



Comparative Study: Yoga and Pregnancy Exercise on First Stage Pain and Length of Labor in Tapanuli Regency

Ganda Agustina Hartati Simbolon^{1*}, Ns. Tiur Romatua Sitohang¹, Elny Lorensi Silalahi¹

¹ Poltekkes Kemenkes Medan, Medan, Indonesia.

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Corresponding Author:

Ganda Agustina Hartati Simbolon

agustinahartati81@gmail.com

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Abstract: Labor pain is pain that comes from uterine contractions trying to expel the baby. The mother's perception of pain during labor can influence the length of the labor process. Pregnant women should be supported to carry out physical exercise to obtain benefits during pregnancy and childbirth. There are several physical exercises during pregnancy, which pregnant women often participate in, such as pregnancy exercises and pregnancy yoga. The aim of this research is to develop yoga exercises and pregnancy exercises to overcome pain in the first stage and duration of labor, as well as to conduct a trial of a combination of yoga exercises and pregnancy exercises which can be developed to reduce pain in the first stage and duration of labour. This study used a prospective cohort design with consecutive sampling technique. The research subjects were pregnant women in the third trimester who were in the working area of North Tapanuli and Central Tapanuli Regencies. The research sample consisted of 50 people taking part in pregnancy exercise and 50 people taking part in pregnancy yoga during April - June 2023. Data analysis used the Mann Withney test. The Mean Rank value for duration of labor for respondents who did yoga exercise was 44.70 and for respondents who did pregnancy exercise was 56.30. Based on the results of statistical tests, a p value of 0.044 was obtained. The Mean Rank value of labor pain for respondents who did yoga exercise was 32.80 and for respondents who did pregnancy exercise was 68.20. Based on the results of statistical tests, a p value of 0.000 was obtained. so it can be concluded that there is a difference in the length of labor and labor pain between pregnant women who were given yoga training and pregnant women who were given pregnancy exercise training.

Keywords: Pregnancy exercise; Pregnant women; Yoga

Introduction

During pregnancy, physical exercise carried out by the mother has a good effect on the fetus, pregnancy, birth weight, reducing birth complications such as reducing pain levels and prolonged labor (Ribeiro et al., 2022). Apart from physical exercise, alternative forms that can be done are massage and energy therapy as well as mindbody healing, such as yoga. Physical exercise during pregnancy includes yoga and pregnancy exercises.

Yoga practice is a form of mind-body medicine that combines physical postures, meditation, and breathing techniques (Sharma et al., 2024). Research shows that the

results of carrying out yoga exercises during the antenatal period can improve birth outcomes and provide a good birth experience. Yoga practice during pregnancy has benefits in maintaining both emotional and physical health and reduces pain, stress and prenatal disorders. Yoga is also considered to be a more effective exercise than walking or other standard prenatal exercises (Sukamti et al., 2022). Yoga works by preparing a woman's body to undergo the birth process that she will go through. This helps women to feel more confident and gain confidence in their body's ability to have a normal birth (Skrondal et al., 2020). Meditation and yoga can reduce physical injury and psychological

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stress during pregnancy and childbirth, including anxiety and pain during labor (Rong et al., 2021).

Long labor can be caused by several factors, one of which is pain. There are two types of pain management, pharmacological and non-pharmacological. Non-pharmacological management can be provided in the form of breathing exercises, relaxation, yoga, massage, aromatherapy, hydrotherapy and hypnosis (Unalmis Erdogan et al., 2017). Continuous management of pain reduction with prenatal yoga under the supervision of trained health workers has been proven to significantly reduce the intensity of pain during the birth process (Palet-Rodríguez & Torrubia-Pérez, 2023). Prenatal yoga is beneficial for the biomotor component of the muscles being trained, and can also increase cardiorespiratory endurance by increasing oxygen consumption in the body, so it is very beneficial for the mother's physical conditioning during the birth process.

Apart from yoga, a form of physical exercise during pregnancy is pregnancy exercise. Pregnancy exercise is an exercise that is useful for strengthening and maintaining the elasticity of the abdomen, ligaments and pelvic floor muscles which are related to the birthing process. Pregnancy exercise is physical exercise in the form of movements that can make pregnant women ready to prepare physically and mentally so that the mother is ready to face childbirth that is safe, fast and spontaneous in accordance with the mother's expectations. Pregnancy exercise can contribute to a better delivery compared to pregnant women who do not do pregnancy exercise (Poyatos-León et al., 2015). Several conditions such as low birth weight, fetal heart rate abnormalities, umbilical cord and meconium disorders, decreased maternal energy, labor pain, premature labor, caesarean section, asphyxia, stress and psychomotor disorders in babies have been reported to decrease in mothers who do pregnancy exercise. There is research that shows the effect of pregnancy exercise and pregnancy yoga on the length of labor (Yekefallah et al., 2021).

The results of a preliminary study conducted in North Tapanuli Regency and Central Tapanuli regency, cases of preterm labor still occur frequently. This can be seen from the 2020 data, there were 190 cases of preterm birth in North Tapanuli Regency and 245 cases in Central Tapanuli Regency. Likewise, caesarean section cases have increased from year to year, 852 cases in 2020, 1023 in 2022 in North Tapanuli Regency. One of the factors that influence the incidence of caesarean section includes complications in pregnancy, another factor is at the patient's own request for reasons of worry about pain during normal delivery, and some are at the request of the patient and their family. Meanwhile, prolonged

active phase was the highest number of cases during June to August 2022, with 56 cases.

Various research results from literature reviews on yoga exercises and pregnancy exercises from various national and international journals have been carried out, the benefits of yoga exercises and pregnancy exercises, namely being able to give birth easily, and keeping the mother and baby healthy. healthy after giving birth. Research conducted by Hu et al. (2021), the benefits of yoga and pregnancy exercise greatly influence the speed of the labor process. According to research by Sun et al. (2010) the benefits of yoga and pregnancy exercise are that it can facilitate the birth process quickly, safely and spontaneously. According to Daniyati et al. (2021), the benefits of yoga and pregnancy exercise are that they can reduce pain during labor and speed up the length of labor in the first stage. This is what attracted researchers' interest in finding out the effect of yoga practice on pain in the first stage. and length of labor during the first stage in Tapanuli Regency.

Method

This research is quantitative research. In the first year, this research used a cross-sectional approach with a comparative analytical method where data regarding the independent variable and the dependent variable were collected at the same time. This study analyzes the effect of pregnancy exercise on first stage pain and duration of labor and the influence of yoga on first stage pain and duration of labor (Zhang et al., 2023). In the first year, the research design used was a comparative study, namely comparing a group of pregnant women who did yoga and a group of pregnant women who did pregnancy exercises on the pain and length of the first stage of labor.

The research was carried out in the working areas of Central Tapanuli Regency and North Tapanuli Regency. Research in North Tapanuli Regency was carried out at 9 Community Health Centers, namely Hutabaginda, Situmeang Habinsaran, Sitada-Tada, Paniaran, Siborong-Borong, Silangit, and Sipahutar. Meanwhile, in Tapanuli Regency, it is being implemented in the Poriaha and Hutabalang Community Health Center working areas. Data collection will be carried out from April to September 2023.

The population in this study were pregnant women in the second and third trimesters who were in the working area of Tapanuli Regency. The sampling technique in this study used consecutive sampling, that is, all samples that came and met the research criteria were included in the study until the required number of

subjects was met. The number of samples in the study was 50 samples from the yoga exercise intervention group and 50 samples from the pregnancy exercise intervention group. The inclusion criteria in this study were; Normal pregnant women in the second trimester and third trimester; Willing to be a respondent; Willing to take part in the therapy used in this research, namely Emotional Freedom Techniques (EFT). The exclusion criteria in this study were: Pregnant women with a history of hyperemesis, anemia, placenta previa, hypertension, hypotension, bleeding, pre-eclampsia; not willing to be a respondent; not being at home for 3 visits.

Before being selected as research respondents, pregnant women in an area were gathered, then carried out yoga and pregnancy exercises (Setiawati et al., 2020). Then the researcher asked for the respondent's willingness to become a sample in this research by signing informed consent. Then the researcher explained the research procedures and determined the Yoga implementation schedule for the Yoga group, as well as the pregnancy exercise group (Rahayu et al., 2023). Apart from that, respondents were asked to do yoga and pregnancy exercise at least 3 times a week during their pregnancy. Meanwhile, pregnancy exercises were carried out at least 10 times during the pregnancy period. When the respondent experienced signs of labor, the researcher also monitored the progress of the mother's labor until the birth of the baby, which was carried out using a partograph so that the respondent's labor time could be determined. Meanwhile, to collect data about pain in pregnant women, this was done using the VAS Pain Measuring tool which had been modified with the Wong Baker Scale. Mothers were asked to describe their level of pain by marking on a questionnaire sheet starting from a scale of 0 - 10 with levels of no pain, mild pain, moderate pain, severe pain and very severe pain (2021).

Data processing is carried out in the following stages: Data checking (editing), namely re-checking the completeness of the questionnaire; Data coding, namely the process of systematically compiling raw data (data in the questionnaire) into a form that is easy to read by a computer; Entering data, namely processing data for analysis, data processing is carried out by entering data from each respondent into a program or software on a computer; Data cleaning (cleaning), namely ensuring

that all data that has been entered is in accordance with the truth.

The data analysis technique uses; Univariate Analysis, namely explaining the characteristics of respondents such as age and maternal gravida; Bivariate analysis, which proves the difference in pain and duration of labor in the exercise group and in the pregnancy exercise group. Before carrying out bivariate analysis, a homogeneity test was carried out. This homogeneity test aims to find out whether the data in variables x and y are homogeneous or not. Then an ANOVA test was carried out to compare the effect of pregnancy exercise and yoga on the duration of the first stage of labor and labor pain (Chuntharapat et al., 2008).

Result and Discussion

Comparative study research has been conducted: Yoga and Pregnancy Exercises on First Stage Pain and Length of Labor in Tapanuli Regency from April to October 2023 on third trimester pregnant women consisting of 50 mothers with Pregnancy Yoga and 50 mothers with Pregnancy Exercises, with the following results:

Univariate Analysis

Univariate analysis was carried out to determine the frequency distribution of each variable in the intervention group and control group. These variables include the characteristics of the respondent (age, education level, gravida). The distribution of data can be seen in the table below:

Respondent Characteristics

Based on the research results, it can be seen the characteristics of respondents in the Pregnancy Yoga and Pregnancy Exercise group aged 20-35 years. Characteristics of respondents who are in the age range of 20-40 years, researchers look at the age of the respondents. At this age, the respondent is expected to have maturity in thinking and acting. Respondents are expected to be able to form a positive coping mechanism in responding to every problem so that the mother does not experience anxiety. Aged 20-40 years, a person has maturity in thinking and acting in response to the illness they experience while being treated.

Table 1. Distribution of Respondent Characteristics in the Yoga Exercise Group and Pregnancy Exercise Group

Respondent characteristics	Yoga Group			Amount	
	n	%	N	Gymnastics Group	%
Age Group (Years)					
< 20	0	0	1		2
20 – 35	45	90	46		92
> 35	5	5	3		6
Level of education					
SD	0	0	0		0
SMP	0	0	0		0
SMA	26	52	31		62
PT	24	48	19		38
Gravida					
Primigravida	14	28	18		36
Secungravida	10	20	15		30
Multigravida	23	46	15		30
Grande multigravida	3	6	2		4

Educational status greatly influences a society's mindset (Zhao et al., 2021). The high level of public education is a support in making it easier to digest the information received so that it can be understood (Haleem et al., 2022). This knowledge itself is usually obtained from knowledge about anxiety and experiences that have been experienced. The researcher considers that this statement indirectly explains that with the mother's high level of education, it is hoped that in the future parents will be able to easily understand and understand every diagnosis that has been explained by the doctor. and carry out treatment in accordance with the recommendations given.

First Stage Labor Pain

Pain in the first stage of labor is visceral pain caused by stretching of the uterus and effacement (flattening) and dilatation of the cervix. This stimulus is delivered to the spinal cord at thoracic 10-12 to lumbar 1. The first stage of pain begins with uterine contractions that spread and cause abdominal cramps. First stage pain. The intensity of first stage pain varies according to the progress of cervical dilatation. Usually when opening 4-7 cm the pain is felt to be somewhat sharp, and after opening 7-10 cm the pain becomes more intense, stabbing and stiff. Below are the levels of labor pain experienced by respondents in the group who took part in pregnancy yoga and the pregnancy exercise group.

Table 2. Levels of First Stage Labor Pain in the Group of Mothers Taking Part in Pregnancy Yoga and the Group of Mothers Taking Part in Pregnancy Exercise in the Tapanuli Regency Area in 2023

Pain Level	Amount				Statistical Test Results
	Pregnancy Yoga Group		Pregnancy Exercise Group		
	n	%	n	%	
No Pain	0	0	0	0	
Mild Pain	17	34	0	0	
Moderate Pain	30	60	21	42	
Severe Pain	3	6	23	46	
Very Severe Pain	0	0	6	12	
Amount	50	100	50	100	

The table above shows that of the 50 mothers who participated in Yoga during pregnancy, the majority of pain levels in the first stage of labor experienced moderate pain, 30 people (60%), mild pain, 17 people (34%), and severe pain, 3 people (6%), while mothers The majority of those who took part in pregnancy exercise experienced severe pain, 23 people (42%), 21 people (42%) had moderate pain and 6 people (12%) had very severe pain. From the table it can also be seen that mothers who took part in pregnancy yoga did not experience very severe pain.

The results of this study are in line with research by (Corrigan et al., 2022) which stated that there was a difference in the first stage pain scale between pregnancy exercise and pregnancy yoga with a p-value of 0.001. In this research it was also concluded that pregnant women who took part in pregnancy exercise had severe pain intensity, while those who took part in pregnancy yoga had moderate pain intensity. The low scale of pain in the first stage of labor in the pregnancy yoga group is because the principles of pregnancy yoga emphasize correct breathing techniques, relaxation and

meditation on the mother's body and mind, so that the mother is better able to overcome the pain she feels. Controlled breathing is a non-pharmacological technique that can help reduce the perception of pain.

Length of First Stage of Labor

Based on table 5.3, it is known that of the 50 mothers who did pregnancy yoga, 90% (45 people) had rapid first stage labor (< 1 cm per hour), and 10% (5 people) had normal labor (1 cm per hour). Meanwhile, 40% (20 people) of mothers who did pregnancy exercise had fast labor, 23 (46%) had normal labor, and 7 (14%) had slow labor.

During the birth process, the mother needs physical and mental preparation so that the birth process runs smoothly and safely, and of course the mother will choose a normal birth plan if there are no other

indications during her pregnancy. To anticipate action if complications occur during delivery or during an emergency, delivery preparation is needed. Efforts that pregnant women can make so that labor goes normally is by doing pregnancy exercises. Pregnancy exercise is one of the physical exercise programs for pregnant women. Pregnancy exercise aims to prepare the mother's physical condition during pregnancy and prepare for childbirth as well as to maintain the muscles and joints that play a role in the birth process, and to grow self-confidence and strengthen mental health (Watkins et al., 2021). The positive effect that can be obtained from pregnancy exercise is that the cervix and uterine activity can be coordinated when labor opens, and the delivery time can be earlier or shorter when compared to pregnant women who do not participate in pregnancy exercise (Beetham et al., 2019).

Table 3. Length of First Stage of Labor in Mothers Using Yoga and Pregnancy Exercises in the Tapanuli Regency Area in 2023

Length of First Stage of Labor	n	Yoga Group		Amount	
		%	n	%	
Fast	45	90	20		40
Normal	5	10	23		46
Slow	0	0	7		14
Amount	50	100	50		100

Bivariate Analysis

Based on table 4, the Mean Rank value for labor pain for respondents who did yoga exercise was 32.80 and for respondents who did pregnancy exercise, it was 68.20. Based on the results of statistical tests, a p value of 0.000 was obtained. This means that there is a difference in labor pain between pregnant women who take part in yoga practice and pregnant women who take part in pregnancy exercise practice. so it can be concluded that labor pain between pregnant women who take part in yoga practice is lighter than that of pregnant women who take part in pregnancy exercise practice.

Based on Table 4, the Mean Rank value for duration of labor for respondents who did yoga exercise was 44.70 and for respondents who did pregnancy exercise was 56.30. Based on the results of statistical tests, a p value of 0.044 was obtained. This means that there is a difference in the length of labor between pregnant women who are given yoga training and pregnant women who are given pregnancy exercise training. So, it can be concluded that the length of labor between pregnant women who take part in yoga practice is faster than that of pregnant women who take part in pregnancy exercise practice.

Table 4. Differences in Length of Labor and Labor Pain in Mothers who were given Yoga and Pregnancy Exercise

Variable	Group	Mean Rank	Sum Rank	A Simpy.sig
Painful	Yoga	32.80	1640.00	0.00
	Pregnancy exercise	68.20	3410.00	
Length of Labor	Yoga	44.70	2235.00	0.04
	Pregnancy exercise	56.30	2815.00	

Bivariate Analysis

Differences in Length of Labor in Mothers who were given Yoga and Pregnancy Exercise

Based on the research results, the mean rank value for duration of labor for respondents who did yoga exercise was 44.70 and for respondents who did

pregnancy exercise was 56.30. Based on the results of statistical tests, a p value of 0.044 was obtained, meaning that there was a difference in the length of labor between pregnant women who were given yoga training and pregnant women who were given pregnancy exercise training. so it can be concluded that yoga practice for

pregnant women is more meaningful in speeding up the first stage of labor than pregnancy exercise.

Yoga practice during pregnancy prepares the mother's psychological condition, especially increasing self-confidence in facing childbirth, has a positive effect on the opening of the cervix and coordinated uterine activity during labor, and statistically results show that labor is earlier than the labor interpretation, with a quicker labor time compared to mothers who do not practice yoga.

Franciska et al. (2021) stated the same thing, there is an influence of maternity yoga on the progress of labor in the first stage of active phase mothers. When doing yoga it can increase uterine contractions which can produce pressure on the uterine wall so that when this pressure is transmitted to the cervix it can result in thinning and dilatation of the cervix. Doing yoga will also train the perineal muscles, pelvic muscles and surrounding areas so that they become more elastic and improve blood flow around the pelvis, as well as triggering the nervous system which facilitates the opening and stretching of the vaginal walls.

Differences in Labor Pain in Mothers who were Given Yoga and Pregnancy Exercise

Based on the research results, the Mean Rank value for labor pain for respondents who did yoga exercise was 32.80 and for respondents who did pregnancy exercise was 68.20. Based on the results of statistical tests, a p value of 0.000 was obtained. So, it can be concluded that there is a difference in labor pain between pregnant women who are given yoga training and pregnant women who are given pregnancy exercise training, where the pain of first stage labor in mothers who do yoga exercise is lighter than in mothers who do pregnancy exercise. In the group of mothers with Yoga Exercise (32.80) they still felt pain in the first stage of labor but it could still be endured or controlled or it was still in the mild pain category, while in the pregnancy exercise group the pain scale in the first stage was 68.20, meaning the pain was annoying and required attempt to restrain him.

The results of this study are in line with research conducted by Zuwariyah et al. (2022) showing that there was lower pain intensity in mothers who did yoga, with a p-value of 0.001. Yoga practice is a form of mind-body medicine that combines physical postures, meditation, and breathing techniques. This research shows that carrying out yoga exercises during the antenatal period can improve birth outcomes and provide a good birth experience. Yoga practice during pregnancy has benefits in maintaining both emotional and physical health and reduces pain, stress and prenatal disorders. Yoga is also considered to be a more effective exercise than walking

or other standard prenatal exercises (Azward et al., 2021). Yoga works by preparing a woman's body to undergo the birth process that she will go through. This helps women to feel more confident and gain confidence in their body's ability to have a normal birth (Bringedal & Aune, 2019). Meditation and yoga can reduce physical injury and psychological stress during pregnancy and childbirth, including anxiety and pain during labor (Holden et al., 2019).

Conclusion

Based on data analysis using statistical tests, it shows that there is a difference in length of labor and pain between mothers who are tired of yoga and mothers who use pregnancy exercise with the following details: Characteristics of respondents, both mothers with yoga training and mothers with pregnancy exercise, were in the age range of 20-35 years, the majority had a high school education, and the majority were multiparous pregnancies. Labor pain among pregnant women who take part in yoga practice is lighter than that of pregnant women who take part in pregnancy exercise practice. The duration of labor among pregnant women who take part in yoga practice is faster than that of pregnant women who take part in pregnancy exercise practice. The researchers' suggestions are: It is hoped that with this research, it is not only pregnancy exercise that pregnant women need to implement in preparation for childbirth, but yoga can be used as a form of physical exercise for pregnant women because it is useful in reducing pain during labor and shortening the length of labor. time; Pregnant women should prepare for comfortable childbirth starting from the pregnancy period. One way is to do pregnancy exercises and yoga exercises; Yoga and pregnancy exercise, if done correctly and regularly, can facilitate the birth process quickly, safely and spontaneously.

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Author Contributions

Conceptualization, G. A. H. S, N. T. R. S, E. L. S.; methodology, G. A. H. S.; validation, N. T. R. S. and E. L. S.; formal analysis, G. A. H. S.; investigation, N. T. R. S. and E. L. S.; resources, G. A. H. S. and N. T. R. S.; data curation, E. L. S.; writing – original draft preparation, G. A. H. S and N. T. R. S.; writing – review and editing, E. L. S.; visualization, and G. A. H. S. and N. T. R. S. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

References

- Azward, H., Ramadhany, S., Pelupessy, N., Usman, A. N., & Bara, F. T. (2021). Prenatal yoga exercise improves sleep quality in the third trimester of pregnant women. *Gaceta Sanitaria*, *35*, S258–S262. <https://doi.org/10.1016/j.gaceta.2021.10.030>
- Beetham, K. S., Giles, C., Noetel, M., Clifton, V., Jones, J. C., & Naughton, G. (2019). The effects of vigorous intensity exercise in the third trimester of pregnancy: A systematic review and meta-analysis. *BMC Pregnancy and Childbirth*, *19*(1), 281. <https://doi.org/10.1186/s12884-019-2441-1>
- Bringedal, H., & Aune, I. (2019). Able to choose? Women's thoughts and experiences regarding informed choices during birth. *Midwifery*, *77*, 123–129. <https://doi.org/10.1016/j.midw.2019.07.007>
- Chuntharapat, S., Petpichetchian, W., & Hatthakit, U. (2008). Yoga during pregnancy: Effects on maternal comfort, labor pain and birth outcomes. *Complementary Therapies in Clinical Practice*, *14*(2), 105–115. <https://doi.org/10.1016/j.ctcp.2007.12.007>
- Corrigan, L., Moran, P., McGrath, N., Eustace-Cook, J., & Daly, D. (2022). The characteristics and effectiveness of pregnancy yoga interventions: A systematic review and meta-analysis. *BMC Pregnancy and Childbirth*, *22*(1), 250. <https://doi.org/10.1186/s12884-022-04474-9>
- Daniyati, A., & Mawaddah, S. (2021). Effect of Prenatal Yoga on Duration of the First Stage of Labor and Perineal Rupture in Primigravida Mothers. *Research Journal of Life Science*, *8*(1), 34–39. <https://doi.org/10.21776/ub.rjls.2021.008.01.5>
- Desmawati, Kongsuwan, W., & Chatchawet, W. (2021). Level of Labor Pain, Level of Labor Pain Behaviors, and Cultural Pain Behaviors among First-Time Indonesian Muslim Mothers. *Open Journal of Obstetrics and Gynecology*, *11*(01), 27–39. <https://doi.org/10.4236/ojog.2021.111004>
- Franciska, Y., Yuka, A. A. S., & Wilma, W. (2021). Relieve Labor Pain With Hypno Prenatal and Prenatal Yoga. *Jurnal Ilmu Dan Teknologi Kesehatan*, *9*(1), 60–70. <https://doi.org/10.32668/jitek.v9i1.579>
- Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275–285. <https://doi.org/10.1016/j.susoc.2022.05.004>
- Holden, S. C., Manor, B., Zhou, J., Zera, C., Davis, R. B., & Yeh, G. Y. (2019). Prenatal Yoga for Back Pain, Balance, and Maternal Wellness: A Randomized, Controlled Pilot Study. *Global Advances in Health and Medicine*, *8*, 216495611987098. <https://doi.org/10.1177/2164956119870984>
- Hu, S., Xu, T., & Wang, X. (2021). Yoga as an Exercise Prescription for the Pregnancy or Postpartum Period: Recent Advances and Perspective. *Yangtze Medicine*, *05*(03), 157–170. <https://doi.org/10.4236/ym.2021.53016>
- Palet-Rodríguez, M., & Torrubia-Pérez, E. (2023). Utilidad de las terapias complementarias en el manejo de dolor durante el parto: Una revisión integradora. *Enfermería Global*, *22*(2), 465–496. <https://doi.org/10.6018/eglobal.529861>
- Poyatos-León, R., García-Hermoso, A., Sanabria-Martínez, G., Álvarez-Bueno, C., Sánchez-López, M., & Martínez-Vizcaíno, V. (2015). Effects of exercise during pregnancy on mode of delivery: A meta-analysis. *Acta Obstetrica et Gynecologica Scandinavica*, *94*(10), 1039–1047. <https://doi.org/10.1111/aogs.12675>
- Rahayu, K. D., Dela Rosa, R. D., & Handayani, W. (2023). Effect of Pregnancy Yoga Exercise on Reducing Anxiety of Pregnant Woman Third Trimester: Pengaruh Latihan Yoga Kehamilan terhadap Penurunan Kecemasan Ibu Hamil Trimester Ketiga. *The Journal of Palembang Nursing Studies*, *2*(1), 50–59. <https://doi.org/10.55048/jpns.v2i1.77>
- Ribeiro, M. M., Andrade, A., & Nunes, I. (2022). Physical exercise in pregnancy: Benefits, risks and prescription. *Journal of Perinatal Medicine*, *50*(1), 4–17. <https://doi.org/10.1515/jpm-2021-0315>
- Rong, L., Wang, R., Ouyang, Y.-Q., & Redding, S. R. (2021). Efficacy of yoga on physiological and psychological discomforts and delivery outcomes in Chinese primiparas. *Complementary Therapies in Clinical Practice*, *44*, 101434. <https://doi.org/10.1016/j.ctcp.2021.101434>
- Setiawati, N., Latifah, L., & Kartikasari, A. (2020). Effectiveness Yoga to Improve The Quality of Sleep in Pregnant Women with Nausea and Vomiting. *Dunia Keperawatan: Jurnal Keperawatan Dan Kesehatan*, *8*(2), 286. <https://doi.org/10.20527/dk.v8i2.8471>
- Sharma, H., Swetanshu, & Singh, P. (2024). Role of Yoga in Cardiovascular Diseases. *Current Problems in Cardiology*, *49*(1), 102032. <https://doi.org/10.1016/j.cpcardiol.2023.102032>
- Skrondal, T. F., Bache-Gabrielsen, T., & Aune, I. (2020). All that I need exists within me: A qualitative study of nulliparous Norwegian women's experiences with planned home birth. *Midwifery*, *86*, 102705. <https://doi.org/10.1016/j.midw.2020.102705>
- Sukamti, S., Aticeh, A., & Sari, G. N. (2022). Exercise for Pain Relief in Yoga is Effective in Reducing Pelvic

- Girdle Pain During the Third Trimester of Pregnancy. *Women, Midwives and Midwifery*, 2(1), 58–64. <https://doi.org/10.36749/wmm.2.1.58-64.2022>
- Sun, Y.-C., Hung, Y.-C., Chang, Y., & Kuo, S.-C. (2010). Effects of a prenatal yoga programme on the discomforts of pregnancy and maternal childbirth self-efficacy in Taiwan. *Midwifery*, 26(6), e31–e36. <https://doi.org/10.1016/j.midw.2009.01.005>
- Unalmis Erdogan, S., Yanikkerem, E., & Goker, A. (2017). Effects of low back massage on perceived birth pain and satisfaction. *Complementary Therapies in Clinical Practice*, 28, 169–175. <https://doi.org/10.1016/j.ctcp.2017.05.016>
- Watkins, V. Y., O'Donnell, C. M., Perez, M., Zhao, P., England, S., Carter, E. B., Kelly, J. C., Frolova, A., & Raghuraman, N. (2021). The impact of physical activity during pregnancy on labor and delivery. *American Journal of Obstetrics and Gynecology*, 225(4), 437.e1–437.e8. <https://doi.org/10.1016/j.ajog.2021.05.036>
- Yekefallah, L., Namdar, P., Dehghankar, L., Golestaneh, F., Taheri, S., & Mohammadkhaniha, F. (2021). The effect of yoga on the delivery and neonatal outcomes in nulliparous pregnant women in Iran: A clinical trial study. *BMC Pregnancy and Childbirth*, 21(1), 351. <https://doi.org/10.1186/s12884-021-03794-6>
- Zhang, D., Ruchat, S.-M., Silva-Jose, C., Gil-Ares, J., Barakat, R., & Sánchez-Polán, M. (2023). Influence of Physical Activity during Pregnancy on Type and Duration of Delivery, and Epidural Use: Systematic Review and Meta-Analysis. *Journal of Clinical Medicine*, 12(15), 5139. <https://doi.org/10.3390/jcm12155139>
- Zhao, S., Du, H., Li, Q., Wu, Q., & Chi, P. (2021). Growth mindset of socioeconomic status boosts subjective well-being: A longitudinal study. *Personality and Individual Differences*, 168, 110301. <https://doi.org/10.1016/j.paid.2020.110301>
- Zuwarayah, N., & Laili, U. (2022). Efektifitas Prenatal Yoga Dalam Mengatasi Nyeri Persalinan. *EMBRIO*, 14(1), 16–20. <https://doi.org/10.36456/embrio.v14i1.4192>