Compared to lumbar discomfort, pain is more frequent and causes higher disability in pregnant women. Pelvic Girdle Pain can cause substantial physical handicap, as well as major psychosocial consequences, a lower quality of life, and a higher risk of chronic pain syndrome². Lower back pain, changes to the Pelvic Girdle, and compensatory postural changes, including an

Corresponding Author: Sangeetha Annamalai, Post graduate, Saveetha College of Physiotherapy, SIMATS, Thandalam, Chennai, India.
E-mail: sangeeask7@gmail.com
increase in lumbar lordosis, are all caused by the
shift in the maternal centre of gravity. PGP worsens
women’s pelvic stability and pain by increasing the
motion of the thoracic, lumbar, and pelvic joints.\(^3\)

PGP is diagnosed with certain provocative
tests that can induce discomfort.\(^4\) The three clinical
tests for SIJ discomfort that are most theoretically
and practically useful are Mennell’s test, Patrick’s
Flexion, Abduction, and External Rotation (FABER)
and Posterior Pelvic discomfort Provocation Test
(P4). These two tests that are most accurate and
reliable for symphysis pubis pain are the modified
Trendelenburg test and symphysis palpation.\(^5\)

The Swiss ball is a popular training device for
core stability exercises in the recreational training
environment. The Swiss ball is a conservative back
pain treatment alternative that can be used as part
of a rehabilitation programme. Its goal is to prevent
further occurrences of low back discomfort.\(^6\) The
goal of this study is to weigh the advantages and
disadvantages of using the ODI as an outcome
indicator for monitoring patients with chronic
illnesses. The Pelvic Girdle Questionnaire (PGQ),
utilised by women experiencing pelvic girdle pain.
The reliability, validity, and utility of the PGQ for
use in clinical treatment and research have been
established. It includes questions regarding activity
involvement and physical symptoms.\(^7\)

**AIM:**

To evaluate whether conventional mat exercises
and Swiss ball exercises are more effective at helping
pregnant women with pelvic girdle pain.

**Materials and Method:**

SMCH’s Saveetha Physiotherapy department
provided 30 patients with Pelvic Girdle Pain who were
between the ages of 23 and 30 for this experimental
investigation. The study took advantage of
convenient sampling along with random assignment.
The study was conducted between September 2022 to
December 2022.

**Inclusion Criteria:**

- Subjects who had previously experienced
  back pain, soreness and stiffness in the pelvic
  joints
  - Subjects who had trouble in walking, climbing
    stairs, rolling over in bed, getting from sitting
to standing, and difficulty standing on one
leg (for example, getting dressed or putting
on trousers) and
  - Subjects those who had presented with
  positive sign in special tests (Mennell’s
test, Patrick’s Flexion, Abduction, and
External Rotation (FABER) and Posterior
Pelvic discomfort Provocation Test (P4),
Trendelenburg test and symphysis palpation) were
included.

**Exclusion Criteria:**

- Subjects, those who consume medication for
  back pain
  - Subjects who had history of respiratory
  illness, cardiovascular diseases,
  - Subjects with unstable vitals and
  - Subjects who had high risk pregnancy were
  excluded.

**Outcome measures:**

- Oswestry disability index 2.0 (ODI)
- Pelvic girdle questionnaire (PGQ)

**Procedure**

The criteria for inclusion and exclusion were
taken into account when choosing participants.
Participants were informed of the procedure before
being requested to sign a consent form. All of the
participants that were included were evaluated in
accordance with the assessment form. Two groups—
groups “A” and “B”—of participants were randomly
assigned. Assessments were done at the beginning
and four weeks into the trial.

**Group A: Swiss ball exercises**

Swiss ball exercises group (n=15) received
warm up (Breathing exercises, calf and hamstring
stretching for nearly 5 minutes) followed by

1. **Pelvic tilt:** With your back on the birthing
  ball, lean it up against a wall and sit. Push
  and gently curve your back towards the
  ball by slightly indulging your abdomen.
  Stronger lower back and uterine muscles can
  be achieved with this exercise.
Figure 1: Pelvic tilt

2. **Circling movement**: Put your feet slightly wider than hip-width apart on the floor and firmly alight on the ball. In a circular motion, move your hips to “draw” little circles on the ground with the ball. Start with 10 anticlockwise repetitions, then move to 10 clockwise.

Figure 2: Circling movement

3. **Side to side**: Starting Position → sitting with feet flat on the floor, buttocks lightly pressed into the Ball. Action - tilt pelvis to the left and right, keep head and shoulders steady. Contract abdominal muscles So that the trunk remains erect.

Figure 3: side to side

4. **Side bending**: Place your feet hip-width apart on the floor in a Swiss ball position. In order to avoid “hunching” your back and shoulders, lean slightly forward. Your hips, shoulders, and ears should all be in a straight line going up and down. Reach with your left arm while bending your upper body to the left. Raise your right arm overhead. As you bend, keep your upper body looking forward; don’t twist it to the side. Ensure that the muscles along your side, from your lower back up to your shoulder, are being gently stretched. For 20 seconds, maintain the stretch. Go back to the beginning place. Stretch two more times. Stretch in the other direction after switching sides. A second time.

Figure 4: side bending

**Group B: Mat exercises**

Mat exercises group (n=15) received warm up (Breathing exercises, calf and hamstring stretching for nearly 5 minutes) followed by

5. **Cat and camel**: Begin by getting down on your hands and knees while on all fours. Make sure the shoulders, knees and hips are all in line, and that the wrists are straight. Maintain a tight core, a flat back, and a neutral spine. It is the starting place. Then inhale deeply. Pull the spine upwards towards the heavens as you exhale. Alternately, draw the belly button towards the spine while maintaining a strong core. Pulling your chin towards your chest will help you to relax your neck. The
position ought to resemble a cat extending. Arch your back as you inhale while relaxing your tummy. As you lift your head, tilt your tailbone up towards the ceiling. The neck should not be compressed. The Cat and Cow stretch is done in the cow stance. Breathe in and out with each movement as you continue to travel from cat to cow. Exhale as you adopt the cat stance while inhaling as you adopt the cow pose. In order to get the maximum rewards of the cow cat stance, you must perform at least 10 repetitions of it or until your abs, hips, spine, and neck are sufficiently warmed up.

![Figure 5: cat and camel](image)

6. Child pose: Put your toes together and spread your hips apart while you knead the mat. Put your head down, lean back a little, and extend your fingers in front of you.

![Figure 6: child pose](image)

7. Backward stretch: Test out the backward stretch to loosen up your thighs, pelvis, and back. Maintaining straight arms and placing your hands directly beneath your shoulders, begin on your hands and knees. Until your knees become comfortable, bend backwards towards your heels. Maintain an extended stance with your arms out in front of you. Then, go back to your starting position after holding for a while. Up the number of repetitions gradually to ten.

![Figure 7: backward stretch](image)

8. Butterfly stretch: Legs outstretched in front of you while sitting on the ground with your back straight. Your feet should be touching as you crouch down and bend your knees. Your feet or ankles can be held using your hands. Your thighs will descend to the floor if you gently press down on them. Inner thighs and the region around the groin should expand out. Continually breathe out after holding the stance for 30 to 60 seconds. Do this two to three times.

![Figure 8: butterfly stretch](image)
Data Analysis

Table 1: Analyses of differences between the groups for ODI

<table>
<thead>
<tr>
<th>STATISTICS</th>
<th>ODI</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALYSIS</td>
<td></td>
</tr>
<tr>
<td>SWISS BALL</td>
<td>50.80</td>
</tr>
<tr>
<td>MAT</td>
<td>59.33</td>
</tr>
<tr>
<td>MEAN</td>
<td>7.38</td>
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<tr>
<td>SD</td>
<td>6.92</td>
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<td>15</td>
<td>15</td>
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<tr>
<td>Unpaired t test value (df,28)</td>
<td>3.2658</td>
</tr>
<tr>
<td>P value</td>
<td>0.0029*</td>
</tr>
</tbody>
</table>

Table 2: Analyses of differences between the groups for PGQ

<table>
<thead>
<tr>
<th>STATISTICS</th>
<th>PGQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALYSIS</td>
<td></td>
</tr>
<tr>
<td>SWISSBALL</td>
<td>47.67</td>
</tr>
<tr>
<td>MAT</td>
<td>73.47</td>
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<tr>
<td>MEAN</td>
<td>9.54</td>
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<tr>
<td>SD</td>
<td>7.16</td>
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<td>15</td>
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<td>15</td>
<td>15</td>
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<tr>
<td>Unpaired t test value (df,28)</td>
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<tr>
<td>P value</td>
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Table 3: Demographic characteristics of included participants.

<table>
<thead>
<tr>
<th>Age (years) (Mean ± SD)</th>
<th>26.3 ± 2.2 Years</th>
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</thead>
<tbody>
<tr>
<td>Participants</td>
<td>30</td>
</tr>
<tr>
<td>2nd trimester</td>
<td>22</td>
</tr>
<tr>
<td>3rd trimester</td>
<td>8</td>
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</table>

Table 4: Comparison of Pre-test and Post-test variables

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pre-test (Mean ± SD)</th>
<th>Post-test (Mean ± SD)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ODI</td>
<td>80.4±0.98</td>
<td>55.05±6.01</td>
<td>&lt;0.0029</td>
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<tr>
<td>PGQ</td>
<td>80.75±2.05</td>
<td>60.5± 18.2</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Result

- Age and trimester were considered as the baseline characteristics. Out of 30 subjects 22 were second trimester and 8 were third trimester.
- Using PGQ questionnaire and ODI questionnaire for the analysis of the pain in the pelvic girdle, the results of the study were assessed in regards to the severity of pain and impairment.
- Graph pad InStat 3 demo tool was used for statistical analysis. This study revealed that the mean reduction of pain using ODI was 81.13 ± 50.8 in Swiss ball exercises and 79.66 ± 59.33 in Mat exercises and p value 0.0029 and the mean reduction of PGQ was 82.26 ±
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47.66 in Swiss ball exercises whereas it was 79.33 ± 73.46 in Mat exercises and p value 0.0001 after the completion of the study.

- Both groups significantly improved as measured by the ODI and PGQ. In comparison to Mat exercises, Swiss ball exercises showed noticeably better improvement.

Discussion

Significant predictors of PGP included women with many children, past back pain, and past low back pain. Pregnancy-related biomechanical changes, strain on the pelvic and back bones, excessive stretching, or cumulative damage to the pelvic soft tissues may all contribute to this\textsuperscript{13}. In the current study, the majority of respondents were pregnant women in their second trimester, in contrast to the published studies where most of the participants were women who were in the final trimester of pregnancy, when the PPGP symptom typically peaks with a mean gestation of 31 weeks. Additionally, there is a lot of variation in the outcome measurements. In other studies, for instance, self-report tools like questionnaires and pain site drawings were used\textsuperscript{14}. According to the current study, there is a significant relationship between previous back pain and PGP discomfort and pelvic girdle pain in pregnant women. Numerous studies have identified equivocal risk factors, the recurrence of PPGP with successive pregnancies, and the absence of preventive strategies\textsuperscript{15}. Symptoms can be reduced and the progression of symptoms can be stopped with conservative treatment methods which include altering one’s activity level, wearing pelvic support clothing, controlling acute exacerbations, receiving physiotherapy, and engaging in regular exercise. In order to manage PGP, a multidisciplinary team includes general practitioners as a crucial component. With an estimated prevalence of 4–84%, during pregnancy common conditions include lower back discomfort and pelvic girdle pain (PGP). Uncertain definitions and diagnostic standards are to blame for the variation in incidence. The onset of pregnancy pain often occurs between 14 and 30 weeks gestation, however it can occur at any time during pregnancy and after delivery\textsuperscript{16}.

PGP in pregnancy will be the main topic of this article. According to an Australian study, only 25% of the female PGP reporting patients received any sort of treatment, and many practitioners do not consider PGP to be a serious pregnancy problem\textsuperscript{17}. Exercises using a stability ball can improve daily living activities and lessen pregnancy low back pain. This programme of stability ball exercises offers healthcare practitioners an evidence-based intervention.

It is possible to lower the rate of handicap in pregnant women who are in the second half of their pregnancy by undertaking exercise activities and receiving training on how to execute everyday tasks correctly. It indicates that by engaging in preventive behaviours such as proper standing, sitting, and resting during pregnancy, pregnant women were able to lessen the degree of incapacity caused by back pain in the second half of their pregnancies. The women who did not take part in the training programmes raised their level of knowledge of the issue through personal experience or by seeking advice from others, but they were unable to lower the impairment rate. Average scores on disability in daily activities were compared between the two groups, and they revealed a substantial difference in the rate of daily activity disability brought on by around the third trimester of pregnancy, low back pain.

Chiu-Fang Yan MS, CNM, RN (Clinical Instructor) et al., 2014 has concluded as, clinical application of the stability ball exercise programme may be a useful supplementary tool for women in their second and third trimesters for enhancing their exercise behaviour, lowering their risk of low back discomfort, and minimizing interference with daily activities\textsuperscript{18}. Faiqa Izhar et al., 2020 has also concluded that the Exercises using a balance ball and ergonomics training were successful in treating low back discomfort brought on by pregnancy. Exercises with a stability ball, however, were more successful in lowering the impairment\textsuperscript{19}.

Conclusion

The outcomes of this investigation indicate that a 4-week intervention for women with Pelvic girdle pain including Swiss ball exercises were crucial in lowering pain and impairment. The study’s objective was to assess the efficacy of mat exercises and Swiss ball exercises for women experiencing pelvic girdle pain which was achieved since the discomfort and functional limitations of the patients are momentarily
lessened by Swiss ball exercises. The results are distinctive due to the sharp decline in PGQ and ODI scores. This study thus provides the evidence in favour of using Swiss ball activities as a non-invasive, reasonably priced therapy for pelvic girdle pain.

**ISRB approval:** This research work has been approved by ISRB committee

**Source of Funding:** Self

**Conflict of Interest:** No conflict of interest during this research.

**References**


