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Original Article

Using epidural analgesia management in primiparous women for painless labor

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Purpose: Clinically, painless labor is a widely used method to alleviate the physical discomfort experienced by pregnant women. However, this approach often overlooks the psychological factors affecting pain expression. Neglecting these factors may lead to clinical issues, such as labor cognition of pregnant women, postpartum depression, and decreased willingness to continue to get pregnant. To address this gap, the present study explores using epidural analgesia management in primiparous women for painless labor.

Methods: The study included 101 respondents who met the study's criteria. The study used a questionnaire, the modified Pain Control Satisfaction Scale (American Pain Society Patient Outcome Questionnaire, APS-POQ), and the State-Trait Anxiety Inventory Trait Anxiety (STAI-T).

Results: There was no significant relationship between pain level and satisfaction before and after primiparous women received epidural analgesia management. However, after the painless labor intervention, trait anxiety was statistically significant. The degree of overall pain was significantly and positively correlated with the degree of trait anxiety after easy labor ($r = .30$, $p = .002$), indicating that the higher the degree of pain perceived by the parturient, the higher the degree of trait anxiety after painless labor.

Conclusion: These findings have practical implications for future clinical medical staff when managing painless labor. Providing psychological support and education on pregnant women's hygiene during labor is crucial for the delivery process of the mother. This can improve maternal awareness of labor and increase maternal willingness to give birth while reducing possible complications and medical costs.

Keywords: epidural analgesia, painless labor, primiparous women, satisfaction, state-Trait Anxiety

1. Introduction

Pain is a highly subjective and personal experience that varies from one individual and is often described as an unpleasant sensation and emotion. During labor, pain is a significant source of discomfort for the mother. It is closely linked to the frequency and intensity of uterine contractions, which progressively increase as delivery progresses (1). The pain experienced during labor has tremendous consequences on the mother's psychological well-being and may also be influenced by sociocultural factors (2). The study indicated that 80% of primiparas experience labor pains that exceed their expectations, characterized by prolonged and intense contractions that can be unbearable. Compared to multiparous women, primiparous women have

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lower pain tolerance, with an 87% difference in pain control, and frequently report feeling body pain and discomfort (3). Consequently, childbirth pain is considered one of life's most painful and unforgettable experiences. Therefore, maternal access to pain management during labor is essential (4).

In many countries, it has been suggested that women use painlessness during labor as the best choice to alleviate natural labor pain. Studies have shown that epidural anesthesia is more effective than non-epidural anesthesia in reducing labor pain and improving maternal pain satisfaction (5). However, satisfaction with good outcomes does not necessarily come from effective pain relief alone. Uncertainty about pain, unfamiliarity with the process, fear or concern regarding labor, and discomfort with the overall experience can affect the satisfaction of primiparous women with pain management during labor (6). Satisfaction during labor does not necessarily correlate directly with pain or pain relief. A woman's happiness with her labor process depends on several factors, including her sense of control, her support, the intensity of pain experienced during labor, and her relationship with the caregiver (7).

The physiological and psychological changes of parturients during pregnancy may be associated with stress (8). During childbirth, if the stress is uncontrolled, the parturient often feels fear and anxiety; labor fear is from 10% to 50% of cases (9). More studies have shown that negative emotional states affect about 7.6-8.8% of mothers during childbirth (10), with primiparas being more prone to experiencing such negative emotions and more severe symptoms (11). Anxiety during pregnancy has also been associated with an increased risk of postpartum depression and adverse outcomes for the fetus (12). The sensory experience of pain is related to emotions. Studies have shown that anxiety reduces pain tolerance and enhances pain perception. It is believed that anxiety reduces the threshold of pain tolerance and increases pain perception (13).

Painless labor is known to be more effective and satisfactory compared to other forms of non-epidural anesthesia. However, clinical observations show that the overall satisfaction rate with easy labor is still low. To address this issue, this study aims to investigate the pain control effects of painless labor interventions on primiparous women and assess their satisfaction levels. The results of this study may help alleviate fear and anxiety associated with labor pain, reduce postpartum sleep disorders and depression, and improve the willingness of women to continue pregnancy. Furthermore, the study findings may serve as a valuable reference for anesthesia nurses to promote painless labor.

2. Materials and methods

2.1 Study design

The Research Ethics Committee of CS1-21110 approved the study protocol. This study employs a cross-sectional research design and selects primiparous women who gave birth spontaneously at a teaching hospital in Taichung City as the survey participants through purposive sampling. The official data collection period was from September 29, 2021, to September 28, 2022.

2.2 Patients selection

The inclusion criteria are:(1) Primiparous and experiencing spontaneous vaginal delivery; (2) Normal course of pregnancy; (3) Conscious and capable of verbal expression; (4) Cervical dilation has commenced and progressed to 3-4 centimeters. The exclusion criteria are contraindications to anesthesia allergy or epidural anesthesia, such as coagulation disorders, needle puncture site infections, refusal or inability of the parturient to cooperate with the positioning requirements, chronic pain patients, or patients with emotional or psychological problems. A total of 102 patients met the inclusion criteria. However, one patient was excluded due to incomplete answers. The last 101 people participated in the research. Inform the participants that the anesthesia personnel will administer the first questionnaire survey when the cervix is dilated by 1-2 centimeters, and another follow-up assessment will be performed after the removal of the epidural catheter and equipment.

2.3 Research questionnaire

This study used a structured questionnaire as a tool for data collection. The questionnaire included the Numeric Rating Scale (Numeric Rating Scale, NRS)

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(14), APS Pain Control Satisfaction Scale, and State-Trait Anxiety Inventory Trait Anxiety (STAI-T). This study is based on the Patient Outcome Questionnaire (APS-POQ) assessment questionnaire compiled by the American Pain Society (APS) in 1995 and the Taiwanese version of the APS Pain Satisfaction in the study by Li et al. (2006) (15). Modified from the scale of treatment effectiveness, which has been authorized and agreed to be used by the original author and revised by the suggestions of five clinical experts. Higher scores indicate higher satisfaction with inpatient pain control. The questionnaire had a total of 15 questions. The reliability and validity analysis of the questionnaire has good reliability and validity. STAI-T refers to a person's anxiety status in a long-term and stable situation. There are 20 self-reported questions in each questionnaire to measure the subjective anxiety feelings of primiparas in this study before and after accepting pain-reducing delivery. The internal consistency reliability of the trait anxiety scale in this study is 0.86. The retest reliability of the trait anxiety scale at one-week intervals is 0.76, indicating that both the situational anxiety scale and the trait scale have good internal consistency. According to " Cronbach's αcoefficient," the acceptable range of value is 0.7-0.9, which shows that the scale measures the same characteristics, indicating that the scale has good internal consistency (16). Both subscales have good internal reliability, test-retest reliability, and convergent and discriminant validity for patients.

2.4 Statistical analysis

The data were coded and entered into a computer for accuracy checking, and statistical analysis was performed using SPSS for Windows 22.0 software. An alpha value of .05 was set as the level of statistical significance. Descriptive and inferential statistics were used for data analysis based on the research objectives, structure, and variable characteristics. Descriptive statistics methods, such as frequency distribution, percentage, mean, standard deviation, maximum value, and minimum value, were used to describe the distribution of independent and dependent variables. Inferential statistical methods used an independent sample t-test, a single one-way ANOVA test with Scheffe's method for post hoc comparisons, and Pearson Correlation Coefficient and multiple linear regression were conducted to analyze the predictors.

3. Results

According to Pinheiro (2019), in age stratification, the age is divided into non-advanced maternal age and advanced maternal age: non-advanced maternal age (20-34 years old), and women of advanced maternal age (≥ 35 years old) (17). The average age of primiparous women was 31.26, most young and middle-aged. Regarding education level, most college degrees or above. The most common occupation was business. Among past surgical records, the majority of patients had no prior surgeries. In terms of chronic diseases, most had no chronic illnesses. In terms of obstetric history, most had no history of obstetric conditions. Regarding miscarriage history, most had no history of miscarriage (Table 1).

Use Independent Sample t-test (Independent Sample t-test) and one-way ANOVA (One-way ANOVA) to explore categorical "personal basic information" (including education level, age, occupation, past surgery history, chronic diseases, Obstetric disease history, miscarriage history) in the "Pain degree after painless labor," "Degree of pain influence" and "Painless labor satisfaction." If the F-test of one-way ANOVA is significant (assuming $\alpha = .05$), the Schaffer method was used for post hoc comparison. Then, the results of Pearson correlation analysis for continuous variables showed that in terms of pain impact, the statistics of "age" and "chronic disease" reached a significant level ($p < .05$). A clear correlation exists in the degree of pain impact. However, pain degree after painless labor and painless labor satisfaction has no statistical significance with primary personal data (Table 2).

The average level of overall trait anxiety before the injection was 43.31, with a standard deviation of 10.96, which was a moderate level of anxiety in the range of 20 to 80 points on the scale. The average anxiety level of the trait after the sparring was 36.84, with a standard deviation of 9.41. The score range of the scale was between 20 and 80 points, which belonged to a moderately low anxiety level. Compared with before the sparring, it can be seen that the anxiety

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Table 1. Basic Demographic Information (N=101)

Characteristics	N=101	%	M	SD
Age (average)			31.26	4.64
18 - 34 year	80	79.2	29.64	3.62
35 - 44 year	21	20.8	37.43	2.38
Education level				
Junior high school	1	1.0		
Senior high school	3	3.0		
University and above	97	96.0		
Occupation				
Civil servant	14	13.9		
Work	14	13.9		
Business	38	37.6		
Medical care	24	23.8		
Housekeeping	11	10.9		
Past Surgical Records				
Yes	21	20.8		
No	80	79.2		
Chronic disease				
Yes	12	11.9		
No	89	88.1		
Obstetric history				
Yes	25	24.8		
No	76	75.2		
Miscarriage history				
Yes	28	27.7		
No	73	72.3		

n: number

level has decreased (Figure 1). Regarding anxiety after painless labor, only the statistics of 'miscarriage history' reached a significant level ($p < .05$), indicating that this basic information correlates significantly with maternal anxiety after painless labor. Further comparison shows that the anxiety level of primiparas without a history of miscarriage is significantly higher than those with a history of miscarriage. As for other primary data, there is no significant relationship with the level of anxiety of postpartum mothers after pain-reducing delivery (Table 3).

After selecting the variables that were significantly correlated with pain degree after painless labor, degree of pain influence, and painless labor satisfaction, only chronic diseases were found to be required for performing regression analysis on pain

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Table 2. Correlation between basic data with pain assessment and management satisfaction (N=101)

Characteristics	N	Pain degree after painless labor			Degree of pain influence			Painless labor satisfaction		
		M±SD	t	P	M±SD	t	P	M±SD	t	P
Age			1.42	.160 [a]		-0.72	.478 [a]		0.12	.907 [a]
18 - 34 year	80	2.40 ± 1.77			4.31 ± 3.03			4.72 ± 0.44		
35 - 44 year	21	1.81 ± 1.40			4.95 ± 3.77			4.70 ± 0.46		
Occupation			1.27	.287 [b]		1.17 [b]	.327		0.38	.822 [b]
Civil servant	14	1.79 ± 1.31			5.07 ± 3.62			4.76 ± 0.42		
Work	14	1.79 ± 1.42			2.79 ± 2.78			4.74 ± 0.40		
Business	38	2.21 ± 1.63			4.64 ± 3.45			4.68 ± 0.45		
Medical care	24	2.79 ± 1.86			4.58 ± 2.89			4.78 ± 0.44		
Housekeeping	11	2.64 ± 2.25			4.80 ± 2.55			4.60 ± 0.54		
Past Surgical Records			-0.26	.795 [a]		0.34	.737 [a]		0.66	.512 [a]
Yes	21	2.19 ± 1.40			4.65 ± 2.98			4.77 ± 0.43		
No	80	2.30 ± 1.79			4.39 ± 3.25			4.70 ± 0.45		
Chronic disease			1.02	.310 [a]		2.23	.028 [a*]		-1.27	.227 [a]
Yes	12	2.75 ± 1.82			6.33 ± 3.63			4.52 ± 0.59		
No	89	2.21 ± 1.70			4.19 ± 3.05			4.74 ± 0.41		
Obstetric history			1.23	.227 [a]		1.90	.061 [a]		0.38	.705 [a]
Yes	25	2.72 ± 2.23			5.48 ± 3.18			4.74 ± 0.44		
No	76	2.13 ± 1.49			4.11 ± 3.13			4.71 ± 0.44		
Miscarriage history			0.36	.721 [a]		-0.16	.875 [a]		-1.00	.320 [a]
Yes	28	2.18 ± 1.33			4.53 ± 2.87			4.79 ± 0.40		
No	73	2.32 ± 1.84			4.41 ± 3.31			4.69 ± 0.46		

Descriptive statistics for each group are presented as mean ± standard deviation
[a] Independent samples t-test, [b] One-way ANOVA,
M: mean, SD: standard deviation,
*P value < 0.05

impact degree. The F-test of the regression model was significant (F = 3.78, p = .026). The regression coefficient of chronic disease (β = .23, p = .022) reached a significant level. The regression coefficient was positive, indicating primiparous women with chronic illness have a higher degree of pain influence and awareness (Table 4).

To select the variables significantly correlated

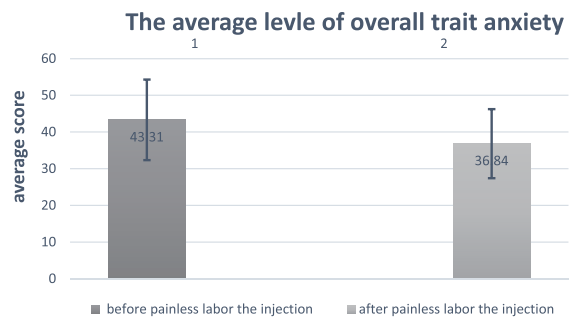


Figure 1. Before and after painless labor injection for trait anxiety

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Table 3. Correlation between basic data and trait anxiety (N=101)

Characteristics	N	Anxiety before painless labor			Anxiety after painless labor		
		M ± SD	t / F / r	p	M ± SD	t / F / r	p
Age			-1.16	.251 [a]		-1.02	.308 [a]
18 - 34 year	80	42.66 ± 11.01			36.35 ± 9.75		
35 - 44 year	21	45.76 ± 10.68			38.71 ± 7.93		
Occupation			1.25	.295 [b]		1.58	.187
Civil servant	14	45.50 ± 13.49			38.79 ± 11.04		
Work	14	38.07 ± 11.08			31.29 ± 6.71		
Business	38	45.00 ± 10.19			37.53 ± 9.00		
Medical care	24	43.21 ± 11.50			36.96 ± 10.28		
Housekeeping	11	41.55 ± 7.55			38.82 ± 8.48		
Past Surgical Records			-0.72	.471 [a]		-0.80	.427 [a]
Yes	21	41.76 ± 10.05			35.38 ± 8.05		
No	80	43.71 ± 11.21			37.23 ± 9.75		
Chronic disease			-0.19	.852 [a]		-0.39	.695 [a]
Yes	12	42.75 ± 9.41			35.83 ± 8.76		
No	89	43.38 ± 11.20			36.98 ± 9.54		
Obstetric history			-1.13	.261 [a]		-0.48	.636 [a]
Yes	25	41.16 ± 9.41			36.16 ± 7.60		
No	76	44.01 ± 11.39			37.07 ± 9.97		
Miscarriage history			0.70	.486 [a]		2.48	.015 [a*]
Yes	28	42.07 ± 9.99			33.82 ± 6.34		
No	73	43.78 ± 11.34			38.00 ± 10.15		

Descriptive statistics for each group are presented as mean ± standard deviation
[a] Independent samples t-test, [b] One-way ANOVA
M: mean, SD: standard deviation
*P value < 0.05

with anxiety before and after pain-reducing delivery injection as influencing factors, only the history of miscarriage was included for regression analysis. The F-test of the regression model was significant ($F = 4.11$, $p = .045$), indicating maybe the predictive ability for the degree of anxiety after injection in pain-reducing delivery. The regression coefficient of the history of miscarriage ($\beta = -.20$, $p = .044$) was significant, indicating a negative regression coefficient. This suggests that primiparous women with a history of miscarriage had lower anxiety levels after pain-reducing delivery (Table 4).

The degree of overall pain was significantly and positively correlated with the degree of trait anxiety after painless labor ($r = .30$, $p = .002$), indicating that the higher the degree of pain perceived by the parturient, the higher the degree of trait anxiety after painless labor. Similarly, the overall pain influence

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Table 4. Regression coefficient analysis for predicting the degree of pain influence and anxiety after painless labor

Characteristics	B Coefficient	Standardized Coefficient	P	95% CI of the difference		R^2
				lower	upper	
Chronic disease [a]						.004
Yes	2.22	.23	.022*	0.33	4.12	
No						
Miscarriage history [b]						.040
Yes	-4.23	-.20	.044*	-8.34	-0.11	
No						

[a] predicting the degree of pain influence; The reference group for age is young adults, while the reference group for chronic diseases is individuals without chronic illnesses.
[b] predicting the degree of anxiety after painless labor; The reference group for miscarriage history is individuals without any history of miscarriage
R^2: Coefficient of determination
*P value < 0.05

Table 5. Pearson product-moment correlation analysis for pain assessment and satisfaction with pain management and degree of trait anxiety

Assessment of pain and satisfaction with painless labor	Degree of trait anxiety			
	Before painless labor r	P	After painless labor r	P
Overall pain degree	.07	.499	.30	.002*
Overall pain influence	.18	.071	.31	.002*
Overall satisfaction	-.20	.045*	-.28	.004*

r: Pearson Correlation Coefficient
*P value < 0.05

was significantly and positively correlated with the degree of trait anxiety after painless labor (r = .31, p = .002), indicating that the higher the degree of influence of maternal perceived pain, the higher the degree of trait anxiety after painless labor. Furthermore, the overall satisfaction was significantly and negatively correlated with the degree of trait anxiety before painless labor (r = -.20, p = .045) and after easy labor (r = -.28, p = .004), suggesting that the higher the maternal satisfaction with painless labor, the lower the trait anxiety before and after the easy labor (Table 5).

4. Discussion

The study participants primarily came from a hospital in central Taiwan, with 101 cases of primiparous women participating in the study. The average age of the study participants was 31.26 years old, and according to the Ministry of the Interior, the average age of a mother is 31.43 years old. This is similar to the average age range of 20-39 years old for 124 parturients in European medical institutions in 2022 and 417 parturients receiving epidural anesthesia in a Vietnamese hospital in 2021(18). The demographic characteristics of the survey sample likely represent the general population of Taiwanese parturients who receive pain relief during childbirth.

This study used multiple logistic regression analysis to investigate the predictive power of

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demographic variables and assessment of pain and control satisfaction before and after painless labor intervention in primiparous women. However, the results did not reach statistical significance, indicating that these variables were not found to be predictive of pain assessment and control satisfaction before and after the intervention. These findings are consistent with those of Louvel et al. (2021), who found no significant difference in satisfaction with pain management with or without epidural analgesia during labor in Reunion Island (19). It is possible that the strict training of anesthesiologists and specialist nurses in Taiwan hospitals plays a role in these results. When parturients agree to receive painless labor, experienced anesthesiologists and specialist nurses provide thorough explanations and health education plans, including instructions for pain-reducing labor, the process of delivery, attention to certain details, and possible symptoms. They also provide verbal guidance to return to the delivery room and advise patients to report any discomfort immediately, with regular observations to assess the effectiveness of pain relief. Furthermore, all nurses in the delivery room receive training in pain management. Through this rigorous health education, both processes can influence a woman's understanding of painless labor.

Studies have perceived labor pain as severe, and many desired pain relief during labor (20). This study used multiple logistic regression to analyze the regression coefficient of chronic diseases reaching a significant level, maybe indicating that this variable can predict the degree of pain impact, and the regression coefficient is positive, which means that primiparous women with chronic diseases have a high perception of pain impact. Because they have experienced pain in the past, they have a higher perception of pain. Therefore, an ideal analgesic should have a rapid onset of action for parturient women and last throughout the labor process without any adverse effects on the mother or fetus (21).

Based on the regression coefficient, the history of miscarriage was a statistically significant difference, maybe indicating this variable predicts the degree of anxiety. The negative regression coefficient suggests that primiparous women who have experienced miscarriage have a lower degree of anxiety after pain-relieving delivery. These findings are consistent with those of Silva et al. (2017) in the study anxiety in pregnancy: prevalence and associated factors indicate that complications in previous pregnancies and a history of miscarriage/risk of premature birth have also been shown to be risk factors for prenatal anxiety. (22). Therefore, special attention should provide effective pain relief and emotional and psychological support for mothers with higher trait anxiety. Providing individual health education and instructions to mothers in advance would be beneficial.

Using Pearson product-moment correlation coefficient analysis, the study found a negative correlation between maternal satisfaction with pain-reducing delivery and trait anxiety before and after delivery. These results are consistent with the findings of Anim-Somuah et al. (2018) in their study comparing epidural analgesia versus non-epidural analgesia or no analgesia for labor pain management (5). Primiparous women may experience varying degrees of pain during labor, resulting in pain responses that may be influenced by various factors, such as their labor situation, environment, preparation for labor, and available support. Therefore, to better manage the production process and pain related to childbirth in primiparous women, videos can be used to improve their control during delivery, increasing their satisfaction and reducing anxiety.

Limitation

This study utilized an effective questionnaire on pain control satisfaction during labor in primiparous women. The questionnaire consisted of four items: pain level before and after administration, degree of impact, overall satisfaction, and trait anxiety. However, the scope of the study's findings is limited, and it is recommended that future research compare national and regional hospitals or conduct comprehensive surveys involving both primiparous and multiparous women to enhance the completeness of the study. We can design and implement interventional measures research to observe the difference before and after the primipara and multipara and the fullness of pain control in different stages of labor.

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