

# The Effect of Prenatal Yoga on Reducing Lower Back Pain in Third-Trimester Pregnancy

Desi Rofita<sup>1\*</sup>, St Halimatusyaadiah<sup>1</sup>, Ni Nengah Arini Murni<sup>1</sup>

<sup>1</sup>Department of Midwifery, Poltekkes Kemenkes Mataram

## ABSTRACT

**Background:** Pregnancy is a period of significant physiological, social, and emotional transformation, often accompanied by a variety of symptoms, among which back pain is a prevalent complaint. Common intervention for alleviating back pain in pregnant women include light physical activity, such as prenatal yoga or pregnancy specific exercises regiments. This study seeks to evaluate the efficacy of prenatal yoga in mitigating back pain during the third trimester of pregnancy.

**Method:** This study utilized a quasi-experimental design employing a non-equivalent control group approach to investigate the impact of prenatal yoga on back pain levels in pregnant women. Participants were 60 women in their third trimester, with 30 assigned to the intervention group (prenatal yoga) and 30 to the control group (pregnancy exercises). Back pain was assessed in both groups using the Numeric Rating Scale (NRS) questionnaire.

**Result:** Both the prenatal yoga and pregnancy exercise groups experienced a reduction in back pain. However, prenatal yoga proved significantly more effective than pregnancy exercises ( $p < 0.05$ ). Midwives are ideally suited to offer guidance during pregnancy classes to address back pain.

**\*Correspondence**  
desirofita210@gmail.com

### Article History

Received 19 December 2024

Revised 10 January 2025

Accepted 20 January 2025

Available Online 12 March 2025

### Keywords

Pregnancy

Prenatal yoga

Back pain

### DOI

10.14710/jpki.20.2.163-170

## INTRODUCTION

Pregnancy, a physiological process initiated by fertilization, involves the gestation and development of a fetus within the maternal womb. As fetal growth progresses, the mother experiences increasing physical discomfort that may impede daily activities. (1) The gravid state induces a cascade of physiological adaptations within the maternal organism, impacting not only the cardiovascular, hormonal, and urinary systems but also presenting musculoskeletal challenges. The dramatic hormonal fluctuations, coupled with increased body mass and alterations in uterine size and position, significantly influence the maternal physique. (2)(3)

The geographic variability in the prevalence of low back pain (LBP) during pregnancy is well-documented. Studies conducted across diverse regions, including the United States, Europe, and parts of Africa, report a wide range of prevalence rates, spanning from approximately 30% to 78%. (4) These variations are often attributed to factors such as gestational age, physical activity levels, and individual biomechanical patterns. In Indonesia, the reported incidence of LBP during pregnancy exhibits a similarly broad range, fluctuating between 20% and 90%, with an observed annual increase potentially correlated with population growth. The onset of

LBP typically occurs around the 22nd week of gestation, reaching peak intensity during the third trimester. (5)

Maternal discomfort during the third trimester of pregnancy is a prevalent concern, with a significant proportion of women experiencing various physical symptoms. Notably, back pain affects 70% of expectant mothers, followed by shortness of breath and hemorrhoids, both affecting 60%. Increased urinary frequency is reported by 50% of women, while striae gravidarum, commonly known as stretch marks, also affects 50%. Constipation and swollen feet are experienced by 40% and 20% of pregnant women, respectively, while leg cramps affect 10%. Among these discomforts, back pain stands out as the most commonly reported, often persisting throughout pregnancy and even postpartum. (6) A history of low back pain in previous pregnancies significantly elevates the risk of recurrence in subsequent pregnancies, with the pattern of discomfort often mirroring that of previous experiences. This underscores the importance of proactive management and preventative strategies for women with a history of pregnancy-related back pain. (7)

During gestation, maternal weight gain typically fluctuates between 11 and 16 kg, with approximately 50% of this augmentation localized within the abdominal area. This expansion of the abdomen necessitates postural adaptations, frequently culminating in lumbago. The onset

of lumbago during pregnancy is generally observed in the second trimester, around the 22nd week. In the third trimester, the incidence of lumbago among pregnant women approximates 70%. (6) Research conducted by Fitriani (2018) indicates that approximately 70% of pregnant women experience lumbago, which may manifest from the initial trimester and typically intensifies during the second and third trimesters. (8)(9)

Gastrointestinal distress, including nausea and emesis, is a frequently reported symptom during gestation, alongside augmented urinary frequency, susceptibility to urinary tract infections, and lassitude. (10) Additional commonly documented physiological changes encompass heartburn, varicosities, nocturnal leg cramps, and constipation. Furthermore, women may experience pelvic discomfort, anxiety, depression, post-traumatic stress, diminished quality of life, and lumbago. (11) The latter often intensifies during the second trimester, potentially impeding ambulation, dressing, object manipulation, and even repose. While lumbago is considered a normative physiological response to pregnancy, its etiology in the third trimester is attributed to the superior migration of the uterine fundus and consequential abdominal protuberance, resulting in an anterior shift in the maternal center of gravity. Indeed, lumbago is so prevalent during pregnancy that it is frequently categorized among the minor discomforts attendant to this physiological state. (12)

Lumbopelvic pain is a common sequela of pregnancy, exhibiting a tendency to escalate in intensity with advancing gestational age. This pain may, in certain instances, radiate to the buttocks, thighs, and lower extremities. For a subset of gravid individuals, the severity of this discomfort can be substantial, significantly impacting activities of daily living and compromising sleep quality. (13) The third trimester is frequently marked by a constellation of physiological changes, including back pain (affecting approximately 70% of women), dyspnea (60%), hemorrhoids (60%), increased urinary frequency (50%), striae gravidarum (50%), constipation (40%), lower extremity edema (20%), and leg cramps (10%). Of these, back pain emerges as a particularly prevalent complaint during gestation, often persisting into the postpartum period. (6)

Weight gain and alterations in spinal physiology are key etiological factors in lower back pain among pregnant women. (14) The accentuation of spinal curvature during late pregnancy, coupled with concomitant postural adaptations, significantly contributes to this discomfort. Furthermore, an imbalance in the strength and activation patterns of agonist and antagonist muscle groups, notably the erector spinae and lumbar flexor muscles, is often observed. The sustained strain imposed

on these muscle groups can precipitate ligamentous and muscular tension, culminating in abdominal fatigue. (15)

A substantial percentage of expectant mothers (ranging from 9.4% to 85.2%) utilize traditional and complementary medicine for the management of lower back pain during gestation. (16) A demonstrably effective intervention for this ailment is light exercise, notably prenatal exercise regimens or pregnancy-specific yoga. Prenatal yoga, a holistic mind-body-spirit discipline, incorporates controlled breathing exercises, meditative techniques, and specific physical postures. (17) The practice of yoga influences the liberation of  $\beta$ -endorphins and neurotransmitters, instigating physiological and neurophysiological modifications conducive to relaxation. This occurs through the modulation of dopamine, serotonin, and cortisol—hormones implicated in emotional lability. Consequently, these hormonal shifts contribute to the attenuation of prevalent psychological symptoms associated with pregnancy, such as stress, anxiety, depression, and anger. (18)(19) Furthermore, yoga assists pregnant individuals in managing a spectrum of physiological symptoms, encompassing dysfunction within the circulatory, urinary, respiratory, digestive, and musculoskeletal systems, as well as mitigating issues like excessive gestational weight gain, fatigue, sleep disruption, and elevated blood glucose levels. (20)

Prenatal yoga is widely recognized as a highly effective method for childbirth preparation, given its emphasis on muscular control, relaxation techniques, and the cultivation of mental tranquility. (21) Comprehensive maternal preparation, encompassing both physical and psychological dimensions, notably the acquisition of knowledge and skills for navigating pregnancy, can substantially mitigate apprehension surrounding the parturition process. (10) Empirical research suggests that yoga-based interventions during gestation yield positive outcomes for both the antenatal and intrapartum periods. (22) Moreover, such interventions are deemed safe and without adverse effects. (23)

Prenatal yoga offers a multitude of benefits for expectant mothers, including the potential to mitigate postpartum depression through sustained physical activity during pregnancy. (10) Empirical evidence supports the safety, feasibility, and widespread acceptance of prenatal yoga among pregnant women. In fact, its positive impact on both physical and mental well-being may surpass that of traditional prenatal exercises like walking. (19)(22) Beyond its physiological advantages, prenatal yoga provides a unique opportunity for women to cultivate inner peace and deepen their connection with their unborn child. (23) Furthermore, it has demonstrated efficacy in alleviating pain, stress, anxiety, and depression, particularly during the third trimester when common

pregnancy-related discomforts tend to intensify. (24) A key mechanism through which prenatal yoga exerts its benefits is the relaxation of spinal muscles. By stretching the hip, spine, and pelvic muscles, contributes to improved body alignment and effectively mitigates lower back pain, pelvic pain, and neck pain. (25) Given that physical exercise is generally advantageous for pregnant women experiencing lower back and pelvic pain, consistent physical activity throughout pregnancy may serve as a preventive measure against such discomfort in future pregnancies. (26) Therefore, it is crucial to consider lower back pain during pregnancy within a broader context, such as in patients with chronic pain. (27) This study aims to investigate the specific effects of prenatal yoga on reducing back pain during the third trimester of pregnancy.

**METHOD**

This research utilized a quasi-experimental design, specifically a non-equivalent control group post-test only design, to investigate the impact of prenatal yoga on lower back pain during the third trimester of pregnancy. Sixty participants were purposively sampled and assigned equally to either the intervention group (prenatal yoga) or the control group (pregnancy exercises). Lower back pain, the dependent variable, was measured in both groups after the intervention. Prenatal yoga, the independent variable, was administered to the intervention group, while the control group engaged in a regimen of pregnancy exercises designed to mitigate lower back pain. Participants in both groups were further divided into three classes each, attending sessions twice weekly for one hour under the guidance of trained instructors utilizing leaflet-based materials. The lower back pain was assessed using the

Numerical Rating Scale (NRS) questionnaire. Data analysis involved univariate descriptive statistics for respondent characteristics and bivariate analysis employing an independent samples t-test to compare post-intervention lower back pain levels between the two groups. Ethical approval for this study was granted by Poltekkes Kemenkes Mataram (reference number: LB.01.03/6/190/2024).

**RESULT AND DISCUSSION**

**Univariate Analysis**

Participants in this study comprised pregnant women enrolled in prenatal education programs. Data collected from these individuals encompassed demographic factors such as age, educational attainment, occupational status, and parity. A summary of the baseline characteristics of the study population, stratified by intervention and control groups, is presented in the table 1.

As shown in Table 1, the majority of respondents were between the ages of 21 and 35, with 26 participants (86.7%) in the intervention group and 24 participants (80%) in the control group. The educational background of most respondents was a high school diploma (SMA), with 14 participants (46.7%) in the intervention group and 13 participants (43.3%) in the control group. In terms of employment, the majority of respondents were unemployed, with 25 participants (83.3%) in the intervention group and 27 participants (90%) in the control group. Furthermore, the majority of respondents had given birth more than once, with 19 participants (63.3%) in the intervention group and 21 participants (70%) in the control group.

**Table 1.** Respondent characteristics

Variable	Intervention		Control	
	n	%	n	%
<b>Age</b>				
≤ 20	2	6.7	1	3.3
21-35	26	86.7	24	80
>35	2	6.7	5	16.7
<b>Education</b>				
Elementary School	7	23.3	2	6.7
Junior High School	6	20	11	36.7
Senior High School	14	46.7	13	43.3
Diploma/Undergraduate Degree	3	10	4	13.3
<b>Employment Status</b>				
Employed	5	16.7	3	10
Unemployed	25	83.3	27	90
<b>Parity</b>				
Primigravida	7	23.3	6	20
Multigravida	19	63.3	21	70
Grande multigravida	4	13.3	3	10

The first test was to determine whether the data were normally distributed using the Shapiro-Wilk test. As shown in Table 2, a Shapiro-Wilk test was employed to assess the normality of the data. The resultant p-value of less than 0.05 indicates a statistically significant deviation from a normal distribution, thereby necessitating the use of a non-parametric approach for subsequent analyses.

Table 3 indicates a change in the pain scale following the intervention in both the prenatal yoga and pregnancy exercise groups. In the prenatal yoga group, pre-intervention, the majority of participants (90%, n=27) reported moderate pain. Post-intervention, this prevalence

shifted to mild pain, with 66.7% of respondents (n=20) reporting this level. Similarly, in the pregnancy exercise group, a pre-intervention majority (63.3%, n=19) experienced moderate pain, which decreased to 53.3% (n=16) post-intervention.

Based on Table 4, the analysis shows that there is a significant effect of both prenatal yoga and pregnancy exercise, with a p-value of 0.00 ( $\alpha < 0.05$ ). There is a statistically significant difference between the average results of the yoga class and the pregnancy exercise class, with a p-value of 0.00 ( $\alpha < 0.05$ ). (see table 5)

**Table 2.** Normality test

Variable	Statistic	df	Sig
<b>Prenatal Yoga</b>			
Pre Test	0.836	30	0.00
Post Test	0.919	30	0.02
<b>Pregnancy Exercise</b>			
Pre Test	0.920	30	0.02
Post Test	0.888	30	0.00

**Table 3.** Pain before and after prenatal yoga and pregnancy exercise

Pain Scale	Prenatal Yoga				Pregnancy Exercise			
	Pre test		Post test		Pre test		Post test	
	n	%	n	%	n	%	n	%
No pain	0	0	6	20	0	0	0	0
Mild pain	2	6.7	20	66.7	9	30	16	53.3
Moderate pain	27	90	4	13.3	19	63.3	14	46.7
Severe pain	1	3.3	0	0	2	6.7	0	0

**Table 4.** Analysis of the effect of prenatal yoga and pregnancy exercise on reducing lower back pain in pregnant women

Variable	n	Mean Rank	P-value
<b>Pretest-Posttes Prenatal Yoga</b>			
Negative Ranks	0	0.00	0.00
Positive ranks	30	15.50	
Ties	0		
<b>Pretest-Posttes Pregnancy Exercise</b>			
Negative Ranks	0	0.00	0.00
Positive ranks	19	10.00	
Ties	11		

**Table 5.** Analysis of the difference between the results of prenatal yoga and pregnancy exercise on reducing lower back pain in pregnant women

Variable	n	Mean Rank	P value
Yoga Class	30	22.97	0.00
Pregnancy Exercise Class	30	38.03	
Total	60		

The demographic profile of participants revealed a predominance of individuals aged 21-35 years, comprising 86.7% (n=26) of the intervention group and 80% (n=24) of the control group. Maternal characteristics, including age, occupation, and parity, constitute key interpersonal factors influencing pregnant women's engagement in prenatal yoga. (28) While lower back pain is often observed to emerge in women aged 20-24, its prevalence typically peaks after 40 years of age. (29) Consistent with this, the study by Andarwulan et al, (2022) established a statistically significant association ( $p=0.001$ ,  $p<0.05$ ) between respondent age and participation in prenatal yoga, with women aged 20-35 demonstrating comparatively higher engagement. (30) This heightened participation may be attributed to a greater awareness of health needs during pregnancy within this age range. Furthermore, existing literature suggests that pregnancy outcomes are optimized when maternal age falls within a specific range, as both younger (<20) and older (>35) mothers are considered to be in a more vulnerable physiological state due to factors such as uterine immaturity or declining reproductive function. (31)

A substantial proportion of respondents in both the intervention (n=14, 46.7%) and control (n=13, 43.3%) groups possessed a secondary school education. This finding aligns with Okta's (2022) research, which established a correlation between educational attainment and pregnant women's engagement with yoga. Furthermore, the observations of Windari et al, (2018) corroborate this, suggesting that individuals with higher levels of education demonstrate a propensity for enhanced comprehension of health-related information, particularly during pregnancy. Consequently, expectant mothers with advanced education are more likely to recognize the importance of and participate in prenatal exercise programs. (33)

A substantial proportion of respondents in both the intervention (n=25, 83.3%) and control (n=27, 90%) groups were unemployed. This observation aligns with prior research, such as that conducted by Andarwulan, et al (2022), which demonstrated a statistically significant relationship ( $p < 0.05$ ) between employment status and participation ( $p = 0.012$ ). (30) Specifically, the study indicated that working mothers, due to time constraints, experience greater difficulty participating in prenatal yoga compared to housewives, who typically have more discretionary time available. (34)

A substantial proportion of participants in both groups were multiparous, with 19 (63.3%) in the intervention group and 21 (70%) in the control group reporting multiple births. High parity, characteristic of multiparous and grand multiparous women, is associated with increased risk due to diminished muscular support of

the uterus, potentially leading to complications such as back pain. (35) Prior research, notably that of Andarwulan et al, (2022), has established a significant correlation ( $p < 0.05$ , specifically  $p = 0.026$ ) between parity and engagement in prenatal yoga. (30) Multiparous women, possessing greater experiential knowledge of pregnancy compared to primiparous individuals, are often more inclined to proactively manage their health during gestation. This prior experience may serve as an intrinsic motivator for health-promoting behaviors throughout the pregnancy. (36)

This study found that both prenatal yoga and general pregnancy exercise programs are associated with a reduction in lower back pain during pregnancy. However, statistical analysis revealed a significant difference ( $p < 0.05$ ) in effectiveness between the two interventions, with prenatal yoga demonstrating superior outcomes. Prenatal yoga has gained popularity as a holistic approach for managing common pregnancy-related discomforts, particularly lower back pain, which is prevalent in the third trimester. The biomechanics of pregnancy contribute to this discomfort. As the fetus grows, the woman's body undergoes significant postural adaptations, placing increasing strain on the spine, especially the lumbar region. The expanding abdomen shifts the center of gravity, requiring the lower back and abdominal muscles to work harder for postural support, which can lead to muscle fatigue and lower back pain. (37) Furthermore, the increased levels of the hormone relaxation during pregnancy cause ligament laxity, reducing joint stability and potentially exacerbating pain. (38)

Pregnancy-related back pain constitutes a prevalent health concern impacting a substantial proportion of women. Prenatal yoga has emerged as an acceptable and safe therapeutic modality for mitigating this discomfort, thereby promoting maternal well-being. (39) Research has demonstrated the efficacy of yoga in alleviating back pain during pregnancy, with Field et al. (2014) reporting its positive influence on reducing stress, anxiety, and sleep disturbances within this population. (40) These findings are corroborated by Rao et al. (2015), whose review of yoga's effectiveness in adults revealed its capacity to diminish anxiety, depression, and both acute and chronic pain, absent any adverse effects. Collectively, these studies suggest that yoga interventions offer benefits for psychological health, encompassing the reduction of anxiety, depression, and stress, and ultimately contribute to an improved quality of life. (41)

Prenatal gentle yoga is a specialized practice designed to accommodate the physiological changes of pregnancy through safe and modified exercises. (39) Specific postures, such as the cat-cow sequence, can effectively stretch and release tension in the lower back

musculature, thereby mitigating stiffness and discomfort in the lumbar region. The consistent practice of gentle yoga movements contributes to the strengthening of core, back, and pelvic floor muscles, which are crucial for maintaining optimal posture during pregnancy and reducing the risk of muscle fatigue-related lower back pain. (42) Furthermore, the incorporation of breathing exercises in prenatal yoga promotes improved blood circulation and muscle relaxation, which can alleviate back pain and mitigate stress commonly experienced during the third trimester. (40)

Prenatal yoga has demonstrated efficacy in mitigating lower back pain and other pregnancy-related discomfort. Research indicates that consistent yoga practice can alleviate pain in the lumbosacral region, which typically intensifies throughout gestation. The benefits of prenatal yoga stem from its ability to fortify and maintain the elasticity of muscles surrounding the hips and pelvis—areas that experience increased strain during pregnancy. Furthermore, these yoga movements facilitate relaxation, enhance sleep quality, and diminish muscle tension, all of which contribute to a reduction in the severity of back pain. (43)

Prenatal yoga, particularly in the third trimester, has been shown to significantly reduce lower back pain, with studies indicating a potential decrease in intensity by 60–80%. This practice also promotes hormonal balance and the release of endorphins, which act as natural analgesics and contribute to an enhanced sense of well-being. Furthermore, prenatal yoga can alleviate common pregnancy discomforts such as nausea, cramps, and dyspnea. (44)

To maximize the benefits of exercise, several studies recommend engaging in 2–3 sessions per week, each lasting 30–60 minutes. Prenatal yoga not only alleviates back pain but also aids childbirth preparation, reduces the likelihood of cesarean delivery, and minimizes the risk of fetal distress. (45)

A separate investigation indicated that, of the 30 participants in their third trimester of pregnancy, 17 (56.7%) reported experiencing mild back pain (level 2 on a pain scale) prior to commencing yoga interventions. (46) Firdayani's (2018) theoretical framework posits that consistent yoga practice during gestation contributes to the maintenance of physical well-being and the mitigation of pregnancy-related back pain. This benefit is attributed to the targeted strengthening exercises inherent in yoga, which promote overall fitness and support the physiological demands of labor. The efficacy of yoga in reducing lower back pain during the second and third trimesters of pregnancy is well-documented. For instance, Fitriani (2018) demonstrated the significant positive impact of both general pregnancy exercise and prenatal

yoga programs on the alleviation of lower back pain specifically in women during their third trimester. (8)

This study is limited by the challenges of simultaneous data collection and respondent retention, highlighting the crucial role of cadres in participant mobilization. However, it boasts the strength of enhancing pregnant women's understanding of prenatal yoga and facilitating its proper execution under the guidance of certified instructors. The study's integration of midwives further empowers participants with direct access to consultation regarding pregnancy-related concerns.

## **CONCLUSION**

The study's findings reveal a demographic profile predominantly consisting of individuals aged 21–35, with 86.7% (n=26) of the intervention group and 80% (n=24) of the control group falling within this age bracket. The highest level of educational attainment for the majority of participants was high school, represented by 46.7% (n=14) in the intervention group and 43.3% (n=13) in the control group. Unemployment was the prevalent employment status, with 83.3% (n=25) of the intervention group and 90% (n=27) of the control group identifying as unemployed. Multiparity was also common, with 63.3% (n=19) of the intervention group and 70% (n=21) of the control group reporting having given birth more than once. Both the prenatal yoga and pregnancy exercise groups exhibited a decrease in lower back pain scale scores. A statistically significant difference ( $p=0.00$ ,  $\alpha < 0.05$ ) was observed between the effects of prenatal yoga and pregnancy exercises. Future research employing qualitative methodologies is recommended to further investigate the efficacy of prenatal yoga interventions in mitigating lower back pain among women in their third trimester of pregnancy. It is anticipated that the present study's outcomes may serve as a valuable resource for healthcare professionals, particularly midwives, in the implementation of prenatal gentle yoga as a non-pharmacological approach to managing back pain during the third trimester. This information can be disseminated by midwives through prenatal classes, thereby addressing maternal concerns related to back pain.

## **Acknowledgments**

The authors gratefully acknowledge the Department of Midwifery, Poltekkes Kemenkes Mataram for their invaluable support throughout this research endeavor.

## **Conflict of Interest**

The authors declare that there's no conflict of interest.

## REFERENCES

1. Arummega MN, Rahmawati A, Meiranny A. Faktor-Faktor yang Mempengaruhi Nyeri Punggung Ibu Hamil Trimester III: Literatur Review. *Oksitosin J Ilm Kebidanan*. 2022;9(1):14–30.
2. Casagrande DM, Zbigniew Gugala, MD P, Shannon M. Clark M, Ronald W. Lindsey M. Low Back Pain and Pelvic Girdle Pain in Pregnancy. 2015;23(9):539–49.
3. Glowinski S, Łosiński K, Kowiański P, Waśkow M, Bryndal A, Grochulska A. Inertial sensors as a tool for diagnosing discopathy lumbosacral pathologic gait: A preliminary research. *Diagnostics* . 2020;10(6):1–13.
4. Manyozo SD, Nesto T, Bonongwe P, Muula AS. Low back pain during pregnancy: Prevalence, risk factors and association with daily activities among pregnant women in urban Blantyre, Malawi. *Malawi Med J*. 2019;31(1):71–6.
5. Lestaluhu V. Studi Kasus: Penatalaksanaan Terapi Komplementer Pada Ibu Hamil Trimester Iii Dengan Nyeri Punggung. *J Kebidanan*. 2022;2(2):96–103.
6. Tanjung Rejeki S, Fitriani Y. Pengaruh Yoga Prenatal Terhadap Nyeri Punggung Pada Ibu Hamil Trimester Ii Dan Iii Di Lia Azzahra Mom & Baby Spa Tegal. *Indones J Kebidanan*. 2019;3(2):92.
7. Omoke NI, Amaraegbulam PI, Umeora OIJ, Okafor LC. Prevalence and risk factors for low back pain during pregnancy among women in Abakaliki, Nigeria. *Pan Afr Med J*. 2021;39.
8. Fitriani L. Efektivitas Senam Hamil Dan Yoga Hamil Terhadap Penurunan Nyeri Punggung Pada Ibu Hamil Trimester III Di Puskesmas Pekkabata. *J-kesmas J Kesehat Masy*. 2018;4(2):72.
9. Wulandari S, Wantini NA. Ketidaknyamanan Fisik Dan Psikologis Pada Ibu Hamil Trimester Iii Di Wilayah Puskesmas Berbah Sleman Daerah Istimewa Yogyakarta. *J Kebidanan Indones*. 2021;12(1):54–67.
10. Nakamura A, van der Waerden J, Melchior M, Bolze C, El-Khoury F, Pryor L. Physical activity during pregnancy and postpartum depression: Systematic review and meta-analysis. *J Affect Disord* . 2019;246(November 2018):29–41.
11. Smythe KL, Petersen I, Schartau P. Prevalence of Perinatal Depression and Anxiety in Both Parents: A Systematic Review and Meta-analysis. *JAMA Netw Open* . 2022;5(6):E2218969.
12. Anggasari Y. Pengaruh Antara Keteraturan Prenatal Gentle Yoga Terhadap Penurunan Tingkat Nyeri Pinggang Pada Ibu Hamil Trimester Iii. *Midwifery J J Kebidanan UM Mataram* . 2021;6(1):34.
13. Sinclair M, Close C, McCullough JE, Hughes C, Liddle SD. How do women manage pregnancy-related low back and/or pelvic pain? Descriptive findings from an online survey. *Evid Based Midwifery* . 2014;12(3):76–82.
14. Schröder G, Kundt G, Otte M, Wendig D, Schober HC. Impact of pregnancy on back pain and body posture in women. *J Phys Ther Sci* . 2016;28(4):1199–207.
15. Yoo H, Shin D, Song C. Changes in the spinal curvature, degree of pain, balance ability, and gait ability according to pregnancy period in pregnant and nonpregnant women. *J Phys Ther Sci* . 2015;27(1):279–84.
16. Bowman RL, Davis DL, Ferguson S, Taylor J. Women’s motivation, perception and experience of complementary and alternative medicine in pregnancy: A meta-synthesis. *Midwifery* . 2018;59:81–7.
17. Taneja DK. Yoga and health. *Indian J Community Med* . 2014;39(2):68–72.
18. Corrigan L, Moran P, McGrath N, Eustace-Cook J, Daly D. The characteristics and effectiveness of pregnancy yoga interventions: a systematic review and meta-analysis. *BMC Pregnancy Childbirth* . 2022;22(1):1–21.
19. Eric C. Meyers, Bleyda R. Solorzano, Justin James, Patrick D. Ganzer, Elaine S., Robert L. Rennaker MPK and SH. Potential for prenatal yoga to serve as an intervention to treat depression during pregnancy. *Physiol Behav* . 2018;176(1):100–106.
20. Balaji PA, Varne SR. Physiological effects of yoga asanas and pranayama on metabolic parameters, maternal, and fetal outcome in gestational diabetes. *Natl J Physiol Pharm Pharmacol* . 2017;7(7):724–8.
21. Cramer H, Frawley J, Steel A, Hall H, Adams J, Broom A, et al. Characteristics of women who practice yoga in different locations during pregnancy. *BMJ Open* . 2015;5(8):1–7.
22. Jiang Q, Wu Z, Zhou L, Dunlop J, Chen P. Effects of Yoga Intervention during Pregnancy: A Review for Current Status. *Am J Perinatol* . 2015;32(6):503–14.
23. Kwon R, Kasper K, London S, Haas DM. A systematic review: The effects of yoga on pregnancy. *Eur J Obstet Gynecol Reprod Biol* . 2020;250:171–7.
24. Martins RF, Pinto E Silva JL. Treatment of pregnancy-related lumbar and pelvic girdle pain by the yoga method: A randomized controlled study. *J Altern Complement Med* . 2014;20(1):24–31.
25. Franisia CA, Febry Mutiariami Dahlan, Cholisah Suralaga. The Effectiveness of Prenatal Yoga on Back Pain in Third Trimester Pregnant Women at the Depok Clinic in 2022. *Sci Midwifery*. 2022;10(3):2075–81.
26. Bryndal A, Majchrzycki M, Grochulska A,

- Glowinski S, Seremak-mrozikiewicz A. Risk factors associated with low back pain among a group of 1510 pregnant women. *J Pers Med.* 2020;10(2):1–10.
27. Backhausen MG, Bendix JM, Damm P, Tabor A, Hegaard HK. Low back pain intensity among childbearing women and associated predictors. A cohort study. *Women and Birth* . 2018;32(4):e467–76.
28. Lutfiyati A, Dwi Yati<sup>2</sup> Sujono Riyadi. Hubungan Karakteristik Ibu Hamil dengan Sikap terhadap Pelaksanaan Senam Hamil di Puskesmas Srandakan, Bantul. *Wiraraja Med J Kesehat.* 2020;10(1):1–9.
29. Sukeksi NT, Kostania G, Suryani E. Pengaruh Teknik Akupressure Terhadap Nyeri Punggung Pada Ibu Hamil Di Wilayah Puskesmas Jogonalan I Klaten. *J Kebidanan dan Kesehat Tradis.* 2018;3(1):1–7.
30. Andarwulan S, Latifah A, Khoirul Waroh Y. Analisis Faktor – Faktor Keikutsertaan Ibu Hamil Trimester Iii Terhadap Prenatal Yoga. *J Ilm Kebidanan (Scientific J Midwifery).* 2022;8(1):28–34.
31. Laili U. Analisis Faktor-Faktor Yang Mempengaruhi Keikutsertaan Senam Hamil Pada Ibu Hamil Di Bps Nina Surabaya. *J Heal Sci.* 2018;8(2):171–4.
32. Oktya T. Faktor-Faktor Yang Berhubungan Dengan Minat Ibu Hamil Dalam Penerapan Senam Yoga Di PMB Bidan E Tahun 2022. *Angew Chemie Int Ed* 6(11), 951–952. 2022;1(April).
33. Windari EN, Putri R, Astriani SN. Hubungan Karakteristik Ibu (Usia, Paritas, Pendidikan) Dan Dukungan Sosial Suami Dengan Keikutsertaan Senam Hamil Di Desa Pandanmulyo. *J Issues Midwifery.* 2018;2(3):30–40.
34. Sartika W, Qomariah S. Analisis Faktor – Faktor Yang Mempengaruhi Keikutsertaansenam Hamil Pada Ibu Hamil Trimester III di BPM Hj. Dince Safrina Sst. *J Keperawatan Abdurrab.* 2019;3(1):57–63.
35. Fithriyah F, Haninggar RD, Dewi RS. Pengaruh Prenatal Massage terhadap Penurunan Nyeri Punggung pada Ibu Hamil Trimester III. *J Kebidanan.* 2020;10(1):36–43.
36. Septiana M. Faktor - Faktor yang Berhubungan dengan Keikutsertaan Ibu Hamil dalam Melakukan Senam Hamil pada Kelas Ibu Hamil. *Cendekia Med.* 2020;5(1):24–31.
37. Curtis K, Weinrib A, Katz J. Systematic review of yoga for pregnant women: Current status and future directions. *Evidence-based Complement Altern Med.* 2012;2012.
38. Chang HY, Lai YH, Jensen MP, Shun SC, Hsiao FH, Lee CN, et al. Factors associated with low back pain changes during the third trimester of pregnancy. *J Adv Nurs.* 2014;70(5):1054–64.
39. Susanti T, Suryaningsih EK, Kebidanan A, Buana W. Pengaruh Prenatal Yoga Terhadap Kesehatan Ibu Dan Janin : Scoping Review The Effect Of Prenatal Yoga In Maternal And Fetal Wellness : Scoping Review. *Avicenna J Heal Res.* 2023;6(2):112.
40. Field T, Diego M, Hernandez-Reif M, Medina L, Delgado J, Hernandez A. Yoga and massage therapy reduce prenatal depression and prematurity. *J Bodyw Mov Ther.* 2012;16(2):204–9.
41. Rao RM, Raghuram N, Nagendra H, Usharani M, Gopinath K, Diwakar R, et al. Effects of an integrated yoga program on self-reported depression scores in breast cancer patients undergoing conventional treatment: A randomized controlled trial. *Indian J Palliat Care.* 2015;21(2):174–81.
42. Rakhshae Z. Effect of Three Yoga Poses (Cobra, Cat and Fish Poses) in Women with Primary Dysmenorrhea: A Randomized Clinical Trial. *J Pediatr Adolesc Gynecol* . 2011;24(4):192–6.
43. Oktavia N, Pramesti AP, Setyani RA. The Effectiveness of Prenatal Yoga on Back Pain Intensity of Third Trimester Pregnant Women in Surakarta. *J Community Empower Heal.* 2023;6(3):139.
44. Wariyah, Khairiah R. Efektivitas Prenatal Yoga terhadap Nyeri Punggung pada Ibu Hamil Trimester III di Wilayah Kerja Puskesmas Telagasari, Kabupaten Karawang, Tahun 2023. *Heal Inf J Penelit* . 2023;15(2):1–5.
45. Dewi AAS, Febriyanti NMA. Reduksi Nyeri Punggung Bawah dengan Prenatal Gentle Yoga pada Kehamilan Trimester III di Gianyar Bali Tahun 2021. *J Bid Ilmu Kesehat.* 2022;12(1):10–6.
46. Saputri IN. The Effect of Yoga Exercises on Back Pain in Third Trimester Pregnant Women. *J Aisyah J Ilmu Kesehat.* 2021;5(1):155–60.