

EFFECT OF AN EDUCATIONAL SESSION REGARDING SITTING PELVIC TILT EXERCISE ON PREGNANT WOMEN'S KNOWLEDGE AND INTENSITY OF LUMBOPELVIC PAIN

¹Abeer Salah Ali Mohamed, ²Nahed Fikry Hassan Khedr & ³Eman A. Fadel

¹ Demonstrator of Woman's Health and Midwifery Nursing, Faculty of Nursing, Mansoura University, Egypt

² Professor of Woman's Health and Midwifery Nursing, Faculty of Nursing, Damietta University, Egypt

³ Assistant Professor of Woman's Health and Midwifery Nursing, Faculty of Nursing, Mansoura University, Egypt.

Corresponding author E-mail: dr.nahid2020@hotmail.com

Abstract:

Background: Lumbopelvic pain is a substantial problem and can have a significant effect on the pregnant women's daily activities. **Aim:** Evaluate the effect of an educational session regarding sitting pelvic tilt exercise on pregnant women's knowledge and intensity of 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:** Antenatal Clinics at Obstetrics and Gynecology Center in Mansoura University Hospital in Egypt. **Tools of data collection:** There were three tools for data collection: Tool I: Structured Interview Schedule. Tool II: Structured Knowledge Questionnaire. Tool III: Numeric Rating Scale. **Results:** There were highly statistically significant differences between the pregnant women's knowledge pre, immediate and after 2 weeks of intervention ($P < 0.001$). Also, there were highly statistically significant differences between the intensity of lumbopelvic pain pre and post intervention ($P < 0.001$). **Conclusion:** The study hypotheses were accepted which indicated that the educational session had significant effects in improving the pregnant women's knowledge regarding sitting pelvic tilt exercise and reducing the intensity of lumbopelvic pain. **Recommendation:** The present study findings recommended that, distribution of a designed brochure about the sitting pelvic tilt exercise for all pregnant women who attended the antenatal clinics as a part of the routine antenatal care. **Keywords:** Educational session, Knowledge, Lumbopelvic pain, Pregnant women, Pelvic tilt exercise.

Introduction

Pregnancy-induced biomechanical, hormonal, and vascular changes are likely to cause a broad range of musculoskeletal problems. Since the most common musculoskeletal problems associated with pregnancy that affect the well-being of the pregnant women is lumbopelvic pain (LPP), this condition has acquired increasing interest around the world (Kesikburun et al., 2018).

Pregnancy-related lumbopelvic pain can be classified as Low Back Pain (LBP) or Pelvic Girdle Pain (PGP); LBP defined as pain between 12th rib or the costal margins and the inferior gluteal fold; while PGP defined as pain in the symphysis pubis or pain between the posterior iliac crest and the gluteal fold (Starzec, Truszczyńska-Baszak, Tarnowski & Rongies, 2019). Almost

half of women with LBP during pregnancy continue to have pain one year postpartum. Typically, PGP begins by the end of the first trimester, peaking between the 24th and 36th gestational weeks, lasting for about six months after delivery, which can interfere with the women's self-care activities during puerperium (Abu et al., 2017).

During pregnancy, increasing the counter of the uterus leads to weakening and stretching of the abdominal muscles. Also, changes in the posture with pelvic anteversion and increased lumbar lordosis with the effect of the gravity, leading to increase the load on the sacroiliac ligaments and lumbar spine, and LPP begin (Mahishale & Borkar, 2016).

Some risk factors have been reported for LBP and PGP during pregnancy, including previous history of LBP and LBP during the menstruation, family history of LBP, strenuous workload, the younger age of the women (Ramachandra, Maiya, Kumar & Kamath, 2015).

Although it is not life-threatening conditions to have LPP during pregnancy, but it affects daily activities and quality of life; pregnant women may experience difficulty in walking, climbing stairs, lifting, working, dressing, sleep, mood and sexual activities (Acharya, Tveter, Grotle, Eberhard-Gran & Stuge, 2019).

Women education and other alternative methods such as Pelvic tilt exercise, nerve stimulation, physiotherapy, yoga, stabilization belts, relaxation, pharmacological treatment, and massage are the gold standards conservative treatment of LPP (Sharaby & Abd Ellatef, 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).

Significance of the study

Lumbopelvic pain is the most common musculoskeletal dysfunction during pregnancy. The prevalence of LPP during pregnancy ranges from 20% to 90%, most studies report prevalence 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 educational session regarding sitting pelvic tilt exercise on pregnant women's knowledge and intensity of lumbopelvic pain (Deepthi, Ponmathi & Sivakumar, 2016). Therefore, this study conducted to evaluate the effect of educational session regarding sitting pelvic tilt exercise on pregnant women's knowledge and intensity of lumbopelvic pain.

Aim of the study

The present study aimed to evaluate the effect of an educational session regarding sitting pelvic tilt exercise on pregnant women's knowledge and intensity of lumbopelvic pain.

Research hypotheses

To fulfill the aim of this study, two hypotheses were tested:

Hypothesis I: Pregnant women who attend the educational session regarding sitting pelvic tilt exercise exhibit improvement in knowledge score

regarding sitting pelvic tilt exercise after intervention than before.

Hypothesis II: Pregnant women who attend the educational session regarding sitting pelvic tilt exercise have less intensity of lumbopelvic pain after intervention than before.

II. 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 Center in Mansoura university hospital in Egypt.

Study Sample

The study sample included a purposive sample of 70 pregnant women who attended the previous mention setting 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 –36th weeks 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 spinal and rheumatologic disorders or history of vertebral spine fracture or surgery.

Sample size:

Based on data from a quasi-experimental study (Mirmolaei, Ansari, Mahmoudi & Ranjbar, 2018), and considering level of significance of 5%, and power of study of 80%, in two-tailed study, the sample size can be calculated using the following formula: $n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(SD)^2\}] / (\text{mean difference between pre and post intervention})^2$

Where SD = standard deviation, $Z_{\alpha/2}$: This depends on level of significance, for 5% this is 1.96, Z_{β} : This depends on power, for 80% this is 0.84. Therefore, $n = [(1.96 + 0.84)^2 \times \{2(3.08)^2\}] / (1.1)^2 = 70$

Based on the above formula, the sample size required for the study was 70.

Tools of data collection:

Three tools were utilized for data collection: **The first tool was a Structured Interview Schedule** which designed by the researcher after reviewing the national and international relevant literature (Mbada et al., 2014; Wijesiriwardana & Gunawardena, 2016; Kokic, Ivanisevic, Uremovic, Kokic, Pisot & Simunic., 2017). The Structured Interview Schedule filled by the researcher. It consisted of two parts: **Part (1) involved the general characteristics of the pregnant women** such as age, level of education, marital status, residence, occupation, telephone number, weight, height, and pre-pregnancy body mass index. **Part (2) encompassed the pregnant women's obstetric history** such as gravidity, parity, gestational age, number of living children and mode of the previous deliveries.

The second tool: Structured knowledge questionnaire regarding Sitting Pelvic Tilt Exercise:

It was designed by the researcher after reviewing the international relevant literature (Sujindra, Bupathy, Suganya & Praveena, 2015; Gregg & Ferguson, 2017; Davies, Wolfe, Mottola & MacKinnon, 2018). It consisted of 25 questions related to knowledge about sitting pelvic tilt exercise: one item for assessing the definition of pelvic tilt exercise, six items for benefits, four items for positions, three items for

precautions, six items for contraindication, and finally five items for danger signs to discontinue exercise during pregnancy. It was assessed pre, immediate post training and after two weeks of the intervention.

Scoring system

The total score equals 25, each correct answer was given 1 mark and each wrong answer was given score 0. Total knowledge score was classified as the following: good if the total score was more than 65%, fair if the total score ranged from 50 to 65 %, and poor if the total score was less than 50 %.

The third tool: Numeric Rating Scale (NRS):

It was adopted from (**Jensen & McFarland, 1993**) to assess the intensity of low back and pelvic girdle pain. Numeric rating scale is a reliable and valid method of measuring pain (**Downie et al, 1978; Ferraz et al, 1990**). 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), one up to three indicated mild pain, four up to six indicated moderate pain, seven up to nine 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. It was 0.892 for the structured knowledge questionnaire. Hence, the tool is highly reliable.

Field work

Preparatory Phase

During this phase, official permissions to carry out the study were obtained from the director of antenatal clinic in the Obstetrics and Gynecology Center at Mansoura University Hospital. The researcher prepared data collection tools by reviewing the local and 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 (**Hinman, Smith, Quillen & Smith, 2015; RNV & VPR, 2016; Hayman, Reaburn, Alley, Cannon & Short, 2019**).

Pilot study

The Pilot study was conducted prior to data collection 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.

Implementation phase

- The researcher attended the previously mentioned setting three days per week until the calculated sample size was obtained. At the first interview: The researcher introduced herself to all the pregnant women who met the inclusion criteria, greeted them, and obtained

their informed consent to participate in the study after explanation of the aim. Before intervention, the researcher interviewed each pregnant woman individually for about 15 - 20 minutes to collect the general characteristics data and obstetric history 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: $BMI = \text{weight (kg)} / [\text{height (m)}]^2$. Moreover, the researcher assessed women's knowledge regarding sitting pelvic tilt exercise through the structured knowledge questionnaire. 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. The educational session was done by the researcher for a small group consisted of three to five pregnant women. The session included both theoretical and practical part. Firstly, the researcher explained the difference between LBP & PGP and their symptoms and definition, benefits, the position of sitting pelvic tilt exercise and precautions for exercising during pregnancy. Also, contraindications and danger signs to stop exercise and consult the physician were illustrated throughout the session. The researcher taught them how to perform the exercise and distributed an 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 from 2 to 3 times per day 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's knowledge about sitting pelvic tilt exercise immediately post intervention and after 2 weeks of the intervention.
- Moreover, the researcher reassessed the pregnant women by using the same NRS to evaluate the effect of sitting pelvic tilt exercise on the intensity of lumbopelvic pain after two weeks of the 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.

III. 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 one 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

EFFECT OF AN EDUCATIONAL SESSION REGARDING etc...

Table two 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): Comparison of pregnant women's correct knowledge regarding definition & benefits and positions of pelvic tilt exercise pre, immediate post intervention and after 2 weeks (n=70)

Pregnant women's correct knowledge regarding pelvic tilt exercise	Pre intervention		Immediate post intervention		2-weeks post intervention		Chi square test	
	No.	%	No.	%	No.	%	X2	p
Definition of pelvic tilt exercise	16	22.9	58	82.9	53	75.7	62.914	<0.001
Benefits of practicing pelvic tilt exercise during pregnancy #								
Decrease muscle spasm	21	30.0	59	84.3	50	71.4	47.775	<0.001
Improves spinal function	14	20.0	65	92.9	47	67.1	79.643	<0.001
Maintain abdominal muscle tone	12	17.1	63	90.0	54	77.1	89.354	<0.001
Maintain correct posture	6	8.6	58	82.9	45	64.3	83.817	<0.001
Improve circulation	8	11.4	54	77.1	48	68.6	71.629	<0.001
Decrease low back pain	39	55.7	56	80.0	52	74.3	10.748	<0.001
Positions for practicing pelvic tilt exercise #								
Standing	15	21.4	55	78.6	38	54.3	46.095	<0.001
Sitting	20	28.6	59	84.3	68	97.1	88.571	<0.001
Lying	41	58.6	55	78.6	61	87.1	15.950	<0.001
Kneeling	12	17.1	39	55.7	23	32.9	23.078	<0.001

#More than one answers is possible

() P value highly statistically significant if < 0.001**

Table three shows that there were highly statistically significant differences between pregnant women's correct knowledge pre, immediate post intervention and after two weeks of

intervention regarding definition of pelvic tilt exercise, benefits of practicing pelvic tilt exercise during pregnancy and positions for practicing pelvic tilt exercise.

Table (4): Comparison of pregnant women’s correct knowledge regarding precautions and contraindications of exercise and warning signs to stop pelvic tilt exercise pre, immediate post intervention and after two weeks of intervention (n=70)

Pregnant women’s correct knowledge regarding pelvic tilt exercise	Pre intervention		Immediate post intervention		2-weeks post intervention		Chi square test	
	No.	%	No.	%	No.	%	X2	p
Precautions for exercising during pregnancy #								
Wear loose fitting, and comfortable clothes	24	34.3	65	92.9	63	90.0	76.368	<0.001
Drink water before, during and after exercising	58	82.9	53	75.7	66	94.3	9.276	0.010
Choose a well-ventilated place away from high temperature	20	28.6	51	72.9	42	60.0	29.236	<0.001
Contraindications for exercises during pregnancy #								
Ruptured membranes	61	87.1	68	97.1	53	75.7	13.929	<0.001
Pre-term labor	21	30.0	60	85.7	52	74.3	52.208	<0.001
Placenta previa	4	5.7	62	88.6	60	85.7	129.048	<0.001
Pre-eclampsia.	14	20.0	54	77.1	39	55.7	46.684	<0.001
Gestational hypertension	8	11.4	60	85.7	57	81.4	101.077	<0.001
Incompetent cervix	13	18.6	63	90.0	35	50.0	72.007	<0.001
Warning signs to stop exercise and consult doctor #								
Amniotic fluid leakage	59	84.3	67	95.7	62	88.6	4.976	0.083
Vaginal bleeding	60	85.7	65	92.9	68	97.1	6.272	0.043
Excessive shortness of breath	7	10.0	65	92.9	58	82.9	121.437	<0.001
Chest pain	17	24.3	63	90.0	54	77.1	73.533	<0.001
Painful uterine contractions	49	70.0	63	90.0	63	90.0	13.440	<0.001

#More than one answers is possible

(**) P value highly statistically significant if < 0.001

Table four shows that there were highly statistically significant differences between the pregnant women’s correct knowledge pre, immediate post intervention and after 2 weeks of intervention regarding precautions of exercising during pregnancy such as wear loose fitting, and comfortable clothes - choose a well-ventilated place away from high temperature. Also, there

were highly statistically significant differences between pregnant women’s correct knowledge pre, immediate post intervention and after 2 weeks of intervention in relation to contraindications of exercises during pregnancy and warning signs to stop exercise when excessive shortness of breath -chest pain – painful uterine contractions.

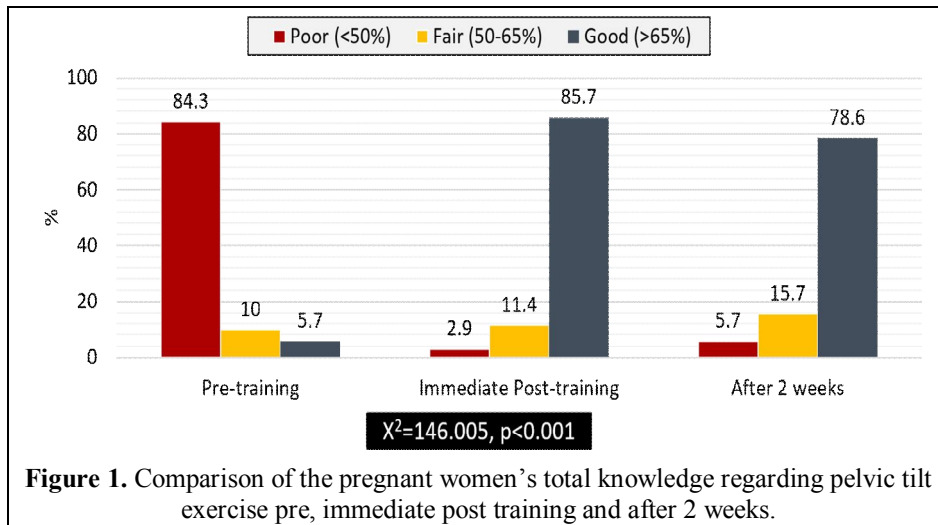


Figure 1. Comparison of the pregnant women's total knowledge regarding pelvic tilt exercise pre, immediate post training and after 2 weeks.

Table (5): 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 five 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.

IV. Discussion

Lumbopelvic pain is a common problem experienced during pregnancy. The present study aimed to evaluate the effect of an educational session regarding sitting pelvic tilt exercise on pregnant women's knowledge and intensity of lumbopelvic pain. The findings of the

present study achieved the study hypotheses and revealed that after implementing the educational session, the pregnant women exhibited improvement in the knowledge score regarding sitting pelvic tilt exercise and had less intensity of lumbopelvic pain than before the intervention.

The findings of the present study showed that more than three-quarters of the pregnant women had good knowledge after two weeks of intervention compared to only (5.7%) of them pre intervention with highly statistically significant difference. This improvement in the pregnant women's knowledge could be attributed to their

active participation and good communication with the researcher who helped them to acquire knowledge. Also, the well-designed colored brochure which made in a simple Arabic language helped the participants in acquiring knowledge regarding pelvic tilt exercise. To the best of our knowledge, this is the first study to assess pregnant women's knowledge regarding pelvic tilt exercise pre and post intervention

Regarding the knowledge of benefits of pelvic tilt exercise, the finding of the present study illustrated that pre intervention, more than half of the pregnant women knew that the exercise may decrease low back pain. This finding is in congruent with **Ali (2019)** who conducted a cross sectional study and revealed that nearly half of them agreed that it could help decrease low back pain. Also, the finding of this study is supported by another cross-sectional study conducted by **Nayak et al. (2015)** who revealed that more than half of the pregnant women agreed that exercise during pregnancy could help reduce LBP. Furthermore, a descriptive study conducted by **Sabiri, Olutende, Wabuyabo & Esther (2018)** in Kenya to assess the knowledge and attitude of 306 expectant mothers on the benefits of exercise during pregnancy and reported that nearly three-quarters of them agreed that the exercise may improve posture. On the other hand, another cross-sectional study conducted in South Africa by **Mahomed (2017)** which found that only 1.7% of the pregnant women agreed that the exercise can reduce the low back pain during pregnancy.

Regarding the contraindications of exercises during pregnancy, the present study findings demonstrated that pre intervention, more than one-quarter of the pregnant women knew that preterm

labor is one of the contraindications of exercises during pregnancy. Similarly, a cross-sectional descriptive study conducted by **Mbada et al. (2014)** to assess knowledge and attitude towards antenatal exercises on 189 Nigerian pregnant women. They found that less than one-quarter of them agreed that preterm labor is one of the contraindications of exercises during pregnancy. Reversely, a cross-sectional descriptive study conducted by **Sujindra et al. (2015)** reported that the majority of pregnant women knew that the preterm labor is one of the contraindications of exercises during pregnancy.

Concerning the lumbopelvic pain, the present study revealed that majority of the 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 prenatal clinic at King Chulalongkorn Memorial Hospital, 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 **Elkhesheh et al., (2016)** in Egypt to assess the effect of practicing pelvic rocking exercise on lowering disability level through decreasing lower back pain in late pregnancy among 100 primigravida women. They found that the pelvic tilt exercise had a significant effect on reducing disability through decreasing lower back pain in pregnant

women. Moreover, the present study findings 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 primigravida Indian women to evaluate effectiveness of sitting pelvic tilt exercise on low back pain and sleep disorder during the third trimester in primigravida. They reported that there was a significant difference in Intensity of low back pain through NRS pre and post intervention ($p < 0.01$). Additionally, a quasi-experimental supporting study conducted by **Kamali, Jafari & Zadeh (2009)** on 60 primigravidas in Iran to determine the effect of sitting pelvic tilt exercise on low back pain and sleep disorder during the third trimester in primigravidas. They reported that the intensity of low back pain in the intervention group post exercise program was significantly decreased than before ($P=0.0001$).

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.

V. Conclusion

Based on the present study findings, the educational session had significant effects in improving the pregnant women's knowledge regarding

sitting pelvic tilt exercise and reducing the intensity of lumbopelvic pain.

VI. Recommendation

- Distribution of a designed brochure about the sitting pelvic tilt exercise for all pregnant women who attended the antenatal clinics as a part of the routine antenatal care.
- Applying further research study to compare the pelvic tilt exercise in different positions for relieving LPP.

Acknowledgement

The researchers would like to thank all participants for their cooperation during the study.

Conflict of Interests

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

References

1. **Abu, M. A., Ghani, N. A. A., Shan, L. P., Sulaiman, A. S., Omar, M. H., Ariffin, M. H. M., & Man, Z. C. (2017)**. Do exercises improve back pain in pregnancy? *Hormone molecular biology and clinical investigation*, 32(3).
2. **Acharya, R. S., Tveter, A. T., Grotle, M., Eberhard-gran, M., & Stuge, B. (2019)**. *Prevalence and severity of low back- and pelvic girdle pain in pregnant Nepalese women*. 0, 1–11.
3. **Ali, Z. A. (2019)**. Knowledge, attitude, and practice of pregnant women toward antenatal physiotherapy in Al-Qurayyat: A cross-sectional study. *Drug Invention Today*, 12(11).
4. **Davies, G. A. L., Wolfe, L. A., Mottola, M. F., & MacKinnon, C. (2018)**. No. 129-Exercise in

- Pregnancy and the Postpartum Period. *Journal of Obstetrics and Gynaecology Canada*, 40(2), e58–e65.
5. **Deepthi, R., Ponmathi, P. & Sivakumar, V. (2016).** Does Sitting Pelvic Tilt Influence Quality of Pain in Low Back Pain and Quality of Sleep among Primigravida Indian Mothers. *Journal of Women's Health Care* 5: 333.
 6. **Downie, W. W., Leatham, P. A., Rhind, V. M., Wright, V., Branco, J. A., Anderson, J. A. (1978).** Studies with pain rating scales. *Annals of rheumatic diseases*, 37(4), 378-381.
 7. **Elkheshen, S. A., Mohamed, H. S., & Abdelgawad, H. A. (2016).** The Effect of Practicing Pelvic Rocking Exercise on Lowering Disability Level through Decreasing Pregnancy Related Lower Back Pain. *Journal of American Science*, 10(2), 197–206.
 8. **Gregg, V. H., & Ferguson, J. E. (2017).** Exercise in Pregnancy. *Clinics in Sports Medicine*, 36(4), 741–752.
 9. **Haakstad, L. A. H., & Bø, K. (2015).** Effect of a regular exercise programme on pelvic girdle and low back pain in previously inactive pregnant women: A randomized controlled trial. *Journal of Rehabilitation Medicine*, 47(3), 229–234.
 10. **Hayman, M., Reaburn, P., Alley, S., Cannon, S., & Short, C. (2019).** What exercise advice are women receiving from their healthcare practitioners during pregnancy? *Women and Birth*, 10–15.
 11. **Hinman, S. K., Smith, K. B., Quillen, D. M., & Smith, M. S. (2015).** *Exercise in Pregnancy: A Clinical Review*. 7(6), 527–531.
 12. **Jensen M. P. & McFarland C. A. (1993).** Increasing the reliability and validity of pain intensity measurement in chronic pain patients. *Pain*, 55(2), 195-203.
 13. **Kamali, S., Jafari, E., & Mazloom Zadeh, S. (2009).** The Effect of “Sitting Pelvic Tilt Exercise” on Low Back Pain and Sleep Disorder in Primigravidas During the Third Trimester. *Muq-Journal*, 3(3), 45–50.
 14. **Keskin, E. A., Onur, O., Keskin, H. L., Gumus, I. I., Kafali, H., & Turhan, N. (2012).** Transcutaneous electrical nerve stimulation improves low back pain during pregnancy. *Gynecologic and Obstetric Investigation*, 74(1), 76–83.
 15. **Kesikburun, S., Güzelküçük, Ü., Fidan, U., Demir, Y., Ergün, A., & Tan, A. K. (2018).** Musculoskeletal pain and symptoms in pregnancy: a descriptive study. *Therapeutic Advances in Musculoskeletal Disease*, 10(12), 229–234.
 16. **Kokic, I. S., Ivanisevic, M., Uremovic, M., Kokic, T., Pisot, R., & Simunic, B. (2017).** Effect of therapeutic exercises on pregnancy-related low back pain and pelvic girdle pain: secondary analysis of a randomized controlled trial. *Journal of rehabilitation medicine*, 49(3), 251-257.
 17. **Mahishale, A., & Borkar, S. S. (2016).** Determining the prevalence of patterns of pregnancy-induced pelvic girdle pain and low back pain in urban and rural populations: A cross-sectional study. *Journal of the Scientific Society*, 43(2), 70–74.
 18. **Mahomed, N. N. (2017).** *Knowledge and practices of pregnant women regarding exercise during pregnancy: a comparison between*
-

- private and public sector (Doctoral dissertation).
19. Mbada, C. E., Adebayo, O. E., Adeyemi, A. B., Arije, O. O., Dada, O. O., Akinwande, O. A., Awotidebe, T. O., & Alonge, I. A. (2014). *Knowledge and Attitude of Nigerian Pregnant Women towards Antenatal Exercise: A Cross-Sectional Survey. 2014.*
 20. Mirmolaei, S. T., Ansari, N. N., Mahmoudi, M., & Ranjbar, F. (2018). Efficacy of a physical training program on pregnancy related lumbopelvic pain. *International Journal of Women's Health and Reproduction Sciences*, 6(2), 161–166.
 21. Nayak, R., Paes, L., Gupta, C., Kumar, K. V., Narayan, A., Thunga, S., & Mithra, P. P. (2015). Knowledge, perception, and attitude of pregnant women towards the role of physical therapy in antenatal care-A cross sectional study. *Online Journal of Health and Allied Sciences*, 14(4), 6.
 22. Ramachandra, P., Maiya, A. G., Kumar, P., & Kamath, A. (2015). Prevalence of musculoskeletal dysfunctions among Indian pregnant women. *Journal of Pregnancy*, 2015.
 23. RNV, D., P, P., & VPR, S. (2016). Does Sitting Pelvic Tilt Influence Quality of Pain in Low Back Pain and Quality of Sleep among Primigravida Indian Mothers. *Journal of Women's Health Care*, 05(05).
 24. Sabiri, E., Olutende, O. M., Wabuyabo, I. K., & Esther, V. (2018). Knowledge of Prenatal Exercise among Expectant Women from Selected Health Facilities, Kakamega County, Kenya. *Journal of Physical Activity Research*, 3(1), 55-59.
 25. Sharaby, S. A., & Ellatef, M. A. B. A. (2019). *Effect of Self-Care Guidelines on Low Back Pain among Pregnant Women. 1(3)*, 144–153.
 26. Stafne, S. N., Salvesen, K. Å., Romundstad, P. R., Stuge, B., & Mørkved, S. (2012). Does regular exercise during pregnancy influence lumbopelvic pain? A randomized controlled trial. *Acta Obstetrica et Gynecologica Scandinavica*, 91(5), 552–559.
 27. Starzec, M., Truszczyńska-Baszak, A., Tarnowski, A., & Rongies, W. (2019). Pregnancy-Related Pelvic Girdle Pain in Polish and Norwegian Women. *Journal of Manipulative and Physiological Therapeutics*, 42(2), 117–124.
 28. Sujindra, E., Bupathy, A., Suganya, A., & Praveena, R. (2015). Knowledge, attitude, and practice of exercise during pregnancy among antenatal mothers. *International Journal of Educational and Psychological Research*, 1(3), 234.
 29. Suputtitada, A., Wacharapreechanont, T., & Chaisayan, P. (2002). Effect of the “sitting pelvic tilt exercise” during the third trimester in primigravidas on back pain. *Journal of the Medical Association of Thailand*, 85(1).
 30. Vermani, E., Mittal, R., & Weeks, A. (2010). *Pelvic Girdle Pain and Low Back Pain in Pregnancy: A Review.* 60–71.
 31. Wijesiriwardana, W. S., & Gunawardena, N. S. (2016). Knowledge, attitudes and practices regarding antenatal exercises among pregnant mothers attending De Soyza Maternity Hospital Colombo.

- Sri Lanka Journal of Obstetrics and Gynaecology*, 37(4).
32. **Zakaria, R., Tompunuh, M. M., & Porouw, H. S. (2019).** The Effect of Diaphragm Breathing Exercise To Lower Back Pain Changes of Pregnant Women in Tapa Public Health Center, Bone Bolango District. *Health Notions*, 3(2), 78–82.