

A Comprehensive Study of the Dynamic Interaction Between Normal Labor Pain and Maternal Anxiety Levels: A Multivariable Approach to Analyzing Psychophysiological Influences and Subjective Perceptions

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Abstract

Normal labor is a complex physical and emotional experience for a mother, with pain being a major element in this process. The interaction between labor pain and maternal anxiety levels is an aspect that requires in-depth understanding, given its influence on the psychophysical well-being of both mother and baby. Although the scientific literature has highlighted the importance of pain and anxiety management during labor, comprehensive studies that consider the psychophysiological and subjective perceptual influences on this dynamic interaction are limited. Therefore, this study aimed to explore the relationship between pain in normal labor and maternal anxiety levels through a multivariable approach. This research method uses a quantitative approach with an analytic observational research type. The research design was conducted prospectively. This research method involves maternal respondents who experience normal labor, with data collection through measuring anxiety levels using standardized questionnaires and psychophysiological analysis using objectively measured parameters. In addition, a multivariable approach was used to analyze the complexity of the interaction between the variables involved. The sample size was 100 laboring mothers, randomly selected from the population of mothers who met the inclusion criteria. The population was mothers giving birth at TPMB Midwife Delima in Bandung City. Using cluster sampling, only 40 pomegranate midwives (10 sub-districts) were taken from a total of 127 pomegranate midwives from 30 sub-districts. The results showed that the average level of pain during labor reached 6.8 with an average duration of 8 hours. The average maternal anxiety level reached 55 on a scale of 0-100. A significant correlation was found between pain and anxiety ($r = 0.68$, $p < 0.05$), while psychophysiological influences such as frequency of uterine contractions and blood pressure also played a role in the experience of pain. Social support was also shown to influence anxiety levels ($p = 0.005$). These findings illustrate the complexity of interactions between psychophysiological and social aspects in the context of normal labor, providing a basis for the development of more targeted intervention strategies in the management of maternal pain and anxiety. The conclusion of this study shows that there is a significant relationship between pain in normal labor and maternal anxiety levels. Psychophysiological influences, such as frequency of uterine contractions and blood pressure, as well as social support, play an important role in determining the mother's experience during labor. Therefore, increased attention to pain management and provision of adequate social support may be key to reducing maternal anxiety levels. A suggestion for health practitioners is to strengthen efforts to integrate holistic pain management strategies and enhance aspects of social support during normal labor, in the hope of improving the mother's overall emotional and physical well-being.

Keywords: Labor Pain, Anxiety.

A. INTRODUCTION

Normal labor is a natural event experienced by most women in the world, but is often accompanied by the experience of significant pain (Kuswandi, 2014). This process involves complex interactions between psychophysiological factors and subjective perceptions, which can influence maternal anxiety levels. Although the management of pain and anxiety in labor has become a focus of attention in midwifery practice, an in-depth understanding of the dynamic interactions between the two still requires further exploration. To address this knowledge gap, this study was conducted involving 100 laboring mothers from 40 midwife practices. The research method involved careful data collection related to labor pain, anxiety levels, psychophysiological factors, and subjective perceptions. Mean pain levels, duration of labor, and anxiety scales were the main focus of analysis to identify possible patterns of relationships between these variables. Thus, this study not only aimed to gain a deeper understanding of the influence of pain on maternal anxiety levels during labor, but also to provide a basis for the development of more effective interventions.

In the context of maternal health, this study is expected to provide a more holistic understanding of maternal experiences during normal labor. By exploring the interplay between psychophysiological factors and subjective perceptions, the results of this study may provide a basis for changing approaches to the management of maternal pain and anxiety during labor. The implications of these findings are expected to improve mothers' emotional and physical well-being and provide guidance for health practitioners in providing more personalized and targeted care. By involving participants from various midwife practices, this study is also expected to provide a more representative and diverse picture of the normal childbirth experience. As a contribution to the scientific literature, this study is expected to serve as a foundation for further research and the development of health policies that prioritize psychological aspects in maternal health services.

This study aims to analyze the dynamic interaction between pain in normal labor and maternal anxiety levels. Involving 100 mothers from 40 midwife practices, this study will analyze the average pain level, duration of labor, and anxiety scale to identify patterns of relationships between these variables. The research objectives include analyzing the relationship between pain and anxiety, evaluating the influence of psychophysiological factors such as frequency of uterine contractions and blood pressure, and examining the role of social support in influencing maternal anxiety levels during labor. By achieving these objectives, the study is expected to provide an empirical basis for the development of more targeted intervention strategies in the management of maternal pain and anxiety during labor, with a positive impact on maternal emotional and physical well-being and provide guidance for health practitioners in providing more personalized and targeted care.

B. METHODS

This study included a type of quantitative research, analytic observational correlation research method, prospective research design. This research method

involves maternal respondents who experience normal labor, with data collection through measuring anxiety levels using standardized questionnaires and psychophysiological analysis using objectively measured parameters. In addition, a multivariable approach was used to analyze the complexity of the interaction between the variables involved. The number of samples taken was 100 laboring mothers, who were randomly selected from the population of mothers who met the inclusion criteria. The population was mothers giving birth at TPMB Midwife Delima in Bandung City. Using cluster sampling, only 40 pomegranate midwives (10 sub-districts) were taken from a total of 127 pomegranate midwives from 30 sub-districts.

C. RESULTS AND DISCUSSION

1. Level of Labor Pain, Duration of Pain and Anxiety Level of Normal Delivery Mothers

Table 1. Mean Pain Level, Pain Duration and Anxiety Level of Laboring Mothers (n = 100)

| Variable | Mean |
|------------------------|------------------|
| Labor Pain Level | 6,8 (scale 0-10) |
| Duration of Labor Pain | 8 (hours) |
| Anxiety Level | 55 (0-100) |

In this study, 100 normal birthing mothers were involved to investigate the level of pain in labor. Statistical analysis showed that the mean pain level experienced by the mothers was 6.8. This pain level scale may reflect the mothers' subjective perception of the intensity of pain during labor. In addition, the duration of labor was also the focus of the study, and results showed that the mean value of labor duration was 8 hours. The duration of labor recorded in hours gives an idea of the length of labor generally experienced by the women in this study.

The statistical table above provides an overview of the anxiety levels of the 100 women who experienced normal labor in this study. The mean anxiety level of 55, measured on a scale of 0 to 100, reflects the average mother's assessment of the level of anxiety they experienced during labor. The mean value obtained indicates that in general, mothers in this study rated their anxiety level as moderate (in the middle of the 0 - 100 scale). This interpretation may provide an understanding of the extent to which normal laboring mothers in this study felt relatively moderate levels of anxiety.

2. Psychophysiology As Part of the Multivariable Influencing Labor Pain

Table 2. Effect of Blood Pressure and Frequency of Uterine Contractions on Labor Pain

| Variable | Labor Pain | |
|-----------------------------------|---------------------|----------|
| | Pearson Correlation | ρ -Value |
| Blood pressure | - 0,30 | 0,003 |
| Frequency of Uterine Contractions | 0,5 | 0,0005 |

The correlation analysis table above reflects the relationship between the variables of blood pressure and frequency of uterine contractions, with the level of labor pain in 100 normal laboring mothers. In the interpretation of these results, it indicates that blood pressure and frequency of uterine contractions have a significant effect on the level of labor pain.

3. Subjective Perception as Part of the Multivariables Affecting Maternal Anxiety Levels

Table 3. Effect of Social Support on Anxiety Levels of Laboring Mothers

| Variable | Anxiety Level | |
|-------------------------------|-------------------------|---------------|
| | Coefficient Correlation | ρ -Value |
| Social support (scale 0 – 10) | - 0,35 | 0,003 |

This table shows the results of the correlation test between the variables of social support and anxiety level. The negative *Pearson* correlation coefficient (-0.35) indicates a negative linear relationship between the two variables. A p value of less than 0.05 indicates that this relationship is significant.

This study obtained a discussion that explains the dynamics of the interaction between pain and anxiety levels in 100 laboring mothers, representative of 40 midwife practices. The main findings indicated that mothers who experienced normal labor faced an average pain level of 6.8 with an average duration of 8 hours. Meanwhile, the average anxiety level reached 55 on a scale of 0-100. These results reflect the complexity of the birth experience, which is not only limited to the physical dimension, but also includes psychological aspects. The maternity experience is not only limited to the physical dimension, but also includes psychological aspects. Some of the psychological factors that influence maternity experience include psychological state, stress, feelings of comfort, pleasure, anxiety, and support received. A phenomenological study found that primiparous mothers felt a deep sense of meaning, pleasure, and constraint when caring for the baby, as well as expectations of the help of health workers (Idriani, 2008). In addition, psychological conditions such as baby blues syndrome also affect mothers' experiences after childbirth, which can be characterized by feelings of sadness, anxiety, and stress (Ningrum SP., 2017; Rahmawati AF., 2018). In addition, the birth experience is also influenced by factors such as the support of her husband, family, and surrounding environment. This demonstrates the complexity of the maternity experience, which involves both physical and psychological aspects (Rahayuningsih, 2021).

Correlation analysis showed a significant relationship between pain and maternal anxiety levels. This strong positive correlation provides a deeper understanding of how pain perception may affect maternal anxiety levels during normal labor. This result is in line with previous research findings which suggest that physical discomfort can significantly contribute to anxiety levels (J Natalie, et al., 2017). In addition, psychophysiological influences, such as frequency of uterine contractions and blood pressure, also play an important role in the experience of pain.

These findings create a more comprehensive understanding of the factors that may influence maternal discomfort levels. Therefore, pain management in normal labor should consider these psychophysiological aspects to achieve a more holistic approach (Sternach, 1968; Jijimole et al., 2018). Blood pressure, as one of the vital parameters reflecting the health condition of the mother, was found to have a significant influence on the level of labor pain. The correlation found suggests that fluctuations in blood pressure may be an important predictor in evaluating maternal comfort levels during labor. This finding is in line with previous studies that have shown an association between blood pressure variability and pain perception in other medical contexts (Lowdermilk DL., et al., 2020). In addition, the frequency of uterine contractions also emerged as an influential variable. A high frequency of uterine contractions correlated with more intense pain levels, implying that careful monitoring of contraction activity may be a useful strategy in labor pain management. Previous research by Lee et al. (2016) showed that monitoring uterine contractions can assist in planning earlier interventions to manage pain.

Social support was found to have a significant impact on maternal anxiety levels during labor. This social factor suggests that interventions involving social support, including the supportive role of family or partners, could potentially reduce anxiety levels in laboring mothers (Abbas et al., 2019; Sarason et al., 1996). Previous studies support these findings, highlighting the importance of social support in coping with stress and anxiety during significant health events (Reid KM. & Taylor MG., 2015). It is important to note that maternal anxiety levels during labor can be influenced by a variety of factors, including social support, previous experiences, and the delivery environment (Jalal M., et al., 2017; Whitburn LY., et al., 2019). Therefore, the results from this study may provide valuable insights for maternal health practitioners in designing a more holistic care approach that takes into account the psychological aspects of mothers during labor. In addition, the mean values generated can serve as a comparison for future studies as well as a basis for comparison between groups of mothers experiencing different levels of anxiety (Oakley, 2018).

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D. CONCLUSION

From the results of data analysis, it can be concluded that: 1) There is a significant correlation between the level of pain in normal labor and the level of maternal anxiety. This result confirms that the experience of pain during labor can substantially affect maternal anxiety levels; 2) The research findings provide a more comprehensive understanding of the psychophysiological factors that influence the experience of pain. Frequency of uterine contractions and blood pressure were shown to have a significant influence on anxiety levels. This signifies the complexity of the interaction between physical and psychological aspects in the context of normal labor; and 3) Social support was found to play an important role in influencing maternal anxiety levels during labor. With a significant value ($p = 0.005$), this finding underscores that interventions involving social support can be an effective strategy to reduce maternal anxiety levels.

The study conclusions provide a strong basis for the development of more targeted intervention strategies in the management of maternal pain and anxiety during labor. By considering the dynamic interplay between psychophysiological and social factors, health practitioners can design holistic and customized care approaches. This study contributes to the understanding of the scientific literature regarding the psychophysiological and social aspects that influence the labor experience. Recommendations for future research include further exploration of factors that may moderate or amplify the interaction between pain and anxiety levels, as well as intervention trials that focus more on social support.

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