International Journal of Advanced Health Science and Technology e-ISSN:2808-6422; p-ISSN:2829-3037
Homepage: ijahst.org Vol. 5 No. 6, pp. 335-340, Desember 2025

RESEARCH ARTICLE OPEN ACCESS

Manuscript received September 10, 2025; revised November 10, 2025; accepted November 15, 2025; date of publication December 30, 2025
Digital Object Identifier (**DOI**): https://doi.org/10.35882/ijahst.v5i6.490

How to cite: Novi Danisia Ekayanti, Nurlailis Saadah, Astuti Setiyani and Budi Joko Santosa, "Association Between Anxiety And Labor Pain Intensity During The First Stage Of Active Labor In Primigravidas", International Journal of Advanced Health Science and Technology, Vol. 5 No. 6, pp. 335-340, December 2025.

Association Between Anxiety And Labor Pain Intensity During The First Stage Of Active Labor In Primigravidas

Novi Danisia Ekayanti, Nurlailis Saadah, Astuti Setiyani and Budi Joko Santosa

Department of Midwifery, Poltekkes Kemenkes Surabaya, Surabaya, Indonesia

Corresponding author: Nurlailis Saadah (e-mail: nurlailis.saadah66@gmail.com).

ABSTRACT Maternal anxiety during childbirth is widely recognized as a psychological factor that may intensify perceived pain and affect labor progress; however, its specific association with pain levels in primigravidas during the first active stage of labor remains under-investigated, particularly in Indonesian clinical settings. This study aimed to examine the correlation between maternal anxiety and labor pain intensity among primigravida women in the active phase of first-stage labor. An analytical observational approach with a cross-sectional design was employed. A sample of 37 primigravidas was recruited using simple random sampling at RSUD Dr. Sayidiman Magetan. Anxiety levels were measured using the Pregnancy-Related Anxiety Questionnaire-Revised (PRAQ-R2), and labor pain intensity was assessed using the Numerical Rating Scale (NRS). Data were analyzed using the Spearman Rank correlation test with a significance threshold of $p < 0.05$. The findings showed that the majority of respondents experienced severe anxiety, and all reported severe labor pain. Statistical testing demonstrated a moderate positive correlation between maternal anxiety and pain intensity (rho = 0.48; p = 0.002), indicating that higher anxiety was associated with heightened pain perception. In conclusion, maternal anxiety is significantly associated with increased labor pain during the first active stage in primigravidas, suggesting that psychological distress may amplify physiological pain responses during childbirth. These results highlight the importance of integrating psychological assessment and supportive interventions such as antenatal counseling, breathing regulation, structured emotional support, and relaxation techniques into maternity care practices. Future research should incorporate larger and more diverse cohorts, additional psychosocial determinants, and interventional analyses to further elucidate causal mechanisms and improve labor management strategieS.

INDEX TERMS Maternal Anxiety, Labor Pain, Primigravida, Active Labor Phase, Psychological Factors in Childbirth

I. INTRODUCTION

Childbirth is a normal physiological process but is strongly influenced by psychological factors, particularly pregnancy-related anxiety and fear of childbirth. High levels of antenatal and intrapartum anxiety are consistently associated with prolonged labor, increased obstetric interventions, negative birth experience, and poorer postpartum mental health outcomes [1]–[4]. Fear of childbirth is highly prevalent worldwide and appears especially pronounced among primigravida women, who face labor and pain without prior experiential reference [1], [5], [6]. In lower-middle-income countries, including Indonesia, limited childbirth education, inadequate support, and sociocultural expectations further exacerbate anxiety surrounding labor [7], [8].

State-of-the-art research has increasingly focused on the complex interplay between fear of childbirth, self-efficacy, and perceived labor pain. Recent cross-sectional studies indicate that fear and anxiety are important predictors of labor pain intensity, with notable differences between primiparous and multiparous women [6], [9], [10]. At the same time, non-pharmacological labor pain management (e.g., breathing techniques, relaxation, massage, water immersion, aromatherapy, and hypnobirthing) has been promoted as a safe, low-cost, and acceptable approach to reduce pain and improve childbirth experience [11]–[14]. Bibliometric and systematic reviews show rapid growth in research on these interventions, yet their routine implementation remains uneven, particularly in resource-limited settings [11], [14], [15].

Measurement of pregnancy-related anxiety has also advanced, with pregnancy-specific instruments such as the Pregnancy-Related Anxiety Questionnaire–Revised 2 (PRAQ-R2) and the Pregnancy-related Anxiety Scale (PrAS) demonstrating strong reliability and cross-cultural validity [16]–[20]. Recent studies in China, Japan, Europe, and Indonesia confirm that pregnancy-related anxiety is a construct distinct from general anxiety and depression and should be assessed with targeted tools in both clinical and

e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 5 No. 6, pp. 335-340, Desember 2025

research contexts [16]–[20]. Despite these methodological developments, relatively few studies have integrated validated pregnancy-specific anxiety scales with real-time intrapartum pain ratings to examine their association in the early active phase of labor, especially among primigravidas in Indonesian hospital settings [7], [10], [21].

This gap is important because labor pain is one of the most intense acute pain experiences and is known to affect maternal psychological status, labor progress, and fetal well-being [11], [21]. Preliminary local data and national reports suggest that many Indonesian primigravida women present with moderate to severe anxiety and high labor pain intensity, yet the strength of the association between these two variables in routine intrapartum care remains insufficiently quantified.

Therefore, the present study aims to analyze the association between maternal anxiety and labor pain intensity during the first active stage of labor among primigravida women at RSUD Dr. Sayidiman Magetan, using the PRAQ-R2 and the Numerical Rating Scale (NRS). The specific contributions of this article are fourfold:

1. To describe the distribution of pregnancy-related anxiety and labor pain intensity in primigravidas during the first active stage of labor;
2. To quantify the correlation between anxiety scores and pain intensity using validated psychometric and pain-assessment instruments;
3. To discuss the implications of these findings for integrating structured anxiety screening and non-pharmacological pain- and anxiety-management strategies into intrapartum care in Indonesian hospital settings; and
4. To enrich the limited regional evidence base on psychosocial determinants of labor experience among primigravida women.

The remainder of this article is structured as follows. Section II details the research design, setting, sampling strategy, measurement instruments, and statistical analysis. Section III presents the empirical results on anxiety levels, labor pain intensity, and their association. Section IV discusses these findings in light of current international and national evidence, with emphasis on clinical and policy implications for midwifery practice. Finally, Section V concludes with key messages and recommendations for future research and the development of targeted anxiety- and pain-management interventions in maternity care.

II. METHODS

A. STUDY DESIGN

This investigation utilized an analytical observational approach with a cross-sectional research design. The cross-sectional model was selected because exposure (maternal anxiety) and outcome (labor pain intensity) were measured concurrently during the same period of active labor, enabling correlation analysis without longitudinal follow-up. Cross-sectional methodologies are commonly recommended in perinatal mental-health and obstetric-psychology research where repeated or invasive measurements across time are impractical or ethically discouraged [25], [26].

B. STUDY SETTING AND TIMEFRAME

The study was conducted at RSUD Dr. Sayidiman Magetan, a regional referral hospital providing comprehensive maternity services, including intrapartum care for low-risk and moderate-risk pregnancies. Data collection occurred during a defined time window within the institutional operational period when eligible primigravida women presented in active labor. The hospital setting ensured access to a continuous flow of childbirth cases and stable obstetric monitoring conditions.

C. STUDY POPULATION AND ELIGIBILITY CRITERIA

The target population comprised primigravida mothers undergoing childbirth in the first stage of active labor. Inclusion and exclusion criteria were applied to ensure homogeneity and reduce confounding variables:

Inclusion criteria:

1. Primigravida status;
2. Gestational age 37–40 weeks;
3. Active-phase labor defined by cervical dilation ≥4 cm;
4. Singleton fetus;
5. Consent to participate and ability to comply with questionnaire procedures.

Exclusion criteria:

1. Known psychiatric disorders requiring pharmacological therapy;
2. Labor induced or augmented pharmacologically;
3. Use of epidural anesthesia or systemic opioid or non-opioid analgesics;
4. Obstetric complications such as preeclampsia, placenta previa, or fetal distress.

These criteria were based on recommendations for standardized obstetric study sampling and for minimizing bias in psychological assessment during labor [27], [28].

D. DATA SAMPLING AND SAMPE SIZE

The sampling strategy employed simple random sampling from labor-admitting mothers who met inclusion criteria during the data-collection period. The target sample size was calculated using the Slovin formula for small-population estimation with allowable error $\alpha = 0.05$. The final sample consisted of 37 respondents. Randomization was implemented using a sequential recruitment list generated from the daily delivery log, ensuring equal probability of sample selection and reducing systematic selection bias [28].

E. INSTRUMENTS AND MEASURES

1) Measurement of Maternal Anxiety

Maternal anxiety was quantified using the Pregnancy-Related Anxiety Questionnaire–Revised 2 (PRAQ-R2), a validated domain-specific instrument assessing anxiety about maternal competence, fetal health, and labor progress. The Indonesian-adapted version used in this study demonstrated strong psychometric reliability with Cronbach α values > 0.89 in prior validation studies [29], [30]. PRAQ-R2 was administered verbally by trained researchers to accommodate the physical and psychological status of women in labor.

2) Measurement of Labor Pain

e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 5 No. 6, pp. 335-340, Desember 2025

Labor pain intensity was assessed using the Numerical Rating Scale (NRS), ranging from 0 ("no pain") to 10 ("worst pain imaginable"). Respondents were asked to provide a numerical pain score during an active uterine contraction. The NRS is widely used for rapid quantification of obstetric pain due to its sensitivity and ease of comprehension [31].

F. DATA COLLECTION PROCEDURE

Upon clinical verification of active-phase labor, eligible participants were informed of the purpose, voluntary nature, and confidentiality aspects of the study. Written informed consent was obtained prior to data acquisition. The data-collection sequence was standardized as follows:

1. Baseline demographic and obstetric data were recorded;
2. PRAQ-R2 was administered 30–60 minutes after confirmed entry into active labor;
3. NRS pain ratings were recorded during a contraction within the same window;
4. Questionnaire administration occurred in a quiet, minimally disruptive environment.

Researchers did not provide psychological counseling, analgesic suggestion, or any behavioral intervention during data collection to maintain natural anxiety and pain response states.

G. STUDY VARIABLES AND DATA MANAGEMENT

Two primary research variables were operationalized:

1. Independent variable: maternal childbirth-related anxiety (PRAQ-R2).
2. Dependent variable: labor pain intensity (NRS score).

Both variables were treated as ordinal-scale data.

Raw questionnaire responses were coded and entered into a dedicated statistical dataset. Double-entry verification was performed to minimize transcription errors. Data were anonymized by replacing personal identifiers with numeric codes.

H. STATISTICAL ANALYSIS AND ETHICAL CONSIDERATIONS

The Spearman Rank correlation test was applied to examine the association between anxiety and pain intensity. Spearman's ρ was selected because the data were non-normally distributed and represented ordinal-scale rankings rather than interval-scaled quantitative measurements. The α-level threshold was set at $p < 0.05$ for determining statistical significance. The analytical procedure followed best-practice recommendations for psychometric-obstetric correlation analysis [32], [33].

Ethical approval was obtained from the Institutional Ethics Review Board. The study adhered to international guidelines for the protection of human subjects in maternity research, ensuring non-invasive procedures, confidentiality, and informed consent [34].

III. RESULTS

A. An Overview of Primigravida Anxiety Events Mothers in the First Active Phase of Labor

A table of findings from studies characterizing maternal anxiety during childbirth is shown below:

TABLE 1
Description of Anxiety Events in Primigravida Mothers in Labor During the First Active Phase

Variables	f	%
Mild anxiety	0	0
Moderate anxiety	1	2.5
Very anxious	39	97.5
Total	40	100

TABLE 1 illustrates the distribution of anxiety levels among primigravida mothers during the first active stage of labor. The results show that nearly all participants experienced severe anxiety, with only one respondent reporting moderate anxiety and none reporting mild anxiety. This indicates an overwhelmingly high level of childbirth-related anxiety among the study population.

B. B. An Account of The First Active Phase of Labor Pain Incidents in Primigravida Mothers

The following is a description of labor pain experienced by primigravida moms during the study's initial active phase:

TABLE 2
The Labor Discomfort That Primigravida Mothers Experienced Throughout the First Active Phase of the Trial Is Described Below

Variables	f	%
Mild pain	0	0
Moderate pain	0	0
Severe pain	40	100
Total	40	100

TABLE 2 presents the intensity of labor pain experienced by primigravida mothers in the first active phase of labor. The findings reveal that every respondent reported severe pain, with no cases of mild or moderate pain. This uniform result demonstrates that labor pain during this stage was consistently perceived as severe by all participants.

C. The Connection between Primigravida's Anxiety and Pain Levels During the First Stage of Active Labor

The relationship between anxiety and pain level in the first stage of the active phase of labor in primigravida is examined in the table below:

TABLE 3
Cross-tabulation of the Association between Anxiety and Pain Levels in Primigravida During the First Stage of Active Labor.

		Painful							
		light		currently		heavy		amount	
		n	%	n	%	n	%	n	%
Worried	light	0	0	0	0	0	0	0	0
	currently	0	0	0	0	1	2.5	1	2.5
	heavy	0	0	0	0	36	97.5	36	97.5
	amount	0	0	0	0	37	100	37	100

TABLE 3 provides a cross-tabulation of anxiety levels and pain intensity among primigravida mothers during the first active stage of labor. The table shows that almost all mothers who experienced severe anxiety also reported severe pain. A small proportion of participants with moderate anxiety likewise experienced severe pain. No participants reported mild anxiety or mild to moderate pain. These results

e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 5 No. 6, pp. 335-340, Desember 2025

highlight the tendency for higher anxiety levels to coincide with heightened pain intensity.

TABLE 4
Spearman Rank Statistical Test Results

		ANXIETY	PAINFUL
ANXIETY	Pearson Correlation	1.00	.48
	Sig. (2-tailed)		.002
	N	37	37
PAINFUL	Pearson Correlation	.48	1.00
	Sig. (2-tailed)	.002	
	N	37	37

TABLE 4 presents the results of the Spearman Rank statistical test yielded a computed rho of 0.48 and a p-value of 0.002, as shown in table 4. The conclusion was that H_0 was rejected since the p-value was less than 0.05 (0.002). The findings indicate a high association between anxiety and the degree of pain experienced during the active phase of the first stage of labor in primigravida.

IV. DISCUSSION

A. INTERPRETATION OF FINDINGS AND THEORETICAL CCONTEXT

The results of this study demonstrate a statistically significant moderate positive correlation between maternal anxiety and labor pain intensity during the first active stage of labor in primigravidas ($\rho = 0.48$; $p = 0.002$), indicating that mothers with higher anxiety tend to experience greater perceived pain. This finding supports the conceptual framework of psychophysiological responses to stress during childbirth. Anxiety activates the sympathetic nervous system and increases catecholamine release, particularly adrenaline and noradrenaline, which can inhibit uterine contractions and amplify nociceptive pain responsiveness [35]. This physiological mechanism suggests that emotional distress directly affects both the neuroperception of pain and biological labor progression.

The predominance of severe anxiety among participants reflects the heightened emotional vulnerability of primigravida women, who lack prior experiential familiarity with childbirth sensations. From a neurocognitive perspective, pain and anxiety share overlapping neural pathways, particularly within the amygdala, thalamus, and anterior cingulate cortex, which can create a feedback loop where anxiety increases pain sensitivity, and intense pain reinforces anxiety [36]. Such bidirectional psychological-physiological feedback mechanisms have been documented in multiple studies on labor experiences and cortisol-mediated stress reactions [37].

The result that all respondents experienced severe pain further underscores the nature of active-phase contractions and cervical dilation as strong nociceptive stimuli. For primigravidas, uterine and cervical tissues have not undergone prior remodeling associated with earlier deliveries, often resulting in increased mechanical resistance and more intense pain sensations [38]. Such anatomical factors may partially explain why primiparous women consistently report higher pain levels than multiparous mothers.

Previous Indonesian and international findings corroborate this relationship between anxiety and increased labor pain [39]. However, the magnitude of our observed correlation, though statistically robust, is moderate rather than strong, suggesting that additional mediating variables such as coping style, labor support, cognitive-emotional preparation, and cultural beliefs also influence pain perception.

These findings highlight essential conceptual insights: labor pain is not merely a physiological variable but a biopsychosocial construct shaped by emotional regulation, cognitive expectation, sociocultural support, and physiological response simultaneously.

B. COMPARISON WITH RELATED STUDIES

Our findings align with the growing body of literature identifying pregnancy-related anxiety as a key determinant of labor pain outcomes. A study by Gürsoy and Gümüş reported that higher childbirth fear correlated significantly with both increased pain intensity and negative birth experience, supporting a similar relationship between emotional distress and sensory pain amplification [40]. Another study conducted in Ethiopia found that women with severe anxiety during pregnancy were not only more likely to report severe intrapartum pain but also longer duration of labor and increased rates of instrumental delivery [41].

In contrast to our results, some research has reported a lower prevalence of severe anxiety or a stronger association between anxiety and pain than found in our sample. For example, Nazir and Amin observed a much higher correlation coefficient ($r = 0.87$) between anxiety and pain among Indian primigravidas, suggesting that cultural childbirth expectations and differing pain-socialization norms may modulate perceptions of bodily discomfort [42]. These discrepancies across geographical regions reinforce that socio-cultural context such as childbirth narratives, religious expectations, or familial support plays a fundamental role in emotional framing of pain.

Studies exploring non-pharmacological pain management methods further contextualize our findings. The efficacy of methods such as warm-water immersion, aromatherapy, hypnobirthing, breathing regulation, and maternal positioning has been repeatedly demonstrated to reduce anxiety-driven pain responses by modulating cognitive appraisal and autonomic response [43]. However, in our study setting, such methods were not used during measurement, which enhances internal validity but indicates a gap between empirical knowledge and clinical implementation.

The measurement tools used PRAQ-R2 for anxiety and NRS for pain are supported by research affirming their reliability and validity across cultures. Cross-validation studies in Japan, Indonesia, and China confirm that PRAQ-R2 is a robust instrument for quantifying childbirth-related anxiety rather than general anxiety [44]. Therefore, our findings are grounded in both methodological rigor and psychological specificity, strengthening the validity of interpretations regarding childbirth-specific anxiety rather than generalized emotional distress.

e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 5 No. 6, pp. 335-340, Desember 2025

C. LIMITATIONS, IMPLICATIONS, AND FUTURE DIRECTIONS

1) Limitations

Despite the meaningful findings, this research has several limitations:

a. **Sample size and regional specificity**: The sample consisted of 37 primigravida mothers from a single regional hospital. While adequate for correlation analysis, it limits broad generalization to all Indonesian or international populations. Larger multicenter studies would improve external validity.
b. **Cross-sectional design**: Anxiety and pain were measured simultaneously, which prevents causal inference. While the correlation suggests co-occurrence, it does not establish whether anxiety causes increased pain or whether early severe pain intensifies anxiety.
c. **Lack of measurement of moderating variables**: Factors such as social support, presence of a partner or doula, childbirth education participation, self-efficacy, and coping style were not assessed. These variables have been shown to significantly influence both anxiety and pain [45].
d. **Absence of intervention assessment**: Non-pharmacological pain management methods were not incorporated or evaluated, although they are known to influence pain perception.
e. **Subjectivity of pain scores**: Pain data derived from self-reported measurement may be influenced by personal pain tolerance thresholds and individual expressive tendencies.

2) Clinical and Public Health Implications

The findings of this study have significant implications for labor management:

a. **Incorporation of anxiety screening in antenatal and intrapartum care**: Routine administration of pregnancy-related anxiety instruments could identify high-risk mothers early.
b. **Implementation of psychological and educational interventions**: Evidence-based strategies such as childbirth education classes, breathing techniques, guided relaxation, mindfulness, and cognitive-behavioral strategies could be integrated into maternal care programs.
c. **Strengthening labor support models**: Supportive presence from professionals or companions has been shown to reduce anxiety and improve pain tolerance. Emotional assurance and informational guidance serve as buffers against fear-driven pain amplification.
d. **Potential to reduce unnecessary clinical interventions**: By reducing anxiety which disrupts uterine contractility effective psychological strategies could improve labor efficiency and minimize escalation to pharmacological or surgical interventions.

3) Recommendations for Future Research

Future studies should:

Employ larger and regionally diverse samples;

a. Utilize longitudinal or prospective cohort designs;
b. Investigate moderating psychosocial variables such as coping strategies, childbirth expectations, and emotional resilience;
c. Assess the effectiveness of specific anxiety-reduction interventions;
d. Evaluate differences between primigravida and multiparous women in psychological adaptation to pain;
e. Incorporate qualitative methodologies to capture experiential narratives of labor anxiety.

V. CONCLUSION

This study aimed to determine the association between pregnancy-related anxiety and the intensity of labor pain among primigravida mothers during the first active stage of labor. The analysis revealed that nearly all respondents experienced severe anxiety, and all reported severe labor pain, with a statistically significant moderate positive correlation between anxiety and pain intensity (Spearman's $\rho = 0.48$; $p = 0.002$). These results confirm that higher maternal anxiety is linked to greater pain perception during childbirth, likely reflecting underlying psychophysiological mechanisms involving sympathetic activation and heightened sensory responsiveness. Given these findings, the integration of systematic psychological screening and non-pharmacological anxiety-reduction methods such as relaxation, breathing techniques, and emotional support should be prioritized within maternity care practices. Future research is recommended to expand the sample size across multiple hospital settings, incorporate longitudinal or prospective designs, evaluate moderating psychosocial and cultural variables, and test the effectiveness of targeted psychological interventions on reducing labor anxiety and pain. Ultimately, the findings of this study contribute to strengthening evidence-based intrapartum care by emphasizing the need to address psychological determinants alongside physiological labor management, thereby improving maternal comfort, emotional preparedness, and childbirth outcomes for primigravida women.

ACKNOWLEDGEMENTS

The authors extend sincere gratitude to RSUD Dr. Sayidiman Magetan for granting research access and logistical support during data collection. Appreciation is also conveyed to the midwifery staff who assisted in participant coordination and measurement procedures, and to all participating mothers for their willingness and cooperation. Additionally, we acknowledge the academic support from Poltekkes Kemenkes Surabaya, whose guidance significantly contributed to the completion of this work.

FUNDING

This research did not receive external funding and was self-supported by the authors.

DATA AVAILABILITY

Data supporting the findings are available from the corresponding author upon reasonable request.

e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 5 No. 6, pp. 335-340, Desember 2025

AUTHOR CONTRIBUTION

All authors contributed substantially to the development of this research. Novi Danisia Ekayanti was responsible for formulating the research concept, conducting field data collection, and performing the initial analysis. Nurlailis Saadah served as the principal supervisor, guiding the methodological design, ensuring ethical compliance, and acting as the corresponding author. Astuti Setiyani contributed to instrument validation, literature review, and drafting the preliminary manuscript. Meanwhile, Budi Joko Santosa supported advanced statistical analysis, interpreted the findings, and provided critical review of the final manuscript. All authors have read, reviewed, and approved the final version of the paper prior to submission.

DECLARATIONS

ETHICAL APPROVAL

The study received ethical approval from the Health Research Ethics Committee of Poltekkes Kemenkes Surabaya.

CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants.

COMPETING INTERESTS

The authors declare no competing interests.

REFERENCES

[1] L. Bist et al., "Childbirth preparedness and childbirth anxiety among primigravida women in a lower-middle-income country," Women and Birth, 2025.
[2] J. Nahaee et al., "Association of childbirth experience with long-term maternal outcomes," BMC Pregnancy Childbirth, 2024.
[3] M. Bagherinia et al., "Prevalence of negative birth experience: a systematic review," BMC Pregnancy Childbirth, 2025.
[4] E. O. Bodunde et al., "Pregnancy and birth complications and long-term maternal mental health," BJOG, 2025.
[5] D. He et al., "Prevalence and factors associated with fear of childbirth in women with late pregnancy," Front. Public Health, 2025.
[6] Y. Huang et al., "A comparison of childbirth self-efficacy, fear of childbirth, and labor pain intensity in primiparas and multiparas," BMC Pregnancy Childbirth, 2024.
[7] G. Nandhini and P. Mahalakshmi, "Maternal anxiety at term and its impact on childbirth: a cross-sectional study," Healthcare Bulletin, 2024.
[8] M. J. E. Naibili et al., "Relationship between knowledge level and anxiety in pregnant women toward labor," J. Ilmu Keperawatan, 2022.
[9] M. Nikpour et al., "Comparing fear of childbirth and labor pain intensity in multiparous and primiparous women," J. Midwifery Reprod. Health, 2024.
[10] A. Kedir et al., "Mode of delivery preferences: the role of childbirth fear and related factors," Front. Psychol., 2023.
[11] W. Nori et al., "Non-pharmacological pain management in labor: an updated review," Cureus, vol. 15, 2023.
[12] W. T. Elgzar et al., "Non-pharmacological labor pain relief methods: a systematic review," Reprod. Health, 2024.
[13] A. A. Mohammed and E. M. Abed, "Efficacy of non-pharmacological interventions for labor pain reduction: a systematic review and meta-analysis," Afr. J. Reprod. Health, 2025.
[14] S. Barut et al., "Trends and hotspots of research on non-pharmacological interventions for labor pain: a bibliometric analysis," J. Psychosom. Obstet. Gynaecol., 2024.
[15] L. Abikou et al., "Healthcare providers' utilization of nonpharmacological pain management during labor," J. Obstet. Gynecol. Neonatal Nurs., 2024.
[16] T. Xie et al., "Psychometric evaluation of the Pregnancy-Related Anxiety Questionnaire-Revised 2 in Chinese pregnant women," Midwifery, 2022.
[17] R. Shirabe et al., "Responsiveness of the Japanese version of the Pregnancy-Related Anxiety Questionnaire–Revised 2," J. Obstet. Gynaecol. Res., 2025.
[18] W. Kurniawati et al., "Validation of the pregnancy-related anxiety scale for pregnant women in Indonesia," BMC Pregnancy Childbirth, 2025.
[19] ResRef, "Pregnancy-Related Anxiety Questionnaire–Revised 2: A guide for researchers and clinicians," 2025.
[20] Y. B. Çelenk et al., "Pregnancy-related anxiety and associated factors among pregnant women in primary care," Fam. Pract. Palliat. Care, 2024.
[21] "Identification of labor pain in mothers in the active phase of labor," J. Kebidanan Malahayati, 2025.
[22] N. Noorlinda et al., "Effectiveness of hypnobirthing for reducing anxiety before childbirth," J. Community Health Sci., 2025.
[23] D. E. Anuhgera et al., "Effect of progressive muscle relaxation on fear of childbirth in primigravida women," J. Kesehatan Keluarga, 2025.
[24] N. D. Ekayanti et al., "Association between anxiety and labor pain intensity during the first stage of active labor in primigravidas," Int. J. Adv. Health Sci. Technol., vol. 5, no. 6, pp. 328–334, 2025.
[25] R. Rodrigues *et al*., "Cross-sectional designs in perinatal mental health research," *J. Reprod. Maternal Health*, 2024.
[26] B. Andresen *et al*., "Best practices for observational design in labor-related psychological research," *Women & Birth*, 2023.
[27] D. Alencar and P. Gomes, "Sampling strategies in clinical obstetric research," *Clin. Nursing Stud.*, 2022.
[28] K. Kalok *et al*., "Psychosocial determinants of childbirth fear among Asian women," *Healthcare*, vol. 13, 2025.
[29] T. Xie *et al*., "Psychometric evaluation of the PRAQ-R2 in Chinese pregnant women," *Midwifery*, 2022.
[30] W. Kurniawati *et al*., "Validation of the pregnancy-related anxiety scale for Indonesian women," *BMC Pregnancy Childbirth*, 2025.
[31] A. Grant and H. Wooten, "Pain measurement in obstetrics: reliability of NRS tools," *Int. J. Pain Res.*, 2023.
[32] Y. Hirano and L. Carter, "Quantitative analysis of anxiety-pain correlations in labor," *Midwifery Sci. Int.*, 2025.
[33] G. Y. Potts and F. Biagi, "Non-parametric correlation methods in clinical data," *Stat. Med.*, 2021.
[34] A. Salazar *et al*., "Ethical governance in childbirth-related research," *Global Bioethics Review*, 2024.
[35] N. Erbas *et al*., "Maternal stress response and hormonal pathways affecting labor," *J. Women's Health Res.*, 2025.
[36] B. Cavinato *et al*., "Anxiety and pain neurocircuitry: implications for obstetric pain," *Pain Med.*, 2024.
[37] H. Matsumoto *et al*., "Stress, cortisol levels, and pain perception in laboring women," *Front. Psychol.*, 2024.
[38] M. Tank *et al*., "Physiological differences in labor pain between primiparous and multiparous women," *BMC Women's Health*, 2025.
[39] R. Septina and N. Rahmawati, "Therapeutic communication and anxiety of primigravidas facing labor," *J. Kebidanan Malahayati*, 2024.
[40] B. Gürsoy and N. Gümüş, "Fear of birth and prenatal variables in pregnant women," *BMC Pregnancy Childbirth*, 2025.
[41] C. Alemu *et al*., "Fear of childbirth and associated factors among pregnant women in Northwest Ethiopia," *Sci. Rep.*, 2024.
[42] U. Nazir and U. Amin, "Fear of childbirth among primigravidas," *Indian Med. Gazette*, 2024.
[43] J. C. Nascimento *et al*., "Aromatherapy for acute pain relief: Meta-analysis," *Comp. Ther. Clin. Pract.*, 2022.
[44] W. Kurniawati *et al*., "Validation of pregnancy-related anxiety scale for Indonesian women," *BMC Pregnancy Childbirth*, 2025.
[45] I. Hildingsson *et al*., "Cluster analysis of childbirth anxiety, depression, and childbirth self-efficacy," *J. Obstet. Gynecol. Neonatal Nurs.*, 2024