

Effect of Practicing Sitting Pelvic Tilt Exercise on the Intensity of Pregnancy-related Lumbopelvic Pain

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Abstract:

Background: Lumbopelvic pain is frequent and disabling condition in pregnancy and causing problems in everyday activities, such as walking, lifting, climbing stairs and sitting. **Aim:** To evaluate the effect of practicing sitting pelvic tilt exercise on the intensity of pregnancy-related lumbopelvic pain. **Subjects and Method:** A quasi-experimental research design conducted on 70 pregnant women with lumbopelvic pain who chosen by a purposive sample. **Setting:** The study carried out at Antenatal Clinics at Obstetrics and Gynecology Department in Mansoura University Hospital in Egypt. **Tools of data collection:** Two tools were used for data collection: Tool I: Structured Interview Schedule to assess the general characteristics, obstetric history of pregnant women and characteristics of lumbopelvic pain. Tool II: Numeric Rating Scale to assess the intensity of lumbopelvic pain pre and post intervention. **Results:** The findings of the present study illustrated that, there were highly statistically significant differences between the intensity of lumbopelvic pain Pre and post intervention ($P < 0.001$). **Conclusion:** The study hypothesis was accepted which indicated that practicing sitting pelvic tilt exercise during pregnancy had a positive effect on reducing the intensity of lumbopelvic pain. **Recommendations:** The present study findings recommended that, the pelvic tilt exercise should be performed regularly as a part of the routine antenatal care.

Keywords: lumbopelvic pain, pelvic tilt exercise, pregnancy.

1. Introduction:

Lumbopelvic pain (LPP) is the most common pregnancy related musculoskeletal complaint. Low back pain (LBP) refers to pain between the gluteal fold and the twelfth rib. While, Pelvic Girdle Pain (PGP) refers to pain between the gluteal fold and the posterior iliac crest, particularly near to the sacroiliac joints (Hu et al., 2020). During pregnancy, almost half of women with initially manifesting LBP continue to have pain until the end of the first year after delivery. Typically, PGP starts by the end of the third month of gestation, with a peak between the twenty fourth and thirty sixth gestational weeks, lasting for about six months after women's self-care activities during puerperium (Abu et al., 2017).

During pregnancy, due to the release of relaxin hormone, the ligamentous laxity increases lead to decrease the stability of the lumbar spine and the pelvis with excessive joint motion. In addition, the weight gain causes a shift of the center of gravity, which leads to excessive lumbar lordosis and pelvic anterior tilting, causing LBP (Bhatia & Chhabra, 2018). Pregnant women who suffer from LPP experience problems in everyday activities, such as walking, dressing, lifting, carrying, turning in bed, climbing stairs, and sitting. In addition, LPP complicates sleep, hobbies, social and sexual life, personal relationships and lead to difficulties with performing tasks at work, and sick leave is often a result (Belogolovsky, Katzman, Christopherson, Rivera & Allen, 2015).

Pelvic tilt exercise with women education and other alternative methods such as nerve stimulation, physiotherapy, yoga, stabilization belts, relaxation, pharmacological treatment, and massage are the gold standards conservative treatment of LPP (Sharaby & Abdellatef, 2019). Also, pelvic tilt exercise can be a preventive measure to reduce the occurrence of LPP or to decrease the pain intensity and the possibility of disability (Zakaria, Tompunuh & Porouw, 2019).

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2. Significance of the study

Lumbopelvic pain is the most common dysfunction affecting the musculoskeletal system during pregnancy. Lumbopelvic pain ranges from 20% to 90% during pregnancy; according to most studies report, the average of LPP prevalence is 50% (**Haakstad&Bø, 2015**). LPP is associated with functional disability which has a significant effect on pregnant women choice for elective caesarean sections to alleviate LPP (**Vermani, Mittal & Weeks, 2010**). Among the most effective strategies to reduce the LPP is the pelvic tilt exercise which increases the flexibility of the muscles needed to compensate the large abdominal mass and maintains normal posture during pregnancy. Unfortunately, in Egypt, only very few studies assessed the effect of practicing sitting pelvic tilt exercise on the intensity of pregnancy- related LPP (**Deepthi, Ponmathi&Sivakumar, 2016**). Therefore, this study conducted to evaluate the effect of practicing sitting pelvic tilt exercise on the intensity of pregnancy- related LPP.

3. Aim of the study

The present study aimed to evaluate the effect of practicing sitting pelvic tilt exercise on the intensity of pregnancy- related LPP.

4. Research hypothesis

Pregnant women who practice sitting pelvic tilt exercise have less intensity of lumbopelvic pain than who don't practice it.

5. Subjects and Method

Study design

A quasi-experimental research design (pretest – posttest design).

Study setting

The study was implemented at the Antenatal Clinics at the Obstetrics and Gynecology Department in Mansoura university hospital in Egypt.

Study Sample

The study sample included a purposive sample of 70 pregnant women who attended the antenatal clinics at the Obstetrics and Gynecology Department in MUH from the beginning of November 2019 to the end of January 2020 and enrolled in this study when fulfilled the following **inclusion Criteria**: Aged between 20 and 35 years, had normal Singleton pregnancy, normal Body Mass Index (18.5 to 24.9), had lumbopelvic pain in third trimester of pregnancy (24th –36thweeks of gestation), attended antenatal clinic regularly and don't use any pain relieving drugs.

Exclusion criteria: Chronic back pain for more than 3 months, back pain after trauma, having history of vertebral spine fracture or surgery or history of spinal and rheumatologic disorders.

Sample size:

Based on data from a quasi-experimental study (**Mirmolaei, Ansari, Mahmoudi&Ranjbar, 2018**), Level of significance was 5%, and power of study was 80%, $n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(SD)^2\}] / (\text{mean difference between pre and post intervention})^2$. The sample size was 70 based on the given formula.

Tools of data collection:

Two tools were utilized for data collection:

Tool (I):A structured interview Schedule which designed by the researcher after reviewing the national and international relevant literature (**Mbada et al., 2014; Kokic et al., 2017; Marzouk & Fadel, 2020**) and being filled by the researcher. It consisted of three parts:

Part (1):General characteristics of the pregnant women such as age, level of education, marital status, residence and occupation.

Part (2):Pregnant women's obstetric history such as gravidity, parity, gestational age, number of living children and mode of the previous deliveries.

Part (3): Assessment of baseline characteristics of LPP such as location through the pain diagram (**Fig. 1**) which adopted from (**Pierce, Homer, Dahlen & King, 2012**). The pain diagram was used to self-report lumbopelvic pain. The LBP was determined if the pregnant women marked the pain areas above the level of the 5th lumbar vertebra (L5). While, the pelvic girdle pain was determined if the pain areas were marked by the pregnant women below the level of L5 and the iliac crests (anterior, posterior, and/or lateral view) and those marked both above and below were classified as combined LBP and PGP.

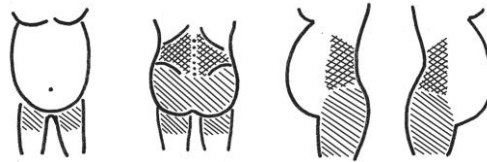


Figure (1). The pain diagram for self- reported LBP and PGP

Also, the pain was assessed for quality, radiation, frequency, duration, the most severe time of pain, aggravating factors and alleviating factors.

Tool (II): Numeric Rating Scale (NRS):

It was adopted from (Jensen & McFarland, 1993) to assess the intensity of LPP. It is the most frequently assessment tool used in the clinical setting with constant scale paces, a straight line with symbols spaced (1) cm distant. It is a subjective assessment tool, the pregnant women had the option to verbally rate their pain intensity as a number or put a dot on the line. It is an 11 point scale ranging from 0 (no pain), 1 up to 3 indicated mild pain, 4 up to 6 indicated moderate pain, 7 up to 9 indicated sever pain and 10 indicated the worst pain.

Validity of the study tools:

It was checked by three specialists in the field of obstetrics and gynecology nursing. Based on specialists' suggestions, the recommended modifications were done and the final form was used for data collection.

Reliability:

The tools for data collection were tested for its reliability by using Cronbach's alpha test in statistical package for Social Science (SPSS) version 20. Numeric rating scale is a reliable and valid method of measuring pain (Downie et al, 1978; Ferraz et al, 1990).

Ethical Considerations

Ethical approval was obtained from the research ethics committee at the faculty of Nursing, Mansoura University to implement the study. Prior to the study, a written formal consent was obtained from all participants after explaining the nature and purpose of the study. Study participation is voluntary and every participant is entitled to withdraw from the study at any time. Anonymity, privacy, safety and confidentiality were absolutely assured throughout the whole study. The result was used as a component of the necessary research for master study as well as for publication and education.

Pilot study

Prior to data collection, the Pilot study was conducted on 10% of the pregnant women (7 pregnant women) who met the inclusion criteria to evaluate the clarity and applicability of these tools. Based on the findings of the pilot study, necessary modifications were done in the form of adding and paraphrasing of some questions. Women involved in the pilot excluded from the study to avoid contamination of the sample.

Field Work

Preparatory Phase

During this phase; official permissions to carry out the study were obtained from the director of Antenatal Clinics at the Obstetrics and Gynecology Department in Mansoura University Hospital. The researcher prepared data collection tools by reviewing the international relevant literature and theoretical knowledge about the various aspects of the study using articles, books, and journals. The researcher designed a colored brochure in a simple Arabic language after reviewing Arabic and English literature (RNV & VPR, 2016; Hayman, Reaburn, Alley, Cannon & Short, 2019).

Implementation phase

The researcher attended the previously mentioned setting three days per week until the calculated sample size was obtained. The researcher explained the purpose of the study and received the informed consent of the pregnant women selected to participate in the study. Before intervention, the researcher interviewed each pregnant woman individually for about fifteen to twenty minutes to obtain the general characteristics data, obstetric history and the baseline assessment of characteristics of lumbopelvic pain by using structured Interview Schedule. Weight and height were measured for each pregnant woman to calculate the body mass index (BMI) according to the standard equation: $BMI = \text{weight (kg)} / [\text{height (m)}]^2$. The pregnant women were asked to mark the location of the pain on a pain diagram, which included an image of a pregnant body drawn with posterior, anterior, and lateral sections. Then, the researcher distributed the pre-test numeric rating scale to the pregnant women to place a mark through the line to indicate the intensity of their pain. Teaching session was done by the researcher for a small group consisted of three to five pregnant women.

The researcher taught them how to perform the exercise and distributed Arabic brochure containing colored pictures that clarified the steps of the exercise, followed by watching an educational video on a laptop. After the end of the educational session, each pregnant woman was asked to re-demonstrate the sitting pelvic tilt exercise. Then, the pregnant women were instructed to do it at home 2-3 times per day and to perform each exercise with 10 repetitions for two consecutive weeks. They were followed and encouraged for their compliance with sitting pelvic tilt exercise through telephone calls and during their antenatal follow up visits at the Obstetrics and Gynecology Center.

Outcome evaluation phase:

The researcher reassessed the pregnant women by using the same NRS to evaluate the effect of practicing sitting pelvic tilt exercise on the intensity of on pregnancy- related lumbopelvic pain after two weeks of intervention.

Statistical Analysis

The statistical analysis of data was done by using SPSS program (Statistical package for the social sciences) version 20. Descriptive statistics with mean and standard deviation (SD) for continuous variables and frequency for categorical variables were analyzed. The association between variables was calculated by chi- square test. The p-value is the degree of significant. A significant level value was considered when $p\text{-value} \leq 0.05$ and a highly significant level value was considered when $p\text{-value} \leq 0.001$, while $p\text{-value} > 0.05$ indicates non-significant.

6. Results:

Table (1): General characteristics of the pregnant women (n= 70)

General characteristics	No.	%
Age (years)		
20 >25	23	32.9
25 >30	24	34.2
30 – 35	23	32.9
Mean \pm SD	27.8 \pm 2.8	
Residence		
Urban	49	70.0
Rural	21	30.0
Educational level		
Illiterate	3	4.3
Basic	4	5.7
Secondary	37	52.9
University	26	37.1
Occupation		
Housewife	57	81.4
Working	13	18.6

Table (1) shows that slightly more than one-third (34.2%) of the pregnant women aged from 25 to less than 30 years old with mean \pm SD= 27.8 \pm 2.8. Also, more than two-thirds (70%) of them were from urban areas and more than half (52.9%) of them had secondary education. Moreover, slightly more than four-fifths (81.4%) of the pregnant women were housewives.

Table (2): Obstetric history of the pregnant women (n= 70)

Obstetric history	No.	%
Gravidity		
Primigravida	36	51.4
Multigravida	34	48.6
Parity		
Nullipara	36	51.4
Primipara	10	14.3
Multipara	24	34.3
Gestational age (weeks)		
24 <30	46	65.7
30 – 36	24	34.3
No. of living children		
No	36	51.4
One	10	14.3
Two or more	24	34.3
Previous deliveries (n=34) #		
Vaginal delivery	19	55.9
Cesarean section delivery	27	79.4

More than one answer is possible

Table (3) reveals that more than half (51.4%) of the pregnant women were primigravida and had no living children. Also, around two-thirds (65.7%) of the pregnant women's gestational age ranged from twenty-four to less than thirty and around four-fifths (79.4%) of them had previous cesarean section deliveries.

Table (3): Assessment of baseline characteristics of pain among the pregnant women pre-intervention (n=70)

characteristics of pain	No.	%
Location of pain#		
Lumbar	65	92.9
Thigh	24	34.3
Gluteal folds	32	45.7
Around Sacroiliac joints	15	21.4
Quality of pain#		
Burning	30	42.9
Cramp	49	70.0
Numbness	10	14.3
Radiation of pain#		
Abdomen	26	37.1
One leg	11	15.7
Both legs	27	38.6
Duration		
Continuous	13	18.6
Intermittent	57	81.4
Frequency		
Once /week	2	2.9
Twice /week	27	38.6
3 times/week	31	44.3
Daily	10	14.3
Most sever time		
Afternoon	11	15.7
Night	48	68.6
No relationship	11	15.7
Aggravating Factors#		
Sitting	3	4.3
Standing	68	97.1
Lying in prone position	31	44.3
Walking	15	21.4
Alleviating Factors#		
Hot application	25	35.7
Exercises	3	4.3
Rest	54	77.1
Massage	11	15.7

#More than one answers is possible.

Table (3) illustrates the majority (92.9%) of the pregnant women had pain located in the lumbar area and more than two-thirds (70%) of them had cramping pain. Also, more than one-third (38.6%) of them, their pain radiated in both legs. Moreover, slightly more than four-fifths (81.4%) of them had intermittent pain and slightly more than two-fifths (44.3%) of them had pain three times per week. In addition, this table demonstrates that more than two-thirds (68.6%) of the pregnant women had the most severe time of pain at night. Furthermore, the most aggravating factor for pain was standing for the majority (97.1%) of the pregnant women and slightly more than three-quarters (77.1%) of them rest for alleviating their pain.

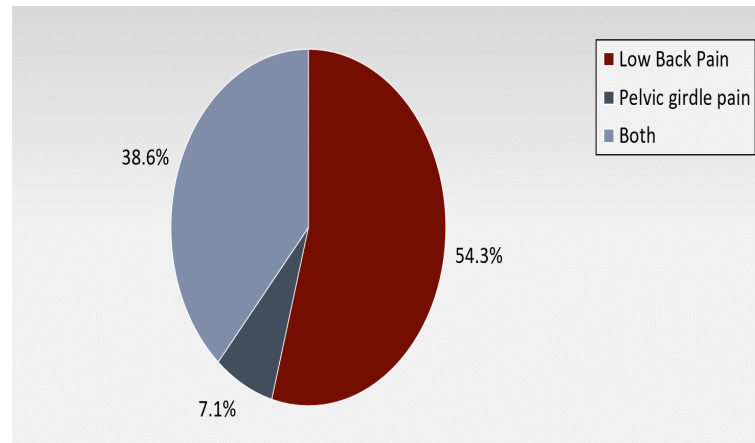


Figure 2. Pregnant women's self-reported low back pain, pelvic girdle pain or both.

Table (4) Comparison of pregnant women's level of pain intensity pre and 2 weeks post intervention (n=70).

Level of pain intensity	Pre-intervention		2 weeks post-intervention		Chi square test	
	No.	%	No.	%	X ²	P
Mild pain	0	0.0	29	41.4	44.335	<0.001**
Moderate pain	36	51.4	32	45.7		
Severe pain	31	44.3	9	12.9		
Worst pain	3	4.3	0	0.0		

(**) P is highly statistically significant if < 0.001.

Table (4) shows that there were highly statistically significant differences between the level of pain intensity Pre and 2 weeks post intervention ($P < 0.001$) in which (41.4%, 45.7% and 12.9% respectively) of the pregnant women had mild, moderate, severe pain post intervention compared to (0.0%, 51.4% and 44.4%) pre intervention.

7. Discussion:

Low back pain is a common problem experienced during pregnancy. The present study aimed to evaluate the effect of practicing sitting pelvic tilt exercise on the intensity of pregnancy-related lumbopelvic pain. The findings of the present study achieved the study hypothesis and revealed that pregnant women who practiced sitting pelvic tilt exercise had less intensity of lumbopelvic pain post-intervention compared to pre-intervention. The present study findings revealed that slightly more than half of the pregnant women had LBP and more than one-third of them had both pain pre-intervention. Also, most pregnant women reported that their pain was intermittent cramping pain and slightly more than two-fifths of them had pain three times per week.

These study findings were parallel to a cross sectional study conducted by **Berber & Satılmış (2020)** to assess the prevalence and risk factors of LBP during pregnancy and its effects on the quality of life on 400 Turkish pregnant women. They reported that almost half of them had LBP during the current pregnancy and most of them described their pain as intermittent. These similarities would be related to the most pregnant women in our study and Berber & Satılmış were housewives and perform their house activities every day regularly which aggravate the LBP.

The present study finding showed that more than two-thirds of the pregnant women had the most severe time of pain at night. At the same line, a randomized controlled trial conducted by **Ozdemir, Bebis, Ortabag & Acikel (2015)** on 96 pregnant women reported that more than three-fifths of them had intermittent sharping pain and more than one-third of them had the most severe time of pain at night. The present study illustrated that more than three-quarters of the pregnant women rest for alleviating their pain. This study finding was in agreement with unblinded randomized controlled trial conducted by **Kluge, Hall, Louw, Theron & Grové**

(2011) who investigate the effect of an exercise program on LPP intensity during pregnancy. They found that more than two-thirds of the pregnant women resort to bed rest to relieve pain.

The present study revealed that majority of the studied pregnant women had less intensity of lumbopelvic pain post-intervention compared to pre-intervention ($P < 0.001$). Congruently, a randomized controlled trial study conducted by **Suputtitada, Wacharapreechanont & Chaisayan (2002)** aimed to determine the effects and safety of the sitting pelvic tilt exercise during the third trimester in alleviating LBP among sixty seven primigravida women who attended the antenatal clinic in Thailand.

They found that women who practiced sitting pelvic tilt exercise reported decreasing low back pain intensity after eight weeks of exercise ($P < 0.001$). In addition, a quasi-experimental design conducted by **Elkheshen et al., (2016)** to evaluate the effect of practicing pelvic rocking exercise on lowering LBP among 100 primigravida Egyptian women. They found that the pelvic tilt exercise had a significant effect on reducing the LBP among pregnant women.

Moreover, the findings of the present study were in agreement with a randomized controlled trial conducted by **Keskin, Onur, Keskin, Gumus, Kafali & Turhan (2012)** who found that the pregnant women who performed pelvic tilt exercise for three weeks had reported a significant relief of LBP (VAS pain $P < .001$). Another supporting study was conducted by **Deepthi et al., (2016)** on 30 Indian primigravida women to evaluate the effectiveness of sitting pelvic tilt exercise on LBP during the third trimester of pregnancy. They reported that there was a significant difference in the intensity of pain through NRS pre and post intervention ($p < 0.01$).

Additionally, a quasi-experimental supporting study conducted by **Kamali, Jafari, Zadeh (2009)** on 60 Iranian primigravida women to investigate the effect of sitting pelvic tilt exercise on LBP during pregnancy. They reported that the intensity of LBP in the intervention group after exercise was significantly decreased ($P = 0.0001$).

Contradictory, a randomized controlled trial conducted by **Stafne et al. (2012)** to evaluate the effect of aerobic and strengthening exercises program on lumbopelvic pain on pregnant women. They reported that there was no statistically significant difference in pain intensity. This contradiction may be due to differences in the type of exercise and equipment which were used.

8. Conclusion:

Based on the present study findings, practicing sitting pelvic tilt exercise had a positive effect on decreasing the intensity of lumbopelvic pain during pregnancy.

9. Recommendation:

- The pelvic tilt exercise should be performed regularly as a part of the routine antenatal care.
- Applying further research study to compare the pelvic tilt exercise in different positions for relieving LPP.

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Conflict of Interests

The authors state that there is no conflict of interests regarding this study.

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