



**REMODELING PREGNANCY EXERCISES WITH PELVIC ROCKING EXERCISE AS MANAGEMENT OF BACK PAIN IN PREGNANT WOMEN**

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**ABSTRACT**

The discomfort that often arises during the third trimester of pregnancy and is often complained of by pregnant women is back pain. Back pain in pregnant women can be treated with pregnancy exercises. In pregnancy exercises, the 5th movement, namely rocking back arches, can be continued with the Pelvic Rocking Exercise for optimal results. Objective: The aim of this study was to determine the effectiveness of remodeling pregnancy exercises using pelvic rocking exercise on back pain in pregnant women. Method: Quasi Experimental research method with pretest-posttest with control group design. The purposive sampling sample was 20 third trimester pregnant women with back pain, divided into 2 groups, namely the control group (pregnancy exercise only) and the intervention group (remodeling pregnancy exercise with pelvic rocking exercise). The instrument used was the Numerical Rating Scale pain scale observation sheet. Data analysis with a difference test between pre and post. Results: The results of the back pain scale for pregnant women in the control group after being given pregnancy exercises obtained an average of 11.71, while in the intervention group after being given remodeling pregnancy exercises with pelvic rocking exercise the average was 9.46. The results of data analysis using the Mann-Whitney U-Test showed a p value of  $0.001 \leq 0.05$ , which means the pain scale in the intervention group decreased more than the pain scale in the control group. Conclusion: Remodeling pregnancy exercise with pelvic rocking exercise is more effective in managing back pain in pregnant women.

Keywords: back pain; pelvic rocking exercise; pregnancy exercise

**How to cite (in APA style)**

Ifalahma, D., Yuliana, A., Bakkar, Z. A., Wargani, R. N., & Puspitasari, R. A. (2024). Remodeling Pregnancy Exercises with Pelvic Rocking Exercise as Management of Back Pain in Pregnant Women. *Indonesian Journal of Global Health Research*, 7(1), 107-116. <https://doi.org/10.37287/ijghr.v7i1.4124>.

**INTRODUCTION**

Pregnancy is a reproductive process that requires special care. Pregnancy risks are dynamic, because pregnant women who were initially normal can suddenly be at high risk. Pregnant women will experience physiological and psychological changes. The physiological changes that occur are often accompanied by a feeling of discomfort in pregnant women (Wulandari, 2019). The discomfort that often arises during the third trimester of pregnancy and is often complained of by pregnant women is back pain, especially in the lumbosacral area. Pain intensity tends to increase with increasing gestational age due to a shift in the center of gravity and changes in poor body posture, causing the body to stretch further and become more tired, especially in the lower back (Saptyani et al, 2020). Back pain can be a problem, making mothers emotionally and physically exhausted and interfering with daily physical activities including relaxation, concentration and social interaction (Usman et al., 2017). Back pain during pregnancy reaches its peak in the 24th to 28th weeks, just before abdominal growth reaches its maximum point. Back pain is often made worse by backache or what is often called "old back pain". This backache is found in 45% of pregnant women, increasing to 69% at 28 weeks and almost remaining at that level. The prevalence of pregnant women

experiencing lower back pain in various regions in Indonesia reaches 60-80%. The incidence of Low Back Pain in pregnant women was found to reach 68% (Kasmandra, 2020).

If low back pain is not treated immediately, it can result in long-term back pain. This can increase the risk of postpartum back pain and chronic low back pain, which require a long time to heal (Gau et al, 2021). In more severe stages, pain can radiate to the pelvic area, causing difficulty walking, and requiring the use of assistive devices. The negative impact of lower back pain on the quality of life of pregnant women includes interference with daily physical activities. Low back pain that is not treated properly in pregnant women can cause poor quality of life for the mother (Carvalho et al., 2017). Back pain in pregnant women can be treated with pharmacological and non-pharmacological therapy. The drugs that are often used are analgesics. However, pregnant women should not take just any medicine without a doctor's prescription. So it is very important to provide non-pharmacological therapy which is safer through drug-free activities, namely pregnancy exercises. Pregnancy exercise can relieve complaints of back pain because there are movements that strengthen the abdominal muscles, make the muscles and ligaments in the pelvis elastic. Pregnancy exercise is able to release endorphins in the body which functions as a sedative and can reduce back pain in pregnant women (Maria et al., 2021).

Pregnancy exercises to reduce back pain consist of 8 movements, namely cat back stretch, forward bend, trunk twist, rocking back arch, back press, seated side bend, lunge, triangle pose. This movement has been proven to reduce the intensity of back pain in pregnant women. Research that has been conducted on pregnancy exercise shows that the results of the pre-test and post-test in the control group were 50% moderate pain intensity and 42% severe pain, while in the intervention group 50% mild pain and 50% moderate pain. Based on statistical analysis, it was found that the p value was 0.001, meaning that pregnancy exercise was effective in reducing the intensity of back pain in pregnant women (Lestari, 2018). Another way to reduce back pain in pregnant women is by providing light exercise such as the Pelvic Rocking Exercise. The Pelvic Rocking Exercise mechanism will reduce pressure on the waist so that the lower back muscles stretch and relax. Providing Pelvic Rocking Exercise can help reduce muscle tension, improve body posture, and increase blood circulation in the body. This can result in a reduction in back pain felt by pregnant women. The intervention regarding pelvic rocking exercise for back pain in pregnant women was studied by Hutaosoit (2022) with a sample of 20 pregnant women in the third trimester with complaints of back pain. The test used is the Wilcoxon test with a significance level of 95%. Based on statistical tests, there is an effect of pelvic rocking on back pain in third trimester pregnant women ( $p = 0.001$ ). Conclusion: Pelvic rocking is a non-pharmacological therapy for treating back pain in third trimester pregnant women.

Apart from pregnant women, Pelvic Rocking Exercise is also beneficial for the fetus. Kanedi's research (2019) showed that in the intervention group the proportion of fetuses with a flexed position was higher ( $P < 0.001$ ) compared to the control group, 49.1% of the intervention group showed a longitudinal position compared to 29.8% of the control group ( $P < 0.001$ ), 56 of 57 intervention group showed cephalic presentation whereas only 45 of 57 control group showed the same presentation ( $P < 0.01$ ). Overall, it is suggested that the Pelvic Rocking Exercise is useful for maintaining the position, attitude of the fetus and presentation so it is worth recommending for pregnant women. In this study, the effectiveness of remodeling pregnancy exercise using pelvic rocking exercise on back pain in pregnant women was tested using an experimental method using a control group. The aim of this research is to determine

the effectiveness of remodeling pregnancy exercises with pelvic rocking exercise on back pain in pregnant women.

**METHOD**

Quasi Experimental research design with pretest-posttest with control group design. The independent variable is remodeling pregnant exercise with pelvic rocking exercise and the dependent variable is reducing back pain for pregnant women. Samples were taken by purposive sampling, namely 20 pregnant women in the third trimester with back pain in Ngadisono Joglo Village, Banjarsari, Surakarta. The sample was divided into 2 groups, namely 10 respondents in the control group (pregnancy exercise only) and 10 respondents in the intervention group (remodeling pregnancy exercise with pelvic rocking exercise). The instrument used was a pain scale observation sheet with a Numerical Rating Scale (NRS) which is a word description tool. Respondents rated pain on a scale of 0-10. On the pain scale, 0 means no pain, 1-3 is mild pain, 4-6 is moderate pain, 7-9 is controlled severe pain, and 10 is uncontrolled severe pain. This measuring instrument is a standard instrument so there is no need to carry out a validity test. The research stages consisted of 3 stages, namely stage I pretest before giving the intervention, stage II was giving the intervention, stage III was posttest after giving the intervention. In Phase II, interventions are given according to the group:

1. Control group with 8 movement pregnancy exercise interventions, namely cat back stretch, forward bend, trunk twist, rocking back arch, back press, seated side bend, lunge, triangle pose.
2. Intervention group with remodeling pregnancy exercises and pelvic rocking exercise with 9 movements, namely cat back stretch, forward bend, trunk twist, rocking back arch, pelvic rocking, back press, seated side bend, lunge, triangle pose.

The data analysis used is bivariate analysis, namely carrying out a difference test between pre and post. It is said that there is an influence if different test results show a p value  $\leq \alpha$  (0.05).

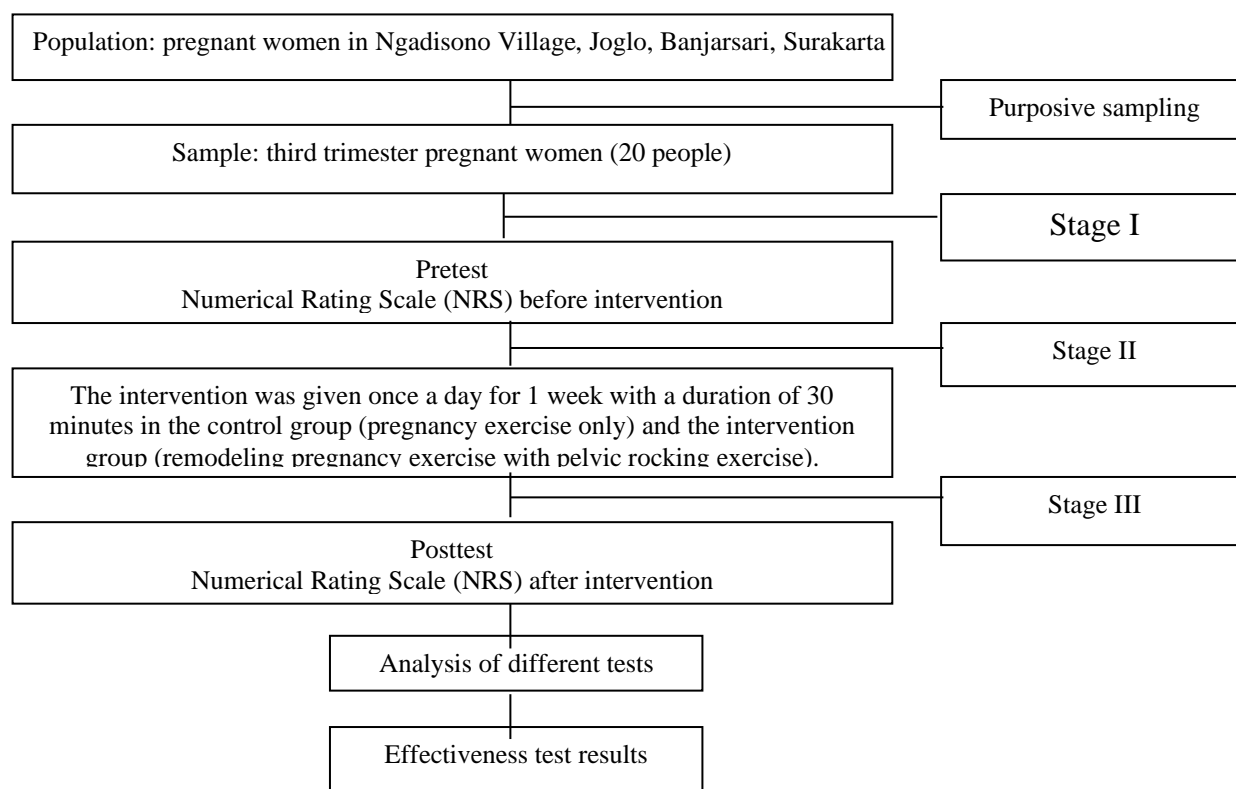


Figure 1. Flow of research implementation

**RESULTS**

Respondent characteristics

Table 1.  
 Characteristics of third trimester pregnant women with back pain in Ngadisono Joglo Village, Banjarsari, Surakarta

Characteristics	f	%
<b>Age</b>		
< 20 years	2	10,00
20 - 35 years	14	70,00
> 35 years	4	20,00
Amount	20	100,00
<b>Gestational Age</b>		
28 weeks	2	10,00
28-35 weeks	15	75,00
> 35 weeks	3	15,00
Amount	20	100,00
<b>Parity</b>		
Primigravida	5	25,00
Multigravida	15	75,00
Amount	20	100,00

Table 1 shows that the majority of pregnant women are aged 20 -35 years, the majority of pregnant women are 28-35 weeks old and the majority of pregnant women are multigravida.

Table 2.  
 Pre Test and Post Test Results of Back Pain Scale in Pregnant Women in the Control Group (Pregnancy Exercise)

Variable	Pain Scale	N	Percentase(%)	Mean	P value
Pre Test	No Pain	0	0,00	19,54	0,358
	Mild Pain	1	10,00		
	Moderate Pain	5	50,00		
	Controlled Severe Pain	4	40,00		
	Severe Uncontrolled Pain	0	0,00		
Amount		10	100,00		
Post Test	No Pain	0	0,00	11,71	
	Mild Pain	2	20,00		
	Moderate Pain	6	60,00		
	Controlled Severe Pain	2	20,00		
	Severe Uncontrolled Pain	0	0,00		
Amount		10	100,00		

Table 2 shows that the pre-test results of the control group before being given pregnancy exercises were 4 pregnant women with a back pain scale in the Controlled Severe Pain category and the post-test results of the control group after being given pregnancy exercises were 2 pregnant women with a back pain scale in the Controlled Severe Pain category.

Table 3.  
Results of Pre Test and Post Test of Back Pain Scale in Pregnant Women in the Intervention Group

Variable	Pain Scale	N	Percentase(%)	Mean	P value
Pre Test	No Pain	0	0,00	17,29	0,001
	Mild Pain	0	0,00		
	Moderate Pain	5	50,00		
	Controlled Severe Pain	5	50,00		
	Severe Uncontrolled Pain	0	0,00		
Amount		10	100,00		
Post Test	No Pain	0	0,00	9,46	
	Mild Pain	5	50,00		
	Moderate Pain	5	50,00		
	Controlled Severe Pain	0	0,00		
	Severe Uncontrolled Pain	0	0,00		
Amount		10	100,00		

Table 3 shows that the pre-test results of the intervention group before being given remodeling pregnancy exercises with pelvic rocking exercise, there were 5 pregnant women with a back pain scale in the Controlled Severe Pain category and the post-test results of the control group after being given remodeling pregnancy exercises with pelvic rocking exercise, there were no pregnant women with back pain scale in the Controlled Severe Pain category.

Table 4.  
Differences in Post Test Results of the Back Pain Scale in Pregnant Women in the Control Group and Intervention Group

Group	N	Mean Rank	Sum of Ranks	P value
Control Group Post Test	10	11,71	273,50	0,001
Intervention Group Post Test	10	9,46	132,50	

Table 4 shows that the back pain scale for pregnant women in the control group after being given pregnancy exercises was an average of 11.71, while in the intervention group after being given remodeling pregnancy exercises with pelvic rocking exercise the average was 9.46. The results of data analysis using the Mann-Whitney U-Test showed a p value of  $0.001 \leq 0.05$ , which means the pain scale in the intervention group decreased more than the pain scale in the control group. Remodeling pregnancy exercise with pelvic rocking exercise is more effective than pregnancy exercise in managing back pain in pregnant women.

## DISCUSSION

The results of the research show that the characteristics of the majority of pregnant women are 20-35 years old, the majority of pregnant women are 28-35 weeks old and the majority of pregnant women are multigravida. A woman's reproductive age for pregnancy is in the age range of 20-35 years. At this age, it is a safe age to give birth and fertility is at its peak. The third trimester of pregnancy starts from the 28th week. Lower back pain usually increases in intensity as gestational age increases, especially in the third trimester because this pain is the result of a shift in the woman's center of gravity and her body posture. Apart from that, it is also due to the increase in the mother's burden because the fetus is getting bigger. High parity will increase the risk of back pain. The more often a woman becomes pregnant and gives birth, the risk of back pain during pregnancy increases (Rose, 2018). Based on table 2, the pre-test results of the control group before being given pregnancy exercises, there were 4 pregnant women with back pain scales in the Controlled Severe Pain category and the post-test results of the control group after being given pregnancy exercises, there were 2 pregnant women with back pain scales in the Controlled Severe Pain category. This shows that pregnancy exercise

can reduce the scale of back pain in pregnant women, marked by a decrease in the number of pregnant women with a back pain scale in the Controlled Severe Pain category from previously 4 to 2. One way to improve health during pregnancy is to do light exercise such as gymnastics. pregnant. Pregnancy exercise is a form of exercise to strengthen and maintain the elasticity of the abdominal wall muscles, ligaments and pelvic floor muscles related to the birthing process. Pregnancy exercise can relieve back pain complaints felt by pregnant women because in pregnancy exercise there are movements that can strengthen the abdominal muscles (Backhausen et al., 2017).

Exercise can reduce various disorders that generally occur during pregnancy, such as the expansion of blood vessels (varicose veins), back pain and muscle and joint pain: increase stamina, which is very necessary during childbirth, and strengthen and tighten the muscles that are most affected by pregnancy: muscles pelvis, abdominal muscles and lumbar muscles. A good pregnancy exercise program can also improve body posture, due to the influence of the expanding uterus and stomach, causing the pelvic area to shift forward. Exercise movements to tighten the muscles of the buttocks, back, shoulders and stomach (Coulombe et al., 2017). Research conducted by Megasari (2015) on the relationship between pregnancy exercise and back pain in pregnant women with the results of his research shows that more than half (75%) of pregnant women who have never done pregnancy exercise experience back pain and all (100%) of pregnant women who often do pregnancy exercises without experiencing back pain. Table 3 shows that the pre-test results of the intervention group before being given remodeling pregnancy exercises with pelvic rocking exercise, there were 5 pregnant women with a back pain scale in the Controlled Severe Pain category and the post-test results of the control group after being given remodeling pregnancy exercises with pelvic rocking exercise, there were no pregnant women with back pain scale in the Controlled Severe Pain category.

This shows that pelvic rocking exercise is very effective in reducing the back pain scale in pregnant women, as evidenced by the decrease in the number of pregnant women with a back pain scale in the Controlled Severe Pain category from previously 5 to none at all who felt Controlled Severe Pain. Pelvic rocking is an effective way to relax the lower body, especially the pelvic area. This technique is often recommended during the third trimester of pregnancy until delivery to increase relaxation and allow gravity to help the baby travel through the birth canal (Haakstad, 2015). Pelvic rocking is highly recommended for pregnant women who complain of back pain, especially before delivery. Pelvic rocking can help tighten the muscles and ligaments that support the body's internal organs. In addition, pelvic rocking can help relieve muscle tension, improve body posture and increase blood circulation, thereby reducing the pain felt by pregnant women. Pelvic rocking can be done in a standing position, lying on your back or side, sitting, or in a half-squatting position on your hands and knees. This exercise is also accompanied by relaxation techniques which can produce endorphin hormones, causing a feeling of comfort (Djupri et al, 2022).

Pelvic rocking exercise therapy is an effective way to relax the lower body, especially the pelvic area. This is often recommended during the third trimester of pregnancy until delivery to increase relaxation and eliminate the feeling of the weight of the baby through the birth canal (Lestari et al, 2021). Providing pelvic rocking exercises is very effective in reducing the intensity of back pain in pregnant women because the Pelvic Rocking Exercise mechanism when the hips and waist are rotated means that at that time there will be a reduction in pressure on the waist so that the back muscles experience stretching and relaxation (Surtiningsih et al., 2020). Purnani (2015) research on pelvic rocking on reducing back pain in

third trimester pregnant women concluded that there was an influence of the pelvic rocking technique on reducing back pain in third trimester pregnant women. Research conducted by Sa'adah et al., (2023) showed that the results of the Wilcoxon Signed Ranks Test p value were  $0.000 < 0.05$ , meaning there was a difference in lower back pain in third trimester pregnant women before and after the pelvic rocking exercise intervention. Pelvic rocking exercise has an effect on reducing lower back pain in third trimester pregnant women.

Table 4 shows that the back pain scale for pregnant women in the control group after being given pregnancy exercises was obtained on average 11.71, while in the intervention group after being given remodeling pregnancy exercises with pelvic rocking exercise the average was 9.46. The results of data analysis using the Mann-Whitney U-Test showed a p value of  $0.001 \leq 0.05$ , which means the pain scale in the intervention group decreased more than the pain scale in the control group. Remodeling pregnancy exercise with pelvic rocking exercise is more effective than pregnancy exercise in managing back pain in pregnant women. Pregnancy exercises that are done regularly can reduce back pain because the movements contained in pregnancy exercises can strengthen the abdominal muscles thereby preventing excessive tension on the pelvic ligaments so that the intensity of back pain is reduced (Liddle & Pennick 2015). Apart from that, doing pregnancy exercises can release endorphins in the body, where the function of endorphins is as a sedative and can reduce back pain in pregnant women (Kokic et al., 2017).

Pelvic rocking exercises can help stretch or stretch the muscles and pelvic joints, thereby reducing muscle tension and reducing pain intensity (Marwiyah & Pusporini, 2017). Apart from that, movements carried out by crawling or standing can reduce the pressure of the fetal head on the pelvic joints so that the intensity of pain felt by pregnant women is reduced by doing this exercise. This exercise is also accompanied by relaxation techniques through breathing exercises and focusing on attention which is very useful in calming the mother's mind and body through the production of endorphin hormones so that it can create a feeling of comfort (Huda et al, 2023). This research is in line with research by Dian et al (2022) on the effects of pelvic rocking on back pain in pregnant women who concluded that pelvic rocking can be used as an alternative technique to relieve back pain.

Pelvic Rocking Exercise is good to do together with pregnancy exercises. In pregnancy exercises, the 5th movement, namely rocking back arches, can be continued with the Pelvic Rocking Exercise for optimal results. This fifth movement is related to stretching and strengthening the back muscles so as to reduce the intensity of back pain felt by pregnant women. This movement is accompanied by relaxation techniques that can produce endorphins and can create a feeling of comfort. Pelvic Rocking Exercise is a light movement that is recommended to reduce back pain for pregnant women. It can also be used to help lower the baby's head into the pelvic cavity towards the birth canal so that the birth process runs smoothly. So it is very good if pregnancy exercise is combined with Pelvic Rocking Exercise. Efforts to reduce back pain in pregnant women require effective, safe and comfortable methods. This is done by considering the health of the pregnant woman and the fetus in the womb. Effective, safe and comfortable efforts can be made by remodeling pregnancy exercises with pelvic rocking exercises. This remodeling involves providing pregnancy exercise training intervention through 8 movements where the 5th movement is rocking back arch followed by the Pelvic Rocking Exercise as the 6th movement so that the number of pregnancy exercise movements becomes 9 steps. This is aimed at optimizing the reduction in the intensity of back pain felt by pregnant women. Apart from that, pregnancy exercises and

Pelvic Rocking Exercise are safe and comfortable for pregnant women because they are exercise therapy and exercises without the use of drugs.

## **CONCLUSION**

The back pain scale of pregnant women who were given remodeling pregnancy exercises with pelvic rocking exercise decreased more than the back pain scale of pregnant women who were given pregnancy exercises alone. Remodeling pregnancy exercise with pelvic rocking exercise is more effective than pregnancy exercise in managing back pain in pregnant women.

## **REFERENCES**

- Backhausen M. G., A. Tabor, H. Albert, S. Rosthoj, P. Damm, and H. K. Hegaard. (2017). The effects of an unsupervised water exercise program on low back pain and sick leave among healthy pregnant women – A randomised controlled trial. *PLoS One*, vol. 12, no. 9, pp. 1–16, doi: 10.1371/journal.pone.0182114.
- Carvalho M. E. C. C. et al. (2017). Low back pain during pregnancy. *Brazilian J. Anesthesiol.*, vol. 67, no. 3, pp. 266–270, doi: 10.1016/j.bjan.2016.03.002.
- Coulombe BJ, Games KE, Neil ER, et al. (2017). Core stability exercise versus general exercise for chronic low back pain. *J Athl Train*;52:71–2.
- Dian Juni Ekasari, Prasida Yunita, & Rachmawati Abdul Hafid. (2022). Pengaruh Pemberian Pelvic Rocking Exercise Terhadap Penurunan Nyeri Punggung Bawah Pada Ibu Hamil. *Zona Kebidanan: Program Studi Kebidanan Universitas Batam*, 12(3). <https://103.124.199.146/index.php/zonabidan/article/view/1048>
- Djupri, D.R., Said, I., Irawati, H.R. & Manggabarani, S. (2022). The Effect of Pelvic Rocking Exercise and Buteyko Exercise on Reducing Primary Dysmenorrhea Pain Levels. *Jurnal Keperawatan Padjadjaran*, 10(1), 22-26. <http://dx.doi.org/10.24198/jkp.v10i1.1938>
- Gau, M. L., Chang, C. Y., Tian, S. H., & Lin, K. C. (2021). Effects of birth ball exercise on pain and selfefficacy during childbirth: a randomised controlled trial in Taiwan. *Midwifery*, 27(6), e293- e300.
- Haakstad LA, Bo K. (2015). Effect of a regular exercise programme on pelvic girdle and low back pain in previously inactive pregnant women: a randomized controlled trial. *J Rehabil Med*;47:229–34.
- Huda Rohmawati, Weni Tri Purnani, Dessy Lutfiasari, & Agung Nugroho Widhi. (2023). The Effect of Pelvic Rocking on Back Pain Intensity in Third Trimester Pregnant Women. *Journal of Global Research in Public Health*, 8(1), 85–88. <https://doi.org/10.30994/jgrph.v8i1.430>
- Hutaosoit ES, Yessi Azwar , Deby Yanthina , Novi Yanti, Donny Hendra, Siska Mulyani. (2022). Pengaruh Pelvic Rocking Terhadap Penurunan Intensitas Nyeri Trimester II. *Health Care : Jurnal Kesehatan* 11 (1) Juni.
- Kanedi, M. (2019). Effect of Pelvic Rocking Exercise Using the Birth Ball on Fetal Lie, Attitude, and Presentation. *International Journal of Women’s Health and Reproduction Sciences* Vol. 7, No. 4, October 2019, 461–466, 7 (4). pp. 461-466. ISSN 2330-4456



- Kasmandra. (2020). Efektivitas Pelvic Tilt Exercise Terhadap Penurunan Nyeri Punggung Pada Ibu Hamil Trimester III di PMB Husniyati dan PMB Ria Tisnawati Kota Palembang. *Jurnal Kebidanan*. Vol..3 No. 4.
- Kokic IS, Ivanisevic M, Uremovic M, et al. (2017). Effect of therapeutic exercises on pregnancy-related low back pain and pelvic girdle pain: Secondary analysis of a randomized controlled trial. *J Rehabil Med*;49:251–7.
- Lestari Puji Astuti, Puji Siswanti, Durrotun Munafiah, Saadah Mujahidah. (2021). Effectiveness of Pelvic Rocking and Gym Ball Exercise Against of Duration of Labor in the First Stage. *Proceedings of the 1st Paris Van Java International Seminar on Health, Economics, Social Science and Humanities (PVJ-ISHESSH)*, 10.2991/assehr.k.210304.155
- Lestari. (2018). Perbedaan Gerakan Goyang Panggul Ke Kanan-Kiri, Ke Depanbelakang Dan Utar Menggunakan Bola Kelahiran Terhadap Kadar Betaendorphin Di Puskesmas. *Jurnal Kebidanan*. Vol..3 No. 4.
- Liddle SD, Pennick V. (2015). Interventions for preventing and treating low-back and pelvic pain during pregnancy. *Cochrane Database Syst Rev*;30:1–16.
- Maria Margarida Ribeiro, Ana Andrade and Inês Nunes. (2021). Physical exercise in pregnancy: benefits, risks and prescription. *Journal of Perinatal Medicine*. <https://doi.org/10.1515/jpm-2021-0315>
- Marwiyah N, L. S. Pusporini. (2017). Package of Birthing Ball, Pelvic Rocking, and Endorphin Massage Decrease the First Step Labor Pain,” *Indones. Nurs. J. Educ. Clin.*, vol. 2, no. 1, p. 65, doi: 10.24990/injec.v2i1.124.
- Megasari M. (2015). Relationship Between Pregnancy Exercises and Low Back Pain Issue For Pregnant Women at Their Third Quarter Period of Pregnancy. *J Keskom*. Nov. 1;3(1):17-20. Available from: <https://jurnal.htp.ac.id/index.php/keskom/article/view/95>
- Purnani, W.T. (2015). Pelvic Rocking Terhadap Penurunan Nyeri Punggung Pada Ibu Hamil Trimester III Di Puskesmas Blabak Kediri. *Jurnal Kebidanan*. No. 5 Vol. 1.
- Rose Neil W. (2018). *Panduan Lengkap : Perawatan Kehamilan*. Jakarta, ID: Dian Rakyat, pp. 88-9
- Sa’adah, A., Sulistiyaningsih, S., & Marfu’ah, S. (2023). Pelvic Rocking Exercise untuk Penurunan Nyeri Punggung Bawah pada Ibu Hamil Trimester III . *Professional Health Journal*, 4(2sp), 312-321. <https://doi.org/10.54832/phj.v4i2sp.513>
- Saptyani P. M., A. Suwondo, and R. Runjati. (2020). Utilization of Back Movement Technique to Intensity of Low Back Pain in Third Trimester Pregnant Women. *Str. J. Ilm. Kesehat.*, vol. 9, no. 2, pp. 535–542, doi: 10.30994/sjik.v9i2.335.
- Surtiningsih, Linda Yanti, Wilis Sukmaningtyas. (2020). The Effectiveness of Pelvic Rocking Exercises on the Length of Time of the First and the Second Stage of Labor. *Proceedings of the 1st International Conference on Community Health (ICCH)*. 10.2991/ahsr.k.200204.028

Usman M.I, M. K. Abubakar, S. Muhammad, A. Rabi, and I. Garba. (2017). Low back pain in pregnant women attending antenatal clinic: The Aminu Kano teaching hospital experience. *Ann. Afr. Med.*, vol. 16, no. 3, pp. 136–140, doi: 10.4103/aam.aam\_214\_16.

Wulandari. (2019). Manajemen Asuhan Kebidanan ibu hamil Di Rsud Syekh Yusuf Gowa, *Jurnal Midwifery*, 2(2), pp. 78–84.