

Association of epidural analgesia with childbirth satisfaction among women with severe fear of childbirth: A cross-sectional study

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SUMMARY: The relationship between fear severity and satisfaction after vaginal delivery was examined with a focus on its association with epidural analgesia. Postpartum cross-sectional questionnaire survey was conducted among 201 healthy women after vaginal delivery in Japan. The participants completed the Japanese Wijma Delivery Experience Questionnaire (JW-DEQ) Version B and the short version of the Childbirth Experience Self-Rating Scale, and were grouped by use of epidural analgesia and/or fear severity. Data were analyzed using Spearman correlation, Mann–Whitney U, and chi-square tests. No significant association between fear and satisfaction was found in the women without epidural analgesia. The proportion of women with severe fear of childbirth, defined as a JW-DEQ Version B score ≥ 85 , was 39%. In the postpartum-recalled severe fear group, epidural analgesia was associated not only with higher overall satisfaction but also higher scores in its sub-factors: "labor pain coping" and "trust in medical staff". In contrast, epidural analgesia was associated only with "labor pain coping" score in the light fear group. Epidural analgesia induced higher childbirth satisfaction among women with severe fear. Although this study is limited by its cross-sectional design, potential recall bias, and the focus on a specific patient population, which may affect the generalizability of the findings, the factors of "labor pain coping" and "trust in medical staff" seem to be important to avoid fear of childbirth for giving childbirth satisfaction.

Keywords: Fear of childbirth, epidural analgesia, labor pain, trust

1. Introduction

Pregnancy and childbirth are major physical, psychological, and social experiences for many women. Although it can bring great joy to their families, women may experience anxiety and stress as predicting the future course of events is difficult. Hence, they often require medical help, education, social support, and self-help strategies. However, the fear of childbirth among some women exceeds the usual anxiety and leads to tokophobia, a severe fear of pregnancy and childbirth (1).

Knauer first described tokophobia in 1897 (2). Its prevalence rates in Western countries were over 20% (3,4). Meta-analyses and systematic reviews estimated that 14% of pregnant women had tokophobia (5). The Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) (3) is an evaluation tool to assess the fear of childbirth. Originally in Swedish, it has now been validated in several other languages and widely used

(6-10).

Low birth satisfaction among women with a severe fear of childbirth is a pressing issue for healthcare providers. Negative birth experiences can lead to postpartum depression and post-traumatic stress disorder (11). The prevalence of postpartum depression was approximately 14% (12). Furthermore, 3.2% of women reported post-traumatic stress disorder after childbirth (13).

Although vaginal delivery is recommended internationally owing to its advantages, women who suffer from a severe fear of childbirth can request a caesarean section instead of vaginal delivery (14). Labor pain, uncertainty of the delivery process, and uncontrollable situations, among other factors, strengthened the fear of childbirth (15). The fear of childbirth was also associated with childbirth with epidural analgesia (CwEA) and emergency caesarean section (16). Thus, we hypothesized that epidural analgesia would be associated with more positive

childbirth experiences, particularly among women with a severe fear of childbirth. This study aimed to examine the relationship between fear severity and satisfaction after vaginal delivery, with a focus on its association with epidural analgesia across different levels of fear of childbirth.

2. Patients and the Method

2.1. Patients

This study was conducted at a clinic and hospital in Japan between October and December 2017. A total of 138 and 204 pregnant women visited the clinic and hospital, respectively, for their birth care during the recruitment period. Inclusion criteria were healthy women after vaginal delivery with or without epidural analgesia. Exclusion criteria included women who were younger than 20 years old, could not complete the questionnaire, and underwent a caesarean section.

2.2. Research protocol

This study was designed as a postpartum cross-sectional questionnaire survey with prospective recruitment. The study was conducted and reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. Healthy women who had undergone vaginal delivery were recruited by a midwife or nurse at the clinic or hospital. Each participant received a detailed explanation of the study protocol and provided written informed consent. Participants completed self-reported questionnaires, which included the Japanese W-DEQ (JW-DEQ) Version B (17), the Short Version of Childbirth Experience Self-Rating Scale (CESRS) (18), and a sociodemographic information questionnaire, which included age, height, pre-pregnancy body weight, body weight at delivery, parity, gestational weeks at delivery, and birth weight, among others. They answered the questionnaires and placed them in the collection box in front of the nurses' station prior to discharge. Participants were grouped by epidural use (CwEA vs childbirth without epidural analgesia [Cw/oEA]) and fear severity (JW-DEQ \geq 85 = severe). To ensure sufficient data for analysis in the smallest subgroup, recruitment was continued until 30 women with CwEA and severe fear of childbirth were enrolled. Since no prior studies had established an effect size for this specific population, a formal power analysis was not conducted, and this study was instead positioned as an exploratory investigation. The total CESRS score was pre-specified as the primary endpoint to assess childbirth satisfaction. The study was reviewed and approved by the Ethics Committee of Kyoto University School of Medicine (No. R1170) in accordance with the Declaration of Helsinki.

2.3. Measurements

2.3.1. Japanese Wijma Delivery Experience Questionnaire Version B

The W-DEQ has been widely used to measure the fear of childbirth (3). The W-DEQ had two versions: Versions A and B measured expectations regarding fear of childbirth in the antenatal and postnatal period, respectively. Both versions compared fear levels between primiparous and multiparous women (3). Each scale comprised 33 items rated on a 6-point scale that ranged from 0 (not at all) to 5 (extremely). The total score ranged from 0 to 165 points. Higher scores indicated a greater degree of fear, with scores over 85 indicating severe fear of childbirth (3).

The W-DEQ Versions A and B were translated into Japanese and their validity and reliability were examined among pregnant and postpartum Japanese women (9,17). Cronbach's alpha (α) of the JW-DEQ Versions A and B was 0.90 and 0.95, respectively (9,17).

2.3.2. Childbirth Experience Self-Rating Scale (Short Version)

The CESRS evaluated childbirth experiences (19). This scale comprised four factors and 35 items rated on a 5-point scale that ranged from 1 (not at all) to 5 (extremely). The total score ranged from 35 to 175 points. Cronbach's α of the four factors ranged from 0.91 to 0.80.

Since the 35-item original CESRS was burdensome, Tokiwa created the CESRS (Short Version) (18). This scale comprised three factors: "labor pain coping score," "trust in medical staff score," and "childbirth process score." Furthermore, 18 items were rated on a 5-point scale, ranging from 1 (not at all) to 5 (extremely). The total score ranged from 18 to 90 points. Cronbach's α of the three factors ranged from 0.79 to 0.85 (18).

2.4. Statistical analyses

Spearman's rank correlation coefficient between the JW-DEQ and CESRS was examined (Figure 2). Statistical analyses were performed to compare each fear severity group (Tables 1 and 2) *via* a Mann-Whitney *U*-test and Pearson's chi-square test. Statistical Package Social Sciences (SPSS) version 26.0 (Japan Inc.) was used for all analyses. Two-tailed *p*-values of $<$ 0.05 were considered statistically significant.

3. Results

3.1. Fear severity and satisfaction during natural vaginal childbirth

Among the 138 and 204 postpartum women in the

clinic and hospital, respectively, 112 (81.2%) and 138 (67.6%) agreed to participate. Hence, 250 postpartum women (73.1%) were included. Of these, 24 who gave birth *via* caesarean section and 25 with missing data were excluded. Finally, data from 201 women were analyzed. We classified participants in the following way: 131 women experienced Cw/oEA and 70 CwEA (Figure 1).

Although a weak correlation tendency was observed between the postpartum-recalled fear (JW-DEQ Version B) and CESRS ($r = -0.203, p = 0.020$) among the 131 women who experienced natural vaginal delivery (Cw/oEA) (Figure 2), no statistically significant association was observed. Subsequently, differences in postpartum-recalled fear severity during childbirth were examined across JW-DEQ Version B scores (Table 1). In total, 83 women had < 85 points in the JW-DEQ Version B (light fear group) and 48 women had ≥ 85 points (severe fear group). No statistically significant differences were observed between the light and severe fear groups in terms of median age, height, pre-pregnancy body weight, body weight at delivery, rate of primipara, gestational weeks at delivery, and birth weight. Women in the light fear group had significantly higher total CESRS scores than women in the severe group. Among the sub-factors, "labor pain coping" ($p < 0.001$) and "trust in medical staff" ($p = 0.017$), were significantly different between the groups.

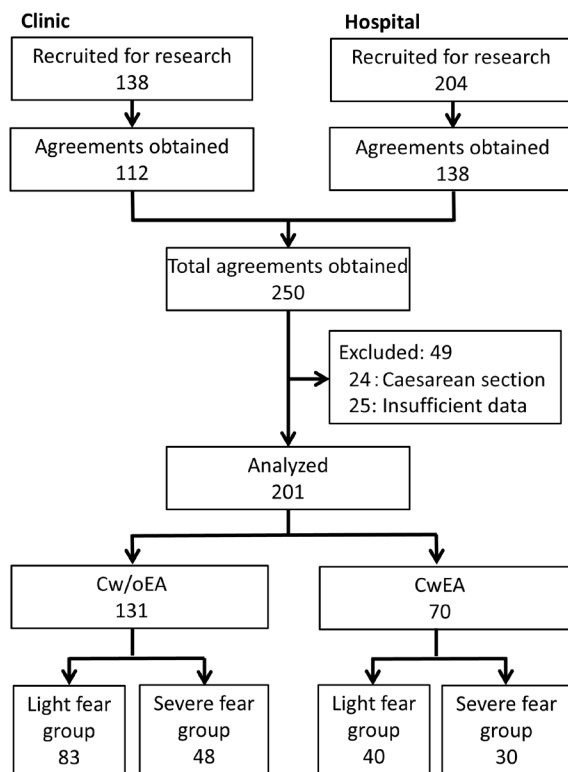


Figure 1. Flow diagrams. Abbreviations: Cw/oEA, Childbirth without epidural analgesia; CwEA, Childbirth with epidural analgesia.

3.2. Association of epidural analgesia with childbirth satisfaction across fear severity levels

In the light postpartum-recalled fear group, no statistically significant differences were observed in the median age, height, pre-pregnancy body weight, body weight at delivery, rate of primipara, gestational weeks at delivery, and birth weight between the 40 women who chose CwEA and the 83 who did not (Table 2). No statistically significant difference in total CESRS scores was observed between the groups ($p = 0.148$). Only one sub-factor, "labor pain coping," in CwEA was higher than that in Cw/oEA ($p = 0.002$).

In the severe postpartum-recalled fear group, no statistically significant differences were observed in the median height, pre-pregnancy body weight, body weight at delivery, rate of primipara, gestational weeks at delivery, and birth weight between the 30 women who chose CwEA and the 48 women who did not. The age of the women who chose CwEA was significantly higher than those who chose Cw/oEA ($p < 0.001$). The women who chose CwEA had significantly higher total CESRS scores ($p = 0.026$) than those who had Cw/oEA. The two sub-factors of "labor pain coping" ($p < 0.001$) and "trust in medical staff" ($p = 0.024$) were significantly different between the groups.

4. Discussion

We demonstrated differences in childbirth experiences associated with epidural analgesia among Japanese women with postpartum-recalled severe fear of childbirth. Among women who chose Cw/oEA, those with severe fear of childbirth had lower CESRS scores than those with light fear. Our results suggest an

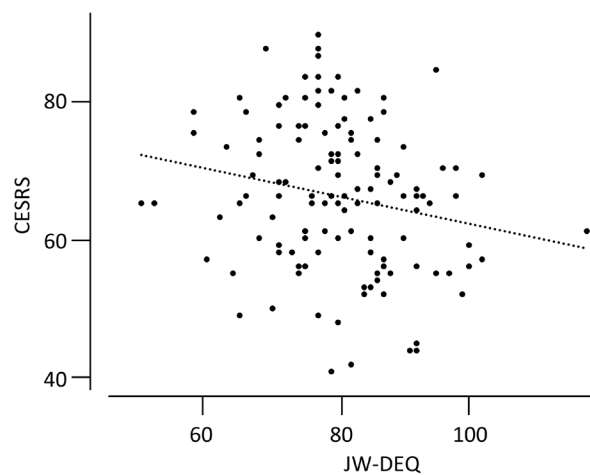


Figure 2. A correlation between the Japanese W-DEQ (JW-DEQ) and Short Version of Childbirth Experience Self-Rating Scale (CESRS) among the 131 women who experienced natural vaginal delivery ($n = 131$, Spearman's $r = -0.203, p = 0.020$). Abbreviations: JW-DEQ, Japanese Wijma Delivery Experience Questionnaire; CESRS, Childbirth Experience Self-Rating Scale.

Table 1. Characteristics of the women with Cw/oEA

Items	Cw/oEA (n = 131)		P value
	Light fear group (n = 83) Median (IQR ^a)	Severe fear group (n = 48) Median (IQR ^a)	
Age (years old)	31.0 (29.0, 34.5)	31.0 (28.0, 33.3)	0.600 ^b
Height (cm)	158.0 (155.5, 162.0)	158.0 (156.0, 162.0)	0.716 ^b
Pre-pregnancy body weight (kg)	49.8 (46.8, 56.4)	52.0 (46.9, 57.1)	0.380 ^b
Body weight at delivery (kg)	61.9 (56.1, 67.5)	61.7 (58.0, 68.0)	0.607 ^b
Primipara (n)	41	27	0.377 ^c
Gestational weeks at delivery (weeks)	39.0 (39.0, 40.0)	39.0 (39.0, 40.0)	0.793 ^b
Birth weight (g)	3076 (2912, 3378)	3155 (2951, 3361)	0.492 ^b
JW-DEQ score	76.0 (72.0, 80.5)	90.5 (87.0, 95.3)	< 0.001 ^b
CESRS			
Total score	68.0 (62.0, 77.0)	61.5 (56.0, 70.0)	< 0.001 ^b
Labor pain coping score	24.0 (20.0, 27.0)	19.5 (16.8, 24.0)	< 0.001 ^b
Trust in medical staff score	26.0 (23.0, 30.0)	24.0 (23.0, 27.0)	0.017 ^b
Childbirth process score	20.0 (17.0, 24.0)	19.5 (16.5, 21.0)	0.105 ^b

Abbreviations: JW-DEQ, Japanese Wijma Delivery Experience Questionnaire; Cw/oEA, Childbirth without epidural analgesia; CESRS, Childbirth Experience Self-Rating Scale. ^aIQR: interquartile range; ^bMann-Whitney-U test; ^cPearson's chi-square test.

Table 2. Characteristics of women in each severity group divided by JW-DEQ score

Items	Light Fear Group (n = 123)			Severe Fear Group (n = 78)		
	Cw/oEA (n = 83) Median (IQR ^a)	CwEA (n = 40) Median (IQR ^a)	P value	Cw/oEA (n = 48) Median (IQR ^a)	CwEA (n = 30) Median (IQR ^a)	P value
Age (years old)	31.0 (29.0, 34.5)	32.0 (29.0, 35.0)	0.455 ^b	31.0 (28.0, 33.3)	35.5 (32.0, 38.0)	< 0.001 ^b
Height (cm)	158.0 (155.5, 162.0)	158.0 (155.8, 162.0)	0.649 ^b	158.0 (156.0, 162.0)	160.0 (155.5, 163.0)	0.467 ^b
Pre-pregnancy body weight (kg)	49.8 (46.8, 56.4)	52.0 (47.9, 57.3)	0.304 ^b	52.0 (46.9, 57.1)	49.3 (46.3, 54.0)	0.177 ^b
Body weight at delivery (kg)	61.9 (56.1, 67.5)	62.0 (56.8, 68.0)	0.703 ^b	61.7 (58.0, 68.0)	61.5 (57.5, 65.0)	0.746 ^b
Primipara (n)	41	23	0.399 ^c	27	23	0.085 ^c
Gestational weeks at delivery (weeks)	39.0 (39.0, 40.0)	39.0 (39.0, 40.0)	0.893 ^b	39.0 (39.0, 40.0)	39.5 (38.3, 40.0)	0.781 ^b
Birth weight (g)	3076 (2912, 3378)	3040 (2885, 3325)	0.595 ^b	3155 (2951, 3361)	3049 (2750, 3270)	0.101 ^b
JW-DEQ score	76.0 (72.0, 80.5)	74.5 (72.0, 79.0)	0.226 ^b	90.5 (87.0, 95.3)	90.5 (87.0, 94.0)	0.897 ^b
CESRS						
Total score	68.0 (62.0, 77.0)	72.5 (66.8, 78.0)	0.148 ^b	61.5 (56.0, 70.0)	69.5 (59.5, 75.5)	0.026 ^b
Labor pain coping score	24.0 (20.0, 27.0)	26.0 (24.8, 30.0)	0.002 ^b	19.5 (16.8, 24.0)	25.0 (21.3, 27.8)	< 0.001 ^b
Trust in medical staff score	26.0 (23.0, 30.0)	27.0 (24.8, 29.0)	0.123 ^b	24.0 (23.0, 27.0)	26.0 (24.0, 28.0)	0.024 ^b
Childbirth process score	20.0 (17.0, 24.0)	20.0 (16.0, 22.0)	0.145 ^b	19.5 (16.5, 21.0)	19.0 (15.0, 21.0)	0.433 ^b

Abbreviations: JW-DEQ, Japanese Wijma Delivery Experience Questionnaire; Cw/oEA, Childbirth without epidural analgesia; CwEA, Childbirth with epidural analgesia; CESRS, Childbirth Experience Self-Rating Scale. ^aIQR: interquartile range; ^bMann-Whitney-U test; ^cPearson's chi-square test.

association between CwEA and improved childbirth experiences in this specific population. The CESRS (Short Version) comprises three subfactors: "labor pain coping", "trust in medical staff" and "childbirth process". Significant differences were observed in the "labor pain coping" and "trust in medical staff" scores.

Severe fear of childbirth has been defined using various measures and cutoffs. In this study, participants were divided into two groups based on their JW-DEQ Version B scores, with scores ≥ 85 indicating severe fear of childbirth, because the research was conducted during the postpartum period. It should be noted that scores on Version B may be influenced by the actual birth experience, potentially resulting in recall bias. The JW-DEQ Version B has been reported to have the same factor structure as Version A, including fear, lack

of positive anticipation, isolation, and riskiness, in both primiparous and multiparous women (17).

In this study, the proportion of women with severe fear of childbirth, defined as a JW-DEQ Version B score ≥ 85 , was 39%. Although this figure does not represent the true prevalence in the general population because of the non-epidemiological sampling design, it is notably higher than both the pooled prevalence of 12% reported using the W-DEQ Version A score ≥ 85 (5) and the 19% reported in a previous Japanese study using the JW-DEQ Version B score ≥ 85 (20). Three factors may explain these differences in prevalence. First, cultural and geographical backgrounds differ substantially; the 12 studies reviewed by O'Connell *et al.* (5) were conducted across 11 European countries and Australia. Further international research using

globally standardized criteria is needed to clarify these cross-cultural differences. Second, methodological differences between W-DEQ Versions A and B should be considered, as Version A assesses antenatal expectations, whereas Version B evaluates postnatal recall. Third, the discrepancy between this study (39%) and the previous Japanese study (19%) (20), despite both using JW-DEQ Version B, may be attributable to selective access to childbirth options. According to a 2020 national survey (33), CwEA was available at only 505 facilities (26% of all birthing facilities in Japan) and accounted for only 8.6% of all deliveries (33). Because 24-hour analgesic services remain limited in Japan, pregnant women with severe fear of childbirth may proactively seek specialized facilities offering these services. This concentration of women with severe fear of childbirth at specific institutions likely explains the notably high prevalence observed in our sample.

The CESRS (Short Version), developed by Tokiwa, is an original scale created in Japan. A previous study reported scores of 65.8 ± 11.1 for primiparous women and 70.2 ± 9.2 for multiparous women (34). Unfortunately, the present study did not classify participants according to parity; however, the score range was similar. Because this scale was developed only in Japanese, international comparisons may be difficult. The Birth Satisfaction Scale-Revised (BSS-R) (35), developed in the UK to assess women's childbirth experiences, has been translated into several languages, including Italian, Dutch, Czech, and Japanese. Its validity and reliability have been confirmed previously (36-40). The BSS-R was adopted by the International Consortium for Health Outcome Measurement (ICHOM) as a standard measure for pregnancy and childbirth outcomes (41). Future research should therefore use the Japanese version of the BSS-R.

In the light fear group, although the "labor pain coping" score in the CwEA group was higher than that in the Cw/oEA group, no statistically significant difference was observed in the total CESRS score. In contrast, in the severe fear group, a statistically significant difference was observed in the total CESRS score, with both the "labor pain coping" and "trust in medical staff" scores being higher in the CwEA group than in the Cw/oEA group. Because labor-inducing agents are often used during CwEA, midwives and nurses frequently visit patients, typically every 30 minutes, to monitor fetal heart rate and provide pain relief support. Physical contact during abdominal monitoring may function as an important form of nonverbal communication that alleviates maternal anxiety and stress, complemented by verbal encouragement in the labor, delivery, and recovery rooms. Consequently, the frequent contact with midwives and nurses associated with CwEA protocols may have contributed to the higher "trust in medical staff" scores. Although the cross-sectional design of this study precludes causal inference, these findings

suggest that the intensive monitoring and supportive touch inherent in CwEA protocols may be positively associated with the psychological well-being of women with severe fear of childbirth.

This study has several limitations. First, the cross-sectional design precludes definitive conclusions regarding causality. Second, because the JW-DEQ Version B was administered postnatally, the actual birth experience may have influenced the scores. Although previous studies have reported a significant correlation between prenatal (Version A) and postpartum (Version B) assessments, the postpartum-recalled fear measured in this study may partially reflect the actual delivery experience; therefore, the potential for recall bias and reverse causality should be considered. Third, the voluntary nature of participation may have introduced selection bias, as participants may have been more sensitive to pain than the general population. Fourth, our purposive sampling strategy was designed to ensure a minimum subgroup size rather than to provide population-level epidemiological estimates. Therefore, the 39% prevalence observed in this study likely reflects the specific clinical characteristics of our institution, where a 24-hour epidural service may attract women with severe fear of childbirth, and should not be generalized to the broader population. Fifth, a major limitation was the relatively small sample size after stratification, particularly the subgroup of 30 women with both CwEA and severe fear of childbirth. This limited the statistical power of the comparisons, and the findings should therefore be interpreted cautiously as exploratory results. Sixth, the cutoff value of ≥ 85 for severe fear of childbirth was not derived from a Japanese population. Finally, detailed analgesia-related variables, such as labor pain scores assessed using a Visual Analog Scale and the exact timing of analgesia initiation, were not evaluated, although CwEA was clinically initiated upon maternal request during the active phase of labor.

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