

SYSTEMATIC REVIEW

The Effect of Pregnancy Exercise to Reduce Lower Back Pain Complaints Among Trimester III Primigravida Woman

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ABSTRACT

Introduction: Pregnancy exercise is a series of body movements carried out by pregnant women to train fitness and strengthen muscles with the aim of naturally secreting endorphin hormones. Endorphin hormones provide a relaxing sensation and reduce complaints of pain during pregnancy and childbirth. The aim of the research is to describe the intensity of pain before and after pregnancy exercise in pregnant women in the third trimester. However, data from studies investigating exercise and the quality of life of pregnant women are inconsistent and, to date. **Methods:** In this literature review is to search several articles via Pubmed, Proquest, Scopus, Science direct, Google Scholar. Clinical trials published in English and Indonesian evaluating the impact of pregnancy exercise on pain intensity during pregnancy. **Results:** Ten studies were involved. Exercise was divided into two methods of pregnancy exercise training, and Correct posture for back care during pregnancy. The combination of pregnancy exercise training and resistance or correct posture has various impacts on the quality of life of pregnant women. This systematic review is the first to show that combined exercise group-based pregnancy exercise or physical activity is associated with significant benefits related to improving the quality of life of pregnant women. Apart from that, pregnancy exercise or resistance training has the potential to improve the quality of life of pregnant women. **Conclusion:** That medical service providers pay more attention to the importance of exercise, and develop tailored exercise programs to encourage improvements in the quality of life of pregnant women *Malaysian Journal of Medicine and Health Sciences* (2025) 21(SUPP3): 175-181. doi:10.47836/mjmhsc.21.s3.27

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INTRODUCTION

A woman's physiological adaptation during pregnancy often causes problems due to the complaints she experiences. In pregnant women entering the third trimester, they will experience various complaints such as anxiety and pain, these are various problems felt by pregnant women from a psychological perspective. Pain in pregnant women is a condition experienced by many pregnant women and causes problems for mothers during their pregnancy (1).

Pain complaints in pregnant So, in terms of quality of life, women will experience various impacts of pregnant women because of the frequent pain complaints they feel (2). Complaints of pain felt by pregnant women affect

the need for sleep and emotional disturbances, several studies state that pain during the pregnancy period influences neurological disorders, sleep disorders and disorders of defecation and urination (3). Lower back pain is a common complaint in pregnant women which is reported to occur in 60%-90% of pregnant women. This complaint occurs during the pregnancy process from physical changes that are felt, increasing body size, increasing body weight, to increasing body weight due to the growth of the intrauterine fetus (2). There are several complaints that are often reported by pregnant women, among these reports is the pain they experience during the pregnancy process. Research results show that 50% to 70% of complaints reported by pregnant women as acute pain that is handled poorly will increase the risk of pain that pregnant women can feel continuously. thereby reducing a better quality of life and increasing the more curatively useful health services (4). Even though the incidence of pain in pregnant women is quite high, there are still many pregnant women who are unable to manage pain during pregnancy. In particular,

pain felt especially in the second and third trimesters is one of the problems that often occurs and must be faced by women in every pregnancy (5). In fact, at the International Society for the Study of Pain forum, pain is a very complex problem which is defined as “a very unpleasant sensory and emotional experience resulting from actual and potential tissue damage (4). During the pregnancy process, various physiological changes occur, such as stress caused by excessive anxiety, to fear resulting from the pain felt (3). Changes in the supporting and connecting soft tissues cause pain in the lower back, this pain is caused by hormonal changes felt by pregnant women when entering the third trimester, causing a reduction in muscle elasticity and flexibility. Lower back pain (lumbar pain) is back pain that occurs in the lumbosacral area. Lower back pain often occurs in pregnant women and will increase in intensity as pregnancy progresses. Pain in pregnancy is caused by changes in the center of gravity and body posture of the pregnant woman. Based on previous research, as many as 50% complained of moderate lower back pain and complained of pain in both legs during pregnancy (6).

Complaints of pain during pregnancy in the second and third trimesters have been felt by 60-80% of pregnant women in Indonesia. Pain such as low back pain felt by pregnant women in the third trimester, causing discomfort is one of the physical and psychological changes experienced by pregnant women during their pregnancy (3). Addressing the causes of these problems requires a quality approach from the pregnancy planning stage to delivery. Pregnancy exercise is one of the efforts that can be done by pregnant women, because this exercise can help them to reduce the back pain they feel during their pregnancy (7). The importance of pregnancy exercise can be useful in reducing stiffness and joint pain due to the increased burden of pregnant women. Pregnancy exercise can help reduce stress during labor, reduce labor pain, reduce premature labor, reduce the risk of Caesarean section (8). However, not all pregnant women understand the importance of physical exercise for their health during pregnancy and childbirth (9). The results of the study stated that physical exercise was proven to help pregnant women reduce complaints of back pain, anxiety and increase muscle relaxation and improve the quality of rest in pregnant women. One effort that can be made to reduce pain during pregnancy, especially in the third trimester, is by doing pregnancy exercises or prenatal exercises (10). Pregnancy exercise is very necessary for every pregnant woman because pregnancy exercise can help the body's stamina and reduce pain during pregnancy (4). However, many pregnant women do not do pregnancy exercise because of excessive fear of doing physical activity during pregnancy, the perception of pregnant women that the pregnancy exercise they do can harm the fetus in their womb. Apart from that, the problem that is a priority is the low participation of pregnant women in taking part in pregnancy exercise due to the lack of knowledge of

pregnant women about the benefits of pregnancy exercise (11). One form of health service to improve the health status of pregnant women and to reduce complaints during pregnancy, several effective health interventions are antenatal services in the form of pregnancy exercises. Prenatal exercise or pregnancy exercise is physical exercise that must be carried out by pregnant women as a form of prenatal service for pregnant women to help mothers adapt to the physiological changes that occur due to the enlargement of the fetus through movement and muscle relaxation, thereby helping the mother feel more comfortable and reduce pain. due to changes in body shape, strengthening and maintaining the elasticity of the abdominal wall muscles, thereby preventing or reducing pain during pregnancy (9).

Pregnancy exercise is a series of body movements carried out by pregnant women to train fitness and strengthen muscles with the aim of naturally secreting endorphin hormones. Endorphin hormones provide a relaxing sensation and reduce complaints of pain during pregnancy and childbirth. Pregnancy exercise involves the parasympathetic nervous system which functions to suppress the production of the hormone epinephrine (adrenaline) and secrete the hormone norepinephrine so that pregnant women are more relaxed. Pregnancy exercise consists of breathing exercises and muscle relaxation so that pain in pregnant women is reduced and helps provide a sense of comfort. The relaxation carried out in pregnancy exercises will reduce pain, anxiety and fear that arise during pregnancy. Pregnancy exercise also produces the secretion of the hormone enkephalin. The enkephalin hormone works with the endorphin hormone as an inhibitor of pain transmission which can reduce pain during pregnancy (12). Pregnancy exercise is effective in reducing pain and helping pregnant women feel relaxed if done regularly (13). Research results state that pregnant women who participate in pregnancy exercises regularly and intensively will improve the health of the mother and fetus in the womb and help reduce complaints during pregnancy (11,14,15). Practicing pregnancy exercises during pregnancy can help train breathing and help pregnant women feel relaxed, making it easier for mothers to adapt to body changes during pregnancy (14).

MATERIALS AND METHODS

This research design uses a systematic review by strategy combines data from multiple sources of the study to provide new integrated results or conclusions, or the investigation can gather different kinds of evidence to investigate or clarify meaning. This method begins with an analysis of the phenomenon of pain in pregnant women in the third trimester and then synthesizes it using pregnancy exercises. The database used in compiling the literature review uses several articles obtained from searches of Pubmed, Proquest, Scopus, Science Direct, and Google Scholar with the article search keyword

using the words pregnancy exercise, pain in pregnant women in the third trimester, from 2018 to 2023. The study screening flow diagram can be seen in (Figure 1).

RESULTS

Criteria Inclusion in the search This literature source includes: articles that examine pregnancy exercise for pain in pregnant women in the third trimester, articles available in English or Indonesian, articles available in full text, articles published between 2018-2023, and in the form of research articles/articles original. Research articles reviewed by researchers are briefly described (Table I).

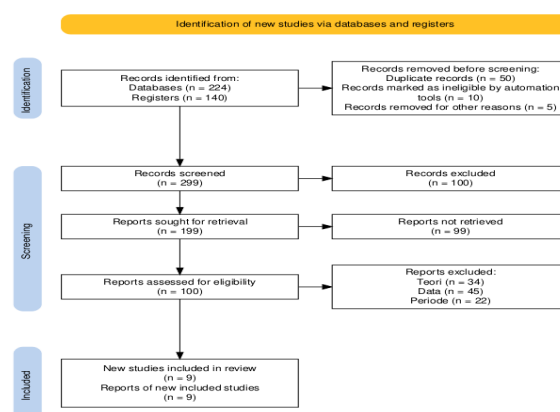


Figure 1 : Flow diagram of study screening

Table I: Characteristics of included studies.

Writer's name	Research Title	Year	Research methods	Results	Conclusion
Sahar Mansour La-madah, Afaf Hassan Ahmad, Manal H. Abo El Maged, Abeer Hassan Shamekh	Effect of Progressive Muscle Relaxation during Pregnancy on Low Back Pain and Quality of Woman's life	2021	At the Sahala Obstetric and Gynecologic Center and the Salah Abd-Rabo Obstetric and Gynecological Clinic in Alexandria, Egypt, a quasi-experimental study design was used.	Participants in the study group experienced a substantial decrease in pain intensity at two months ($p < 0.05$), whereas those in the control group saw an increase in pain intensity at the same time. Furthermore, after two months, the study group's quality of life significantly improved compared to the control group in every category ($p < 0.05$).	The results of this study indicate that low back discomfort was common among expectant mothers. The results also lend credence to the researchers' theories and offer compelling proof that progressive muscle relaxation techniques can reduce low back pain and improve pregnant women's quality of life.
Nadia Mahmoud Mohamed Mahmoud, Assistant lecturer, Niven Rizk Mohamed, Professor, Isis Emile Mikheal, Assistant Professor	Effect of Foot Reflexology on Low Back Pain Intensity and Functional Abilities Among Pregnant Women	2023	Quasi Experimental Non-Equivalent Control Design Group with Pretest and Posttest	The results showed a very statistically significant difference between the groups studied in relation to the level of pain after the intervention where ($P = < 0.001$). *) .With regard to their functional abilities, statistically significant differences were found between control and study group after intervention where $p = < 0.001$.	Pregnant women undergoing a foot reflexology massage course experienced a significant reduction in the intensity of lower back pain & increased functional ability.
Hamed Mamipour, Samira Farazmehr, Hossein Negahban, Salman Nazary-Moghadam, Farideh Dehghan-Maneshadi, Mozhdeh Navi Nezhad, Sarah Jafari, Masoumeh Sharifzadeh	Effect of Core Stabilization Exercises on Pain, Functional Disability, and Quality of Life in Pregnant Women With Lumbar and Pelvic Girdle Pain: A Randomized Controlled Trial	2023	Blinded outcome assessors were used in this randomized controlled experiment with a repeated-measures design. From prenatal healthcare practitioners, 35 pregnant women experiencing LPG pain were selected. For ten weeks, they were divided into two study groups and given either standard prenatal care	All outcome indicators, with the exception of the Social category ($P = .18$) on the WHOQOL-BREF questionnaire, showed a statistically significant interaction between group and time. With the exception of the Environment category (end of pregnancy: $P = .36$; 6-week follow-up: $P = .75$) on the WHOQOL-BREF questionnaire, the group within time analysis revealed that the exercise group's mean scores had significantly improved at the post-intervention, end of pregnancy, and 6-week follow-up evaluations.	According to the study's findings, pregnant women with LPG discomfort saw better pain alleviation, improved impairment, and an overall higher quality of life when core stability exercises were added to their regular care.

CONTINUE

Table I: Characteristics of included studies. (CONT.)

Writer's name	Research Title	Year	Research methods	Results	Conclusion
Njoku Isaac Omoke, Peace Ifeoma Amaraeg- bulam, Odidika Ugochukwu Joannes Umeora, Love Chimezirim Okafor	Prevalence and risk factors for low back pain during pregnancy among women in Abakaliki, Nigeria	2021	this was a cross-sectional study carried out among pregnant women women admitted into the Labor Ward of Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Nigeria over a period of 8 months. They were interviewed within 2 to 7 days postpartum with a questionnaire. Socio-demographic and obstetrics characteristics as well as LBP intensity, features and associated factors were evaluated. Significant factors for LBP that emerged from the univariable analysis were entered into multivariable regression analysis to evaluate the risk of each factor when adjusted to other factors	of the 478 women interviewed, 138 (28.9%) of them (95% CI 25.1-33.1) reported LBP in the index pregnancy. The onset of pain was predominantly in the third trimester and the mean pain intensity was 4.3 ± 1.36 . In the univariable analysis, six factors were significantly associated with LBP. Logistic regression analysis identified LBP in previous pregnancy (aOR: 24.76, (95% CI 6.88- 89.11); $p < 0.001$), macrosomia (aOR: 4.15(95% CI 2.05-8.42); $p < 0.001$) and absence of domestic help (aOR: 0.50(95% CI 0.31-0.82); $p = 0.006$) as independent risk factors for LBP during pregnancy among the women.	Conclusion: in this study, LBP during pregnancy is within worldwide range and predominantly mild to moderate in intensity. The independent risk factors identified call for high priorities accorded to women with these factors in measures aimed at addressing LBP during pregnancy.
Siti Mutoharoh , Dyah Puji Astuti , Kusumastuti , Wulan Rahmadhani , Phan Trieu Phu MD	The Effective- ness Of Preg- nancy Exercise With Kinesio Taping On Lower Back Pain In Preg- nant Women In The Third Trimester	2021	QuasiExperimental Non-Equiva- lent Control Design Group with Pretest and Posttest	The research results show that pregnancy exercise with the addition of Kinesio taping has a significant effect on reducing pain lower back in third trimester pregnant women as shown by a P value of 0.001.	Exercise Pregnancy with the addi- tion of Kinesio taping can reduce pain in the lower back. to mother third trimester of pregnancy.
Margie H Daven- port, Andree-Anne Marchand, Mi- chelle F Mottola, Veronica J Poitras, Casey E Gray, Alejandra Jaramillo Garcia, Nick Bar- rowman, Frances Sobierajski, Marina James,1 Victoria L Meah, Rachel J Skow, Laurel Riske,1 Megan Nuspl, Taniya S Nagpal, Anne Courbalay, Linda G Slater, Kristi B Adamo, Gregory A Davies, Ruben Barakat, Stephe- nie-May Ruchat	Exercise for the prevention and treatment of low back, pelvic girdle and lumbopel- vic pain during pregnancy: a systematic re- view and me- ta-analysis	2018	QuasiExperimental Non-Equiva- lent Control Design Group with Pretest and Posttest	The analyses included data from 32 studies (n=52 297 pregnant women). 'Very low' to 'moderate' quality evidence from 13 randomised controlled trials (RCTs) showed prenatal exercise did not reduce the odds of suffering from LBP, PGP and LBPP either in pregnancy or the postpartum period. However, 'very low' to 'moderate' quality evidence from 15 RCTs identified lower pain severity during pregnancy and the early postpartum period in women who exercised during pregnancy (standardised mean difference -1.03, 95%CI -1.58, -0.48) compared with those who did not exercise. These findings were supported by 'very low' quality evidence from other study designs	Compared with not exer- cising, prenatal exercise decreased the severity of LBP, PGP or LBPP during and following pregnancy but did not decrease the odds of any of these con- ditions at any time point
Triwik Sri Mulati, Tri Wahyuni , Kuswati Kuswati , Dewi Susilowati	Factors That Affect Back Pain In Second And Third Trimester Preg- nant Women	2022	This research was a cross sec- tional design. The sample was 30 pregnant women in the 2nd and 3rd trimesters experiencing back pain determined by using the total population sampling technique with the following inclusion and exclusion criteria. Back pain felt by pregnant women was stated in filling out a questionnaire with a pain instrument, namely the Numeric Rating Scale. The data were analyzed by statistical Odds Ratio Test.	The result of data analysis between pregnancy back pain with several factors are as follows: the OR value of mother age factor was 0.464. The OR value of gestational age factor was 0.571. The occupation's OR value was 0.762. The parity's OR value was 0.242. The reli- gion's OR value was 0.464. The OR value of gender was 1.000. The OR value of history of lifting heavy objects was 1.833. The OR value of history of excessive bending was 13.000. The yoga exercise's OR value was 0.143.	History of excessive bending has the greatest risk of back pain in preg- nant women.

CONTINUE

Tabel I: Characteristics of included studies. (CONT.)

Writer's name	Research Title	Year	Research methods	Results	Conclusion
Aminatur Rofiah SST, Desa Sepanyul,	The Effect Of Pregnancy Exercises On Reducing Back Pain	2019	This type of research is pre experimental with one group pretest posttest design. The population of this study were all pregnant women of trimester II and III who practically 35 pregnant women. The sampling technique uses total sampling. Independent pregnancy variable variables and dependent variable decrease in lower back pain. Research instrument used. Data processing using editing, coding, scoring, tabulating with Rank Spearman data analysis. T	shows that before carrying out pregnancy exercise, the majority of respondents experienced lower back pain with a scale of 4 (very painful) as many as 19 respondents (54.3%), Meanwhile, after carrying out pregnancy exercises, the majority of respondents experienced pain lower back with a scale of 3 (more painful) as many as 22 respondents (62.9%). Statistic test Spearman Rank shows r value = $0.000 < \pm (0.05)$ so H_1 is accepted.	There is an effect of pregnancy exercise on reducing lower back pain in second and third trimester pregnant women.
Lina Fitriani	Down In Pregnant Women In The II And III Trimester The Effectiveness Of Pregnancy Exercises And Pregnancy Yoga Decreasing Back Pain In 3rd Trimester Pregnant Women Pekabata Health Center	2018	QuasiExperimental Non-Equivalent Control Design Group with Pretest and Posttest	Research shows where there was a decrease in the pain scale before and after complete pregnancy exercise the average value of decline is 26 and p.value 0.000 which means H_0 rejected means there is a relationship meaning between pregnant women whodo pregnancy exercises with decreased back pain meaning H_0 is rejected meaning there is a meaningful relationship among pregnant women who do yogapregnant with reduced pain back.	nam pregnant effective in reduces lower back pain in third trimester pregnant women seen from pre-test to post-test results decreased with results.

DISCUSSION

This research is the first to systematically investigate the impact of Pregnancy exercise resistance training or PA on the quality of life of pregnant women. Ten studies were included and analyzed. One in three studies reported that exercise pregnancies significantly improve the quality of life of pregnant women, and two of them all four studies show that resistance training can improve quality of life of pregnant women and reducing pain Two out of three studies revealed that combined exercise improves the quality of life of pregnant women, and all three research shows that yoga or PA can positively influence quality of life pregnant women. Although the results of various studies are similar diverse, overall, this review provides evidence that exercise is feasible, acceptable and effective interventions to improve women's quality of life during pregnancy.

As gestational age increases, the pain felt by pregnant women in the lower back will increase, this intensity will increase as gestational age increases. This pain occurs due to a shift in the center of gravity and body posture experienced by pregnant women in the third trimester. Pregnancy causes the center of gravity of pregnant women to change towards the front, as the stomach becomes more bulging. This causes body posture to change, resulting in pain or tension in the lower back (15). According to researchers, in the third trimester of pregnancy, mothers experience more lower back pain than in the second trimester of pregnancy because as

gestational age increases, changes in the mother's body posture tend to experience changes such as lordosis, lower back pain will be more severe if the mother never does physical activity to reduce complaints of pain. lower back.

There are various factors that influence the intensity of pain experienced by each individual, because low back pain is pain that is often experienced by pregnant women (16). In the second and third trimesters, pregnant women often feel low back pain at this age (17). In the second trimester it occurs increased back pain. Due to the shift in the center of gravity and body posture that is felt at gestational age as the uterus enlarges, the level of intensity of pain experienced will increase as gestational age increases (18). So, to avoid wrong body posture, this can be overcome by carrying out various daily activities correctly and regularly (19).(20) In addition, muscles or often called nerve roots will feel pressure, causing pain, tenderness, tension, and a feeling of stiffness in the lower part that can be felt (21). There is an increase in sexual activity, increased connective tissue, softness of joint tissue in the pelvis and collagen tissue, these symptoms are symptoms that are felt during the 3 months of pregnancy. In addition, if daily activities are carried out excessively, the back muscles, tendons and ligaments will experience stress and tension which is the source of back pain when carrying out daily activities. steroid hormones, so that the joints relax and mobility of the hip joints also occurs. Apart from that, low back pain in pregnant women can be treated with pregnancy

exercises that suit the pregnant woman's abilities (22).

Hospitals, health centers, clinics and several other health centers have implemented pregnancy exercise as part of the antenatal care system, so that in certain health service centers, this exercise has been implemented. For pregnant women, this exercise is a very important activity, because by participating in pregnancy exercise, pregnant women can help maintain the health of their bodies and reduce the pain they feel in their waist (4). According to researchers in Sepanyol Village, Gudo District, Jombang Regency, classes for pregnant women have been held every certain period. In this period or wave, pregnant women have not been given material on pregnancy exercises, especially about lower back pain and pregnancy exercises. This means that pregnant women do not know the importance of information about back pain, bottom and pregnancy exercise. Pregnancy exercise is a sport that aims to help pregnant women reduce the pain they feel due to increasing the curve angle (23). So, various pregnancy problems such as low back pain and making joints or body tissues more flexible, can be achieved by doing regular pregnancy exercises. (24). However, exercise will actually be dangerous if done for more than the recommended time. 15-60 minutes is the recommended time for doing exercise, so this research examines the effect of pregnancy felt on pregnant women who feel tired when doing pregnancy exercises for approximately 20 minutes and 30 minutes at maximum (25).

Opinoid hormone is an endogenous hormone that functions as morphine in humans. This hormone can be activated when a person does pregnancy exercises. B-endorphin is a system of opioid hormones that are released and then captured by receptors in the hypothalamus and limbic system to regulate emotions (25). Increased b-endorphins have been shown to be closely related to natural sedatives, improving memory, increases appetite, sexual ability, blood pressure and breathing, creates a sense of comfort, and reduces low back pain in pregnant women (6). It is explained that pregnancy exercise therapy has a working mechanism that is directly directed at the affected part, namely the lower back (18). It provides double protection, apart from providing a relaxing effect on the body's movement system, it also provides protection from outside the peripheral skin by providing a reverse effect. makes the skin lift because the elasticity of the band will create a wider space between the skin and muscles resulting in increased blood circulation and drainage of lymphatic fluid as well as stimulating the skin. mechanoreceptors (myelinated nerve fibers) which are sent to the hypothalamus which stimulate the pituitary gland to produce endorphins (18). Therefore, pregnancy exercise can inhibit pain transmission based on gate control theory. Thus, pregnancy exercise is more effective in reducing pain in third trimester pregnant women.

CONCLUSION

Pregnancy exercise intervention to reduce pain intensity in pregnant women in the third trimester is the latest intervention method that has been proven to be effective in reducing pain. It is hoped that pregnant women in the second and third trimesters can be more active in taking part in classes for pregnant women so that they can learn about new methods in health science, especially pregnancy exercise because pregnancy exercise is a non-pharmacological therapy that is useful for pregnant women to reduce lower back pain and other complaints during pregnancy and childbirth.

REFERENCES

1. Mohamed NM, Mohamed NR, Mikheal IE. Effect of Foot Reflexology on Low Back Pain Intensity and Functional Abilities Among Pregnant Women. *Alexandria Sci Nurs J*. 2023 Mar 1;25(1):11–21. doi: 10.21608/asalexu.2023.300004.
2. Ray-Griffith S, Wendel M, Stowe Z, Magann E. Chronic pain during pregnancy: a review of the literature. *Int J Womens Health*. 2018 Apr;Volume 10:153–64. doi: 10.2147/IJWH.S151845.
3. Brunton R, Simpson N, Dryer R. Pregnancy-Related Anxiety, Perceived Parental Self-Efficacy and the Influence of Parity and Age. *Int J Environ Res Public Health*. 2020 Sep 15;17(18):6709. doi: 10.3390/ijerph17186709.
4. Omoke NI, Amaraegbulam PI, Umeora OJ, Okafor LC. Prevalence and risk factors for low back pain during pregnancy among women in Abakaliki, Nigeria. *Pan Afr Med J*. 2021;39:70. doi: 10.11604/pamj.2021.39.70.24367.
5. Ella Khairunnisa, Eka Riana, Dwi Khalisa Putri, Sella Ridha Agfiani. Gambaran Derajat Nyeri Punggung Pada Ibu Hamil Trimester III. *WOMB Midwifery J*. 2022 Dec 31;1(2):13–7. doi: 10.54832/wombmidj.v1i2.69.
6. Purnamasari KD. Nyeri Punggung Bawah Pada Ibu Hamil Trimester II Dan III. *J Midwifery Public Heal*. 2019 May 9;1(1):9. doi: 10.25157/jmph.v1i1.2000.
7. Yang Y, Le Ray I, Zhu J, Zhang J, Hua J, Reilly M. Preeclampsia Prevalence, Risk Factors, and Pregnancy Outcomes in Sweden and China. *JAMA Netw Open*. 2021 May 10;4(5):e218401. doi: 10.1001/jamanetworkopen.2021.8401.
8. Putra DA, Prihatanto FSI, Lestari P. Health Literacy and Pre-Eclampsia Knowledge of Pregnant Mother in Primary Health Care in Surabaya. *Biomol Heal Sci J*. 2020 Oct 30;3(2):83. doi: 10.20473/bhsj.v3i2.22026.
9. Liu N, Gou W, Wang J, Chen D, Sun W, Guo P, et al. Effects of exercise on pregnant women's quality of life: A systematic review. *Eur J Obstet Gynecol Reprod Biol*. 2019 Nov;242:170–7. doi: 10.1016/j.

ejogrb.2019.03.009.

10. Ulya R, Panduragan SL, Fitriana S, Hassan HC. The Effect of Lactation Massage Combination and Postpartum Breast Care Aged One to Three Days on the Experience of Adequate Breastfeeding. *Malaysian J Med Heal Sci*. 2023 Aug 10;19(s9):251–5. doi: 10.47836/mjmhs.19.s9.34.
11. Firdayani D, Rosita E. Pengaruh Senam Hamil Terhadap Penurunan Nyeri Punggung Bawah Pada Ibu Hamil Trimester II DAN III. *J Kebidanan*. 2020 Sep 18;9(2):139–47. doi: 10.35874/jib.v9i2.574.
12. Smeltzer SC, Bare BG. Textbook Of Medical Surgical Nursing. Jakarta: EGC; 2015.
13. Jogdeo BA, Bhore DN. The Effect of Back Massage on Breast Feeding among Neonates who. *Int J Sci Res*. 2016 Apr 5;5(4):2287–90. doi: 10.21275/v5i4.NOV163118.
14. Nabunya P, Mubeezi R, Awor P. Prevalence of exclusive breastfeeding among mothers in the informal sector, Kampala Uganda. Yourkavitch J, editor. *PLoS One*. 2020 Sep 24;15(9):e0239062. doi: 10.1371/journal.pone.0239062.
15. Varney H. Textbook of Midwifery Care. Jakarta: EGC; 2014.
16. Kareem ZSA, Emam EA reheem, Mohamed HA-E. Effectiveness of Teaching Program on Knowledge Regarding the Breast Feeding Problems among Postnatal Mothers. *Minia Sci Nurs J*. 2018 Dec 30;004(1):1–10. doi: 10.21608/msnj.2018.187741.
17. Karaman E, Kaplan Ş, Alpaycı M, Zetin O, Kolusarı A, Şahin HG. Can Kinesio-taping be a novel treatment option for emesis gravidarum? A randomized preliminary study. *East J Med*. 2018;23(3):199–205. doi: 10.5505/ejm.2018.54254.
18. Kaplan Ş, Alpaycı M, Karaman E, Zetin O, Llızkan Y, İltar S, et al. Short-Term Effects of Kinesio Taping in Women with Pregnancy-Related Low Back Pain: A Randomized Controlled Clinical Trial. *Med Sci Monit*. 2016 Apr 18;22:1297–301. doi: 10.12659/MSM.898353.
19. Vas J, Cintado MC, Aranda-Regules JM, Aguilar I, Rivas Ruiz F. Effect of ear acupuncture on pregnancy-related pain in the lower back and posterior pelvic girdle: A multicenter randomized clinical trial. *Acta Obstet Gynecol Scand*. 2019 Oct;98(10):1307–17. doi: 10.1111/aogs.13635.
20. Rahayu D, Yunarsih. Hubungan Pengetahuan Dengan Pelaksanaan Senam Hamil Ibu Primigravida. *J Kesehat*. 2019;10(1):97–106.
21. Rahmadhani W. Knowledge Of Postpartum Mothers On Postpartum Care In Healthcare Centers In Kebumen. *J Ilm Kesehat Keperawatan*. 2020 Jun 20;16(1):28. doi: 10.26753/jikk.v16i1.379.
22. Gürşen C, İnanoglu D, Kaya S, Akbayrak T, Baltacı G. Effects of exercise and Kinesio taping on abdominal recovery in women with cesarean section: a pilot randomized controlled trial. *Arch Gynecol Obstet*. 2016 Mar 2;293(3):557–65. doi: 10.1007/s00404-015-3862-3.
23. Intarti WD, Pustisari L. Contribution of Exercise for Pregnant Women in the Third Trimester in Reduction Back Pain in the Cilacap Excitative Area. *Midwifery Sci*. 2017;8(1).
24. Susanti NY, Putri NK. Development of pregnancy exercise and its effect on reducing complaints of low back pain in third trimester pregnant women. *Oxytocin J Obstet*. 2019 Feb 1;6(1):45–9. doi: 10.35316/oksitosin.v6i1.343.
25. Marwiyah N, Sufi F. The Effect of Pregnancy Exercise on the Sleep Quality of Pregnant Women in the Second and Third Trimester in Margaluyu Village, Kasemen Health Center Working Area. *Faletehan Heal J*. 2018 Dec 26;5(3):123–8. doi: 10.33746/fhj.v5i3.34.
26. Damanik M, Fahmy R, Merdawati L. Gambaran Keakuratan Dokumentasi Asuhan Keperawatan. *J Kesehatan Andalas*. 2020;8(4):138–44. doi: 10.25077/jka.v8i4.1131.
27. Lamadah SM, Ahmad AH, Maged MA, Shamekh AH. Effect of Progressive Muscle Relaxation during Pregnancy on Low Back Pain and Quality of Woman's life, Tanta Scientific Nursing Journal, 2021;23(4): 193-213. doi: 10.3389/fphys.2020.00450
28. Mamipour H, Farazmehr S, Negahban H, Moghadam SN, Manshadi FD, Nezhad MN, Sharifzadeh M. Effect of Core Stabilization Exercises on Pain, Functional Disability, and Quality of Life in Pregnant Women With Lumbar and Pelvic Girdle Pain: A Randomized Controlled Trial, *Journal of Manipulative and Physiologic*, 2023, <https://doi.org/10.1016/j.jmpt.2023.05.005>