

Effectiveness of Specific Lumbar Stabilization Exercise for LBP among Postpartum Women: A Quasi-Experimental Study

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ABSTRACT

Background: Postpartum back pain is common, with up to 75% of women experiencing back pain immediately following birth due to ligament laxity and postural changes. Besides the lack of pelvic floor muscles strength, urine leakage problem during coughing and sneezing also arises in this condition. The purpose of this study was to explore the effect of stabilization exercise (SE) and Kegel exercise. **Objective:** To evaluate the pain intensity in rest and different functional activities before and after introducing spinal stabilization exercises in postpartum women with low back pain and also find out the effect of Kegel exercise.

Study Design: A Quasi-Experimental (one group) pretest-posttest design was used.

Methodology: 27 patients who were fulfill inclusion criteria within this study period with postpartum low back pain, attended at Gynecological and Women's Health unit, CRP, Mirpur, Dhaka was purposively chosen to conduct the study. Spinal stabilization exercise was applied to the participants to find out the effectiveness of this exercise. Kegel exercise was also introduced who have urine leakage problem among 27 patients. Participants received the exercise for 45 minutes, 2 times a week & total 6 weeks. Besides this they performed the exercises at home 5 times a day also. A numeric pain rating scale was used to measure pain intensity in different functional activities such as swiping, squatting, chair sitting, heavy weight lifting, walking, and journey by bus or rickshaw, and stair climbing. Pain score was analyzed by calculating the "Wilcoxon Signed Ranked Test".

Results: Results showed that relative improvement occurs in all participants in the

experimental group. Pain scores on numeric pain rating Scale on different functional activities such as during toilet sitting, stair climbing, walking, during weight lifting, were relatively reduced which was also statistically significant ($p \leq .05$). Participants who have a urine leakage problem also recover from this problem.

Conclusions: Lumbar stabilization exercises has effect on reducing pain and improving functional activities, and to solve the urine leakage problem Kegel exercise effective.

KEYWORDS

Kegel exercise, Low back pain, Postpartum low back pain, Spinal stabilization exercises

INTRODUCTION

LBP is recognized as a universal complain with increasing disabling episodes of 26% from 1974 to 1978 (Kulie et al., 2010). According to recent studies, the prevalence of LBP is highest in women (Bunzli, Gillham & Esterman, 2011). Almost 70% of women experienced LBP during their lifetime, whereas 50% of women affected during pregnancy and 66% following their reproductive years. Studies said that pain will disappear after pregnancy within 1 year, but the prevalence of LBP within 2 to 18 months postpartum is about 2% to 65% (Chou et al., 2007). Low back pain reportedly occurs in 30% - 45% of women during the post-partum period (To & Wong, 2003). According to Pauda et al. (2005), around half of women who experience back pain during pregnancy still complain of back pain symptoms at 1 year after delivery. Mogren (2008) reported that about 40% may continue to experience pain that may extend to 6 months. For those with a history of LBP during pregnancy, LBP seems to decrease over the postpartum period. It was found that those have LBP or PGP at postpartum less than 3 months were at higher risk for persistent or chronic LBP and also among them, only 6% recover within 6-18 months after postpartum (Corso, 2016).

The postpartum period is counting initially from delivery to two years later. Usually, the weakness of the abdominal muscles and decreased stability of the lumbar spine are the reasons behind producing LBP during the postpartum period. In this condition, the lumbar spine is unable to provide support to the increased weight of the mother's body (Depledge et al., 2005). Patients with PGP have increased motion in their pelvic joints as compared with healthy pregnant controls. When the pelvic joint's motion is increased in pregnant women with PGP that results in decreased efficiency of load transmission thus the shear forces increased into the joints. Also focused that LBP in pregnant women with PGP which may

increase by shear forces (Vermani, Mittal & Weeks, 2010).

During and after pregnancy, urinary incontinence is a common complain women which affects the quality of life (DiBenedetto, Coidessa & Delneri, 2009). Its prevalence is between 10% and 40%, and the most common form is stress urinary incontinence (SUI). Age, body mass index (BMI), genetic factors, pregnancy and delivery, and a history of hysterectomy, smoking, race, constipation, and menopause have been considered as its risk factors (Kashanian, Ali, Nazemi & Bahasadri, 2011). Women usually avoid this problem because it creates a socially embarrassing situation associated with condition (Price, Dawood & Jackson, 2010). Haylen et al. (2010) said in his study that during coughing or laughing stress urinary incontinence (SUI) is involuntary urine leakage upon physical exertion. Its prevalence varies from 10–39%. Mixed urinary incontinence (MUI) is urine leakage with a combination of SUI and detrusor over activity and has a prevalence of 7.5– 25% (Dumoulin, Hay-Smith & Mac Habee-Seguin, 2014).

Among many approaches of physiotherapy, the individually tailored treatment process is known as conventional physiotherapy or usual care. It includes education, manual therapy, and exercise but there is no evidence for the effectiveness of "specific" stabilization exercise and it is unresolved. Clinically, this is at odds with much current physiotherapy practice and management (Cairns, Foster & Wright, 2006). Damen et al (2002) showed in the study that postpartum pain focused on the importance of two muscles, transverse abdominis (TA) and multifidus (MF). These two muscles are lying deep in the spine, to form the functional core stability of the body. In pregnancy-related back pain, these two muscles are weakened, if these problems are not addressed, chances for recurrence of back pain would be increased. The lower back muscles are used, along with the pelvic muscles, during vaginal birth. Recent research has focused on the importance of coactivity of the spinal stabilizer muscles, including the diaphragm, TA, and pelvic floor muscle (PFM), which is essential for the mechanical stability of the lumbar.

In 1948, Kegel first found out the successful outcomes in women with SUI symptoms using pelvic floor muscle exercises. Since 1948, several physiotherapy methods have been used (biofeedback, electro stimulation, vaginal cones, vaginal ball, individual or group therapy) in the treatment of UI, with different success rates. In a recent review, pelvic floor muscle training (PFMT) has been found to improve UI symptoms in all types of incontinence (Dumoulin et al. 2014). In the literature, most PMFT programs have been performed under the regular control of a physiotherapist in physiotherapy centers, which may not be cost-

effective and is time- consuming (Cavkaytar et al., 2014).

According to The World Health Organization (2010) Bangladesh has poor prenatal and postpartum care, nutritional deficiencies, high incidence of no- skilled birth attendant utilization, and the second-highest maternal mortality and morbidity rates next to sub-Saharan Africa. As a result, Bangladesh becomes more vulnerable to live for women because of arising complications during pregnancy and it is continuing into the postpartum period and in conclusion, also reduces their health-related quality of life (HRQOL). The purpose of this study was to find out the effect of stabilization exercise (SE) and Kegel exercise.

METHODOLOGY

It was a quasi-experimental design (pretest-posttest) of a single group study and provides an intervention during the experiment. This study was conducted at the outdoor Gynecological and Women's Health Physiotherapy Unit, CRP, Mirpur, Bangladesh. A before and after intervention that was expressed as pretest and posttest was administered with each subject of groups to compare the pain effects before and after the treatment. The data was collected from 20th February 2019 to 30th August 2019. It was performed after assessing the patient, initial recording, treatment, and final recording. After screening the outdoor patients at the Gynecological and Women's health unit, the sample was taken from a population by purposive sampling. Twenty-seven subjects were selected for data collection according to the inclusion criteria. The samples were given a numerical number of 1, 2, and 3. Inclusion criteria were the participants were those individuals who were diagnosed previously with postpartum mechanical LBP or recently diagnosed by a Physiotherapist, patients within 6 months to 2 years postpartum, aged between 18 to 35 years, voluntary participants, patients had a minimum of 1 previous episode of LBP, alteration in normal activities or for which medical care or intervention had been ineffective. Exclusion Criteria were- LBP from the pathological cause, the participants who had a deformity of the spine, patients with a clinical disorder which may become worse with the lumbar stabilization exercises e.g.: severe uncontrolled hypertensive patient, severe acute bronchial asthma, recent fracture around the lumbar spine, LBP from spondylolisthesis, spondylosis, spondylolysis, numbness, and paresthesia of toes of one or both lower limb as a result of low back pain, subjects who were mentally unstable.

The researcher was also concern about ethical issues. The research proposal was submitted for approval to the Ethical Committee of Bangladesh Health Professions Institute

(BHPI) IRB (Institutional review Board), CRP who followed the Bangladesh Medical Research guideline (BMRC) and the World Health Organization (WHO) guideline. Again, before data collection, permission was taken with a requested permission letter hand over to the appropriate authority of the study area and seeking assistance for smooth access to data collection with insurance of patient's safety. To eliminate ethical claims, the participants were set free to receive treatment for other purposes as usual. Each participant was informed about the study before beginning and given written consent. The researcher received verbal and signed an informed consent form to participate in this study from every subject. The study was self-funded with no conflict of interest. The ethical committee of the Bangladesh Health Professions Institute approved the study.

The evidence-based treatment protocol, spinal stabilization exercises was performed by one qualified physiotherapist. After providing 12 sessions of treatment for every subject in the group, again above procedure was followed to take post-test. The participant received treatment as regular patients in the Gynecological and Women's health unit; they continued as per their schedule where each participant received 2 days per week for 6 weeks.

Measurement tool

Numeric pain rating scale

In this study, the researcher used a numeric pain rating scale for measuring the intensity of the pain (Mann, 2003), Here a zero (0) means no pain, 1-3 indicates mild pain, 4-6 indicates that pain is moderate and 7-10 is severe pain feeling experienced by patients (Haefeli & Elfering, 2005).

Intervention:

The spinal stabilization exercise protocol

Participants underwent the exercise for 45 minutes, 2 times a week, for a total duration of 6 weeks. All participants were educated on the correct posture and lumbar stabilization exercise with core stabilizing system (Appendix 1; Stuge, Laerum, Kirkesola & Vollestad, 2004), and by consulting with a specialist physiotherapist. The education session was performed at the clinic by a trained physical therapist at the first visit. Moreover, a printed pamphlet with instructions on how to perform the exercises was given to each patient. The exercises were performed at home 5 times a day by all participants.

Data Analysis

The SPSS version 20.0 software was used in the performance of statistical analyses for the mean and standard deviation. Experimental studies with the different subject design within one subject group and the data is non-parametric and numerical data, which should be analyzed with "Wilcoxon Signed Rank Test:" as it was quasi-experimental and had within groups of different subjects, who were selected to spinal stabilization exercises and the measurement of the outcome came from collecting Numeric pain rating score. Data were numerical, were not well distributed & Within-group comparisons among subjects.

RESULTS

Based on eligibility criteria 27 females enrolled in and participate in the study which was limited on number for time limitation and to meet the eligible criteria. The mean age of the participants was 27.56 ± 3.683 years with a range from 18 to 35 years and the minimum age was 19 years and the maximum age was 33 years. It is found that 3.7%, 11.1%, 22.2% and 25.9%, 25.9%, 11.1% of the participants belonged to age group 18-20 years, 21-23 years, 24-26 years, 27-29 years 30-32 years, and 33-35 years. Among the participants 81.5% participators were housewife, 11.1% participators were service holder, 3.7% was a banker and 3.7% was doctor. 70.4% of patients had only the complaint of pain in the lower back region and about 18.5% of patients had weakness of the lower limb associated with low back pain and 11.1% of patients has both low back pain associated with weakness and numbness in the lower limb. It is shown that among total participants, 22.2% of participant's onset of a current problem was from the last six months, 77.8% was before 1 year before coming to the respective unit. Most of the participants (85.2%) attend on last delivery within 1 years, followed by 6 months (7.4%) and 2 years or not more than 2 years (7.4%). All participants were habituated to perform repetitive and household work that was included in the questionnaire by the researcher.

The study also shows, from 27 participants, 17 participants had urine leakage problems during coughing and sneezing in the pretest examination. The total findings of the study show that the average mean score after receiving treatment is lower than before receiving treatment (Table 1). Statistical analysis of the data represented that the findings of the study are significant. Mean difference between pre-test and post-test score shows improvement in at all variable in various functional position (Figure 1). To find out the level of significance ($P < .05$) for the two-tailed hypothesis using the Wilcoxon test, the critical

value of T is 98 for sample number 27 ($n-1=26$). Here as the observed Z-value of variables such as pain during resting position, sweeping, toilet sitting, walking, stair climbing, heavy weight lifting, during rolling, is lower than the critical value of T (Table 2), so it can be said that the null hypothesis is rejected and the alternative hypothesis is accepted.

Table 1: Present Condition of Urine Leakage Problem after Receiving Treatment

Spinal stabilization treatment group					
Subject	Pretest	Posttest	Subject	Pre-Test	Post test
E1	Yes	No	E15	Yes	No
E2	Yes	No	E16	No	No
E3	Yes	No	E17	Yes	No
E4	Yes	No	E18	Yes	No
E5	No	No	E19	Yes	No
E6	Yes	No	E20	Yes	No
E7	No	No	E21	Yes	No
E8	Yes	No	E22	Yes	No
E9	No	No	E23	No	No
E10	Yes	No	E24	No	No
E11	Yes	No	E25	No	No
E12	Yes	No	E26	No	No
E13	No	No	E27	Yes	No
E14	No	No			

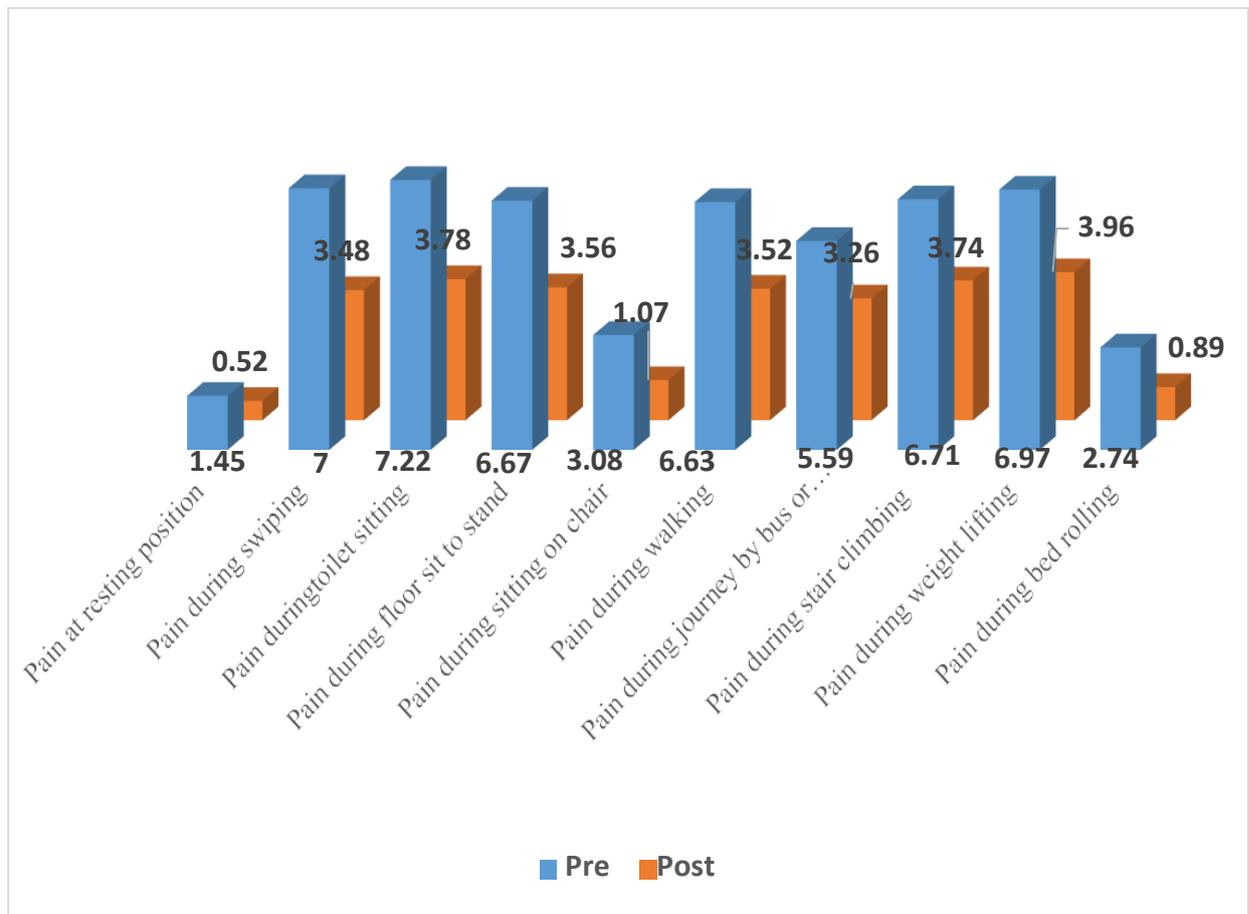


Figure 1: Mean Improvement of Different Variables in a Different Functional Position

Table 2: Variables in the study statistically significance at the following level of significance

Serial No.	Variables	Mean pre-test	Mean post-test	Mean difference	“z” Value	“p” value
01.	Pain at resting Position	1.44	0.52	0.93	3.34	0.001
02.	Pain during swiping	7.00	3.48	3.52	4.60	0.00
03.	Pain during toilet Sitting	7.22	3.78	3.45	4.61	0.00
04.	Pain during floor sit to stand	6.67	3.55	3.11	4.58	0.00
05.	Pain during sitting on chair	3.07	1.07	2	4.42	0.00
06.	Pain during walking	6.63	3.52	3.11	4.60	0.00
07.	Pain during journey by bus or rickshaw	5.59	3.26	2.33	4.59	0.00
08.	Pain during stair climbing	6.70	3.74	2.99	4.57	0.00
09.	Pain during weight lifting	6.96	3.96	3	4.63	0.00
10.	Pain during bed rolling	2.74	0.89	1.85	4.16	0.00

DISCUSSION

This research found significant improvement in pain. Pretest and posttest, mean difference of pain at rest is .93 and their p-value ($p < 0.05$). The result of this study showed that subjects with postpartum low back pain who received spinal stabilization exercises relatively decrease pain in resting position and also all functional activities compared to individual's initial pain status by calculating the mean difference. Considering these findings, it seems that spinal stabilization exercises are more pronounced in individuals with postpartum low back pain. To evaluate the efficacy of specific stabilization exercises for patients with postpartum low back pain to reduce pain and improve functional status, a study was conducted in Norway in 2004. Eighty-one postpartum women (after one to three months of pregnancy and their mean age was 32 years) were randomized into a trial group ($n=40$) and a control group ($n=41$). Subjects in the intervention group instructed specific stabilization exercises with conventional physiotherapy management and control group received only individualized physiotherapy by six experienced physiotherapists over a period at two different clinical settings. A one-year follow-up evaluation was also conducted at home. The results of the study showed that a treatment program with specific stabilizing exercises, integrated functionally was effective in reducing pain and improving functional status (Stuge et al., 2004). In 2019 at RCT was conducted with 48 participants of chronic LBP. They were randomized to 1 of 4 groups after screening which were Flexibility exercise, walking exercise WE, stabilization exercise (SE), and stabilization with WE (SWE) groups. Participants involved each exercise for 6 weeks. This study also suggested that the stabilization exercise and walking exercise might have some favorable effects on muscle strength and physical endurance. Where the efficiency of the WE and the SE on reducing pain and improving physical endurance and also recommended that these interventions should be applied for chronic LBP (Suh et al., 2019). Ehsani et al. (2019), found in a study that, the TA and PFM muscle activity is improved among the subjects with postpartum LBP, who performed SE exercises, and the significant improvement was found in the ability to contract the TA after a SE exercise program is consistent. Another key finding of this study was increased PFM activity without training it directly by activating the TA muscle with SE exercises in postpartum with LBP. The significant improvement came out due to receive specific lumbar stabilization exercises along with the core stabilizing system of the spine had measured in the study. In another study, results showed the significance of these exercises to all of these subjects. Breen et al reported that the overall incidence of back pain 1-2 months postpartum

in this population was related to predisposing factors like the previous history of back pain, younger age, and greater weight. They showed that core stabilization exercises and postural correction resulted in improvement. In this study researcher also found significant improvement by calculating statistical test (Wilcoxon signed-rank test) in ten functional activities considering the $p\text{-value} < 0.05$ (Suh et al., 2019). Resting position, sweeping, chair sit to stand, journey by bus or rickshaw, toilet sitting, waking stair climbing, weight lifting and bed rolling are following functional activities. This improvement may be found due to the exercises used were based on those that have been widely advocated and publicized to promote spinal stability and integration of exercises into daily activities (Sullivan, 2000). This research found mean age is 26.74 and most of them are a housewife. The last delivery date of most of the participants is within one year, and most of them are suffering from this problem for one year and all participants are habituated to all kinds of household work. For participants who have urine leakage problems initially at the treatment after performing the Kegel exercise, their problems were solved. So, it can be said that Kegel exercise is one of the most effective interventions in urine leakage problems during coughing and sneezing.

LIMITATIONS

In Bangladesh, postpartum LBP related research work was less common, the short study period, only 6 weeks' treatment sessions are the limitation. The research was carried out only in one center of Bangladesh such a small environment and 27 participants of postpartum LBP were included in this study and this is a very small quantity of samples in one group. So, there is a lack of sufficiency of sample for the study to generalization and also took participants of both acute, chronic and follow up cases with low back pain which also influence.

CONCLUSIONS & RECOMMENDATION

The performance of Spinal stabilization exercise with a core stabilizing system is a very effective protocol for postpartum LBP as it will increase back muscle strength and endurance. The researcher tries to explore the effectiveness of Spinal stabilization exercises to reduce the features of postpartum patients with LBP and Kegel exercise to reduce urine leakage problems after pregnancy. It will be helpful for rehabilitation through physiotherapy management and to enhance functional activities. Also, it will be very helpful for the professionals to decide the specific evidence-based protocol for applying interventions.

A larger sample size may improve the statistical significance of some of the results. To conduct randomized control trial within two groups (Control & Trial group) and maintaining the double-blinding procedure to find the actual rate of effectiveness of lumber stabilization exercise in postpartum LBP in the future. Explore the long-term effect of the treatment is also recommended.

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APPENDIX 1

Exercise 1: Core Strengthening (Static)

- **Therapist:** Instruct the patient so that the patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Prone lying on the bed.

Steps:

- Four-point kneeling on the bed, continue to breathe normally. Slowly try to draw in your abdominal wall. Holding this position for 10 seconds.
- Then relax your abdominal wall. Elbow straight with shoulder level. Maintain normal thoracic and lumbar curves. Perform it ten times per set, 5 sets a day. Stop performing beyond the painful range.

Exercise 2: Core Strengthening (Dynamic, Cat Camel Exercise)

- **Therapist:** Instruct the patient so that the patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Prone lying on the bed.

Steps:

- Four-point kneeling on the bed, continue to breathe normally. Elbow straight with shoulder level, maintain the normal spinal curve. Move the trunk and pelvis into upward and downward direction rhythmically.
- Perform it ten times per set, 5 sets a day. Stop performing beyond the painful range.

Exercise 3: Core Strengthening (Dynamic, Superman Exercise)

- **Therapist:** Instruct the patient so that the patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Prone lying on the bed.

Steps:

- Maintain a normal neutral spine on prone lying. Bring your legs together and extend your arms overhead so your biceps are alongside your ears. Using the muscles of your back with a little help from your glutes, raise your legs and torso off the ground, keep your leg straight.
- Hold this position for five seconds. Lower back down to the ground with control. Perform it ten times per set, 5 sets a day. Stop performing beyond the painful range.

Exercise 4: Lumber Extension

- **Therapist:** Instruct the patient so that the patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Prone lying on the bed.

Steps:

- Elbow straight and hand placement on the ground with shoulder level. Raise head & trunk, Pelvic neutral. Hold it for 10 seconds. Return to the starting position.
- Perform it 10 times per set, 5 sets a day. Stop performing beyond the painful range.

Exercise 5: Hook Lying Combination Exercise

- **Therapist:** Instruct the patient so that the patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Supine lying on the bed.

Steps:

- Hook lying position on the bed, maintain a normal neutral spine. Holding the hands together and arms straight up. Raise knees so that it comes horizontal to the bed level and leg goes out, Arms go overhead at the same angle of the leg. Hold each position for 10 seconds. Slowly return to the starting position.
- Alternate in the other leg and arm. Hold each position for 10 seconds. Perform it five times per set, 5 sets a day. Stop performing beyond the painful range.

Exercise 6: Bridging Exercise

- **Therapist:** Instruct the patient so that that patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Supine lying on the bed.

Steps:

- Maintain a normal neutral spine and breath normally. Raise your buttock about 2 inches above the bed, not raise the head, trunk. Holding this position for 10 seconds. Gently down the lower back.
- Perform it 10 times per set, 5 sets a day. Stop performing beyond the painful range.

Exercise 7: Straight Leg Raising

- **Therapist:** Instruct the patient so that the patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Prone lying on the bed.

Steps:

- Straight Leg Raise of one leg about six inches above the table. Then slowly return. Perform it ten times per set, three sets a day.
- Perform it ten times per set, 5 sets a day. Stop performing beyond the painful range.

Exercise 8: Pelvic Tilting Exercise

- **Therapist:** Instruct the patient so that the patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Sitting on the physio ball.

Steps:

- Try to move the ball forward & backward, side to side.
- Perform it for 5 minutes.

Exercise 9: Kegel Exercise

If the patient has a problem of urinary incontinence after C-section with LBP, then only introduce this exercise.

- **Therapist:** Instruct the patient so that the patient will be able to perform the exercise solely beyond the painful range.
- **Patient position:** Supine lying, knee 90 semi-flex, sole touched on the bed.

Steps:

- Breath freely during exercise. Tighten the pelvic floor muscle, not try to contract the muscle of the abdominal, thigh & buttocks. Then relax for 5 seconds, try to perform it four or five times in a row.
- Perform it 5 times a day, 10 repetitions, 1 set.