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Research Article

Variables Contributing to Women's Prelabor Beliefs about Epidural Analgesia: Results of a Randomized Controlled Trial in Dutch Women

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Abstract

Introduction: Multiple factors influence a woman's choice for Epidural Analgesia (EA) during labor. The aims of this study were to explore variables contributing to antepartum beliefs about EA, and factors influencing the experience of childbirth pain.

Methods: Women (n=446) who were randomly allocated to routine EA or analgesia on request, filled in the Beliefs About Epidural Questionnaire (BEAQ) and Pain Catastrophizing Scale (PCS) before randomization, and the Child Birth Experience questionnaire (CEQ) six weeks after delivery.

Results: Multiple linear regression showed a significant association between PCS score and every subscale of the BEAQ ($p<.001$): women with negative thoughts about pain expressed a more positive attitude towards EA, were more positive about others recommending EA, and were less confident about their ability to tolerate pain and give birth without EA. In women who requested pain relief, a significant association was found between catastrophizing about pain before delivery and a negative childbirth experience after delivery ($r=.25$, $p=.004$).

Conclusion: Pain catastrophizing is the most important factor associated with beliefs about EA and the feelings about childbirth after delivery, which should especially be accounted for in young, nulliparous women with lower education. These results contribute to make a tailor-made pain management plan for women during pregnancy based on catastrophizing thoughts.

Keywords: Epidural; Analgesia; Childbirth; Catastrophizing

Introduction

The experience of labor pain is a complex, subjective, multidimensional reaction on sensory stimuli, which occur during delivery [1]. The severity of labor pain as judged by most women as (very) serious is influenced by physical as well as psychologic factors [2]. This might explain the large variability that has been observed in the level of experienced pain by women in labor [3]. The degree of pain experienced during labor may be influenced by women's characteristics such as age, parity, education level, cultural background, and labor characteristics such as spontaneous onset or induced labor, duration of labor, medical interventions, and fetal intra-uterine wellbeing [1,3-5].

Pain relief is an important issue for women in labor. A women's labor experience will be influenced by the choice for pain relief and the level of pain experienced [6,7]. Not having a choice in pain relief or not being satisfied in coping with pain results in a higher risk of looking back negatively on childbirth [7]. Epidural Analgesia (EA) has been proven to be the most effective method of pain management [8,9]. In 2018, 21.5% of laboring women in the Netherlands received EA [10]. The desire to have a pain-free childbirth, positive experiences with EA of family and friends, parity status, and the fear of side effects of EA influence the use of EA during labor [11]. A higher EA rate was found in nulliparous women [11,12], older women [12,13], higher educated women and women with a higher income [13]. In the Netherlands, maternal age of 35 or older, a positive attitude of the caregiver towards EA, and a lower degree of coping with labor pain were independent factors associated with pre-labor epidural preference [14,15].

Pain catastrophizing is an excessive negative focus on actual or anticipated pain [16,17]. Women who catastrophize tend to experience labor as more painful and have more fear for labor pain as compared to women who do not tend to catastrophize [11,18]. In low risk nulliparous women, pain catastrophizing and external pain control significantly predicted the request for (different types of) pain relief during labor [19]. There is strong evidence that labor pain catastrophizing plays an important role in labor experience [18,20].

The aim of this study was to explore antepartum beliefs about EA in association with baseline characteristics and pain catastrophizing, in a group of Dutch women, randomized for EA or analgesia on request during labor. Secondly, we hypothesized that pain catastrophizing as well as childbirth experience would be different between women who requested analgesia during labor as compared to women who did not. Knowledge of the influence of factors associated with the beliefs about EA, attributes to a better understanding and improves insight in the thoughts of a pregnant women and finally contributes to an individual pain management plan.

Methods

Design and patients

This study was a sub-study of The Randomized Epidural Analgesia Trial (TREAT), which results were published earlier [21]. The trial was approved by the Medical Ethics Committee of the participating centers and was registered in the clinical trial register (NCT01261689). It was a bi-center, randomized, non-inferiority trial that compared the effect of routine labor EA with analgesia on request. Women were eligible if they were 18 years and older, pregnant with a singleton in vertex presentation at a gestational age of 36 weeks or more. Baseline characteristics of women who participated in the study were collected, including maternal age, Body Mass Index (BMI), highest completed education level (primary=elementary school, secondary=high school, vocational school and preparatory school, tertiary education=higher professional education or Master/Bachelor level), parity, ethnicity, and mode of delivery.

Randomization

From 32 weeks' gestation, eligible women were given oral and written information about the trial. After their oral and written informed consent, women were randomly allocated before the start (or induction) of labor to either routine EA (EA-group) or Analgesia On Request (AOR-group) in a 1:1 ratio, with stratification for center and parity, by using sequentially numbered opaque envelopes. Additional information about the procedure is described in the original article [21]. Women were asked to fill in the Beliefs about Epidural Questionnaire (BEAQ) and the Pain Catastrophizing Scale (PCS) antepartum before randomization at the outpatient clinic. At their routine postpartum appointment, six weeks postpartum, they were asked to fill in the Childbirth Experience Questionnaire (CEQ).

Beliefs about Epidural Questionnaire (BEAQ)

The BEAQ was designed to assess specific beliefs about EA that might influence the decision to choose EA [11]. It is a structured, self-administered, quantitative questionnaire of 20 items. The 19 items use five-point Likert scales (1=completely disagree to 5=completely agree) and are grouped into three subscales: 11 *attitude* items, 5 *subjective norm* items and 3 *perceived control* items. The 11 *attitude* items measure the perceived advantages and disadvantages of (not) using EA, the 5 *subjective norm* items assess the influence of health care professionals (e.g. midwife and gynecologist) and the immediate social environment (e.g. family and friends) on the choice of EA, and the 3 *perceived control* items reflect the perceived ability of coping with labor pain. For the *attitude* and *subjective norm* subscales, a higher score represents a more positive feeling towards EA, for the *perceived control* subscale a higher score represents a higher degree of coping with pain and therefore a lower expected need of pain relief. The scores of the subscale items were combined into one total score for the concerning subscale by computing the average score on these specific items. For this purpose, four items of the *attitude* subscale were converted to a reversed Likert scale (item 4, 5, 6 and 8). The internal consistency (Cronbach's alpha) of the BEAQ subscales in this study was equal to α=.55 for attitudes, α=.67 for *subjective norms*, and α=.80 for *perceived control*.

Pain Catastrophizing Scale (PCS)

The PCS has been designed to assess three dimensions of catastrophizing; rumination, magnification and helplessness [17]. It consists of 13 statements describing different thoughts and feelings that can be experienced when in pain. Women were

asked to rank these statements on a five-point Likert scale (0=not at all to 4=all the time) reflecting on a painful experience in the past. The average of these 13 scores was computed per woman, where a higher score indicates more catastrophizing thoughts. The internal consistency of the PCS in this study was equal to α=.94. A total score of 30 is judged to be a clinically relevant level of catastrophizing [17].

Childbirth Experience Questionnaire (CEQ)

The CEQ was designed to specifically assess the distress and pain experienced during childbirth [22]. It consists of 10 items with a five-point Likert scale (1=completely disagree to 5=completely agree). Three points were converted to a reversed Likert scale (item 2, 7 and 8). A total score (1-5) was obtained by averaging the ten item scores, where a higher score implies a worse experience of distress and pain during childbirth. The internal consistency of the CEQ in this study was equal to α=.80.

Statistical Analysis

We used IBM SPSS® Statistics for Windows (version 23.0, IBM corp., Armonk, NY, USA) to analyze the data. For BEAQ, PCS and CEQ, total (average) scores were only computed for a woman if more than half of the items of that (sub) scale were observed, otherwise the total score for that individual was considered missing. Differences in numerical and categorical variables between groups were tested using independent-samples t-test and chi-square or Fisher's exact test, respectively. To assess the effects of age (years), education (tertiary versus primary/secondary), parity (multipara versus primipara), and PCS on BEAQ subscales (attitude, subjective norms, perceived control), multiple linear regression analysis was used. In the analgesia on request group, the association between PCS and CEQ was assessed using Pearson correlation coefficient (r) for women who requested pain relief and for women who did not request pain relief. Additionally, these correlations were compared using Fisher's z-test for independent correlation coefficients. A two-sided *p*-value≤0.05 was considered to be statistically significant.

Results

Patient characteristics and beliefs about EA

Table 1 shows the baseline characteristics, mode of delivery and results of the pre-randomization questionnaires BEAQ and PCS of the total study group (n=446), the EA-group (n=210) and the AOR-group (n=236) separately. The baseline characteristics age, BMI, education level, parity and ethnicity were not significantly different between the EA group and AOR group. Mean scores of the three BEAQ subscales were also not significantly different between both groups. Comparing the women in the analgesia on request group who requested analgesia and those who did not, a significant difference was found in level of education, parity, mode of delivery and the BEAQ subscale perceived control. Women who requested analgesia were more often nulliparous (p=<.000) and had a lower perceived control score (p=.039). They also had less frequently a spontaneous delivery (p=.011). The mean PCS score in the total study group was 17.27 (SD 11.04) with comparable results in the EA group, AOR group (p=0.67) and also in women who request for analgesia and women who did not within the AOR group (p=0.76). Comparable results were also found for the number of women with a PCS score equal to or higher than 30; 26 (12.4%) in the EA group and 29 (12.3%) in the AOR-group (p=.970, data not shown).

	Total study group (n=446)	**Epidural analgesia group (n=210)**	**Analgesia on request group (n=236)**	**p-value**	**Analgesia on request group (n=236)**		**p-value**
					Request for analgesia (n=180)	**No request for analgesia (n=56)**	
Age, years (SD)	30.18 (5.1)	30.38 (5.2)	30.00 (5.1)	.437	29.71 (5.0)	30.95 (5.2)	.110
BMI (SD)	25.68 (5.6)	25.71 (5.9)	25.67 (5.3)	.940	25.99 (5.3)	24.60 (5.2)	.086
Education, *n* (%) *				.432			.014
Primary/Secondary	253 (56.3%)	115 (54.8%)	138 (58.5%)		112 (62.2%)	26 (46.4%)	
Tertiary	126 (28.3%)	62 (29.5%)	64 (27.1%)		46 (25.6%)	18 (32.1%)	
Parity, *n* (%)				.594			**<.000**
Nulliparous	219 (49.1%)	105 (50.0%)	112 (47.5%)		99 (55.0%)	13 (23.2%)	
Multiparous	227 (50.9%)	105 (50.0%)	124 (52.5%)		81 (45.0%)	43 (76.8%)	
Caucasian, *n* (%) **	336 (85.9%)	152 (72.4%)	184 (78.0%)	.175	145 (80.6%)	39 (69.6%)	.096

Mode of delivery, *n* (%) ***							**.011**
Spontaneous	311 (69.7%)	139 (66.2%)	172 (72.9%)	.127	124 (68.9%)	48 (85.7%)	
Instrumental vaginal	61 (13.7%)	33 (15.7%)	28 (11.9%)	.242	24 (13.3%)	4 (7.1%)	
Cesarean section	74 (16.6%)	38 (18.1%)	36 (15.3%)	.424	32 (17.8%)	4 (7.1%)	
BEAQ, mean score (SD)							
Attitudes	3.37 (0.42)	3.37 (0.41)	3.37 (0.43)	>.999	3.40 (0.42)	3.28 (0.44)	.066
Subjective norms	2.65 (0.81)	2.68 (0.87)	2.62 (0.75)	.439	2.64 (0.76)	2.57 (0.70)	.541
Perceived control	3.39 (0.96)	3.36 (0.97)	3.41 (0.95)	.583	3.34 (0.94)	3.64 (0.95)	**.039**
PCS, mean score (SD)	17.27 (11.04)	17.51 (10.81)	17.06 (11.26)	.668	16.93 (11.15)	17.47(11.71)	.755

* Primary/Secondary vs Tertiary, missing values not show

** Missing values not shown

*** Spontaneous vs instrumental vaginal + cesarean section

Table 1: Baseline characteristics, mode of delivery and results of the pre-randomization questionnaires BEAQ and PCS of the study group and its subgroups.

As shown in Table 2 lower educated women (p=.002) scored significantly higher in the BEAQ subscale *attitude*, suggesting a more positive feeling towards EA in these women. The BEAQ subscale *subjective norms* reflects the influence of health care professionals and the immediate social environment. Nulliparous women (p=.006) and women under the age of 25 years (p=.027) scored higher on the subscale *subjective norms*. Lower educated women (p=.002) and women under the age of 25 years (p=.023), scored lower on the BEAQ subscale *perceived control*, suggesting that these women had a lower degree of coping with pain and therefore a higher expected need of pain relief.

BEAQ Subscales mean score (SD)	**Study group** (n=446)	**Nullipa-rous** (n=219)	**Multipa-rous** (n=227)	**p-value**	**Lower educa-tion** (n=253)	**Higher educa-tion** (n=126)	**p-value**	**≤ 24 years** (n=59)	**25-29 years** (n=142)	**30-34 years** (n=155)	**≥ 35 years** (n=90)	p-value
Attitudes	3.37 (0.42)	3.38 (0.42)	3.36 (0.42)	.616	3.42 (0.43)	3.28 (0.38)	**.002**	3.46 (0.21)	3.36 (0.43)	3.38 (0.41)	3.30 (0.39)	.144
Subjective Norms	2.65 (0.81)	2.76 (0.77)	2.55 (0.84)	**.006**	2.71 (0.82)	2.57 (0.75)	.108	2.91 (0.76)	2.69 (0.82)	2.58 (0.65)	2.54 (0.66)	.027*
Perceived Control	3.39 (0.96)	3.32 (0.82)	3.46 (1.00)	.106	3.26 (0.96)	3.58 (0.92)	**.002**	3.20 (0.89)	3.31 (0.95)	3.38 (1.02)	3.64 (0.87)	.023**
*<25 vs 35 + p=.039, 30-35 vs < 25 p=.038 **<25 vs > 35 p=.029												

Table 2: Pre-randomization beliefs about epidural analgesia according to the baseline characteristics parity, education level and age of the pregnant women.

Influence of pain catastrophizing and demographics on the beliefs about EA

Multiple regression analysis was performed to assess the relationship of Pain Catastrophizing (PCS) and socio-demographic factors such as age, parity and education, with the three subscales of the BEAQ in the total study group. In the different regression analyses pain catastrophizing always stayed in the model as significant predictor for the variance for each of the BEAQ subscales attitude, subjective norms and perceived control (Table 3). The significant explanatory contribution of the total model was 10.3, 10.0 and 22.7 for attitude, subjective norms and perceived control respectively. For subjective norms besides pain catastrophizing it was also predicted by parity.

	Attitude			Subjective			Perceived Control		
Variable	**B**	**(95% CI)**	**p-value**	**B**	**(95% CI)**	**p-value**	**B**	**(95% CI)**	**p-value**
Age (years)	-.003	(-.010, .005)	.490	-.012	(-.027, .003)	.126	.003	(-.014, .019)	.754
Education (tertiary vs primary/ secondary)	-.078	(-.164, .008)	.075	-.015	(-.181, .152)	.862	.109	(-.073, .291)	.240
Parity (primipara vs multipara)	.010	(-.067, .088)	.795	.174	(.024, .324)	**.023**	-.124	(-.288, .040)	.139
Pain catastrophizing (PCS)	.141	(.097, .186)	**<.001**	.253	(.167, .340)	**<.001**	-.514	(-.609, -.420)	**<.001**

Analgesia on request (QOR) group, n = 172

*R-square = .103 for Attitude, .100 for Subjective Norms, and .227 for Perceived control.

B = unstandardized regression coefficient, indicating the association between the independent variable and the outcome (attitude, subjective norms or perceived control), after correction for the other independent variables.

Table 3: Multiple regression analyses of the three BEAQ scales and age, parity, education, and PCS questionnaire, based on multiple linear regression analysis.

Relation between pain catastrophizing and childbirth experience in women who requested pain relief and women who didn't

The association between preexisting pain catastrophizing and the experience of childbirth was evaluated in the AOR group who filled in both questionnaires; the PCS and CEQ questionnaire (n=172, 73%) (Table 4). From these women, 132 (76.7%) requested pain relief during labor and 40 (23.3%) women delivered without analgesia. Women who requested pain relief were significantly more often nulliparous (p=.001) and had less frequently a spontaneous delivery (p=.042). These figures are comparable with the total AOR group (Table 1). In women who requested pain relief during labor, a higher level of pain catastrophizing was significantly associated with a more negative childbirth experience (r=.25, p=.004, data not shown). This was in contrast to women who delivered without any analgesia in which this association was not found (r=.06, p=.736, data not shown).

	Women who requested pain relief N= 132	**Women who did not request pain relief N=40**	**p-value**
Age, years (SD)	30.36 (4.9)	32.00 (4.5)	.061
BMI (SD)	26.48 (5.4)	25.08 (5.8)	.160
Education, n (%)*			.089
Primary/Secondary	78 (59.1%)	15 (37.5%)	
Tertiary	38 (28.8%)	15 (37.5%)	
Parity, n (%)			**.001**
Nulliparous	76 (57.6%)	11 (27.5%)	
Multiparous	56 (42.4%)	29 (72.5%)	
Caucasian, n (%)*	109 (82.6%)	28 (70.0%)	.097
Mode of delivery, n (%)**			**.042**
Spontaneous	95 (72.0%)	35 (87.5%)	
Instrumental vaginal	17 (12.9%)	4 (10.0%)	
Cesarean section	20 (15.2%)	1 (2.5%)	
PCS, mean score (SD)	15.61 (9.9)	14.87 (9.5)	.677
CEQ, mean score (SD)	30.20 (4.5)	29.44 (4.7)	.356

*Missing values not shown

**spontaneous vs instrumental vaginal + caesarean section

Table 4: Baseline characteristics of the women from the analgesia on request group who completed both the PCS and CEQ questionnaires (n=172, 73%) according to women with and without request for pain relief.

Discussion

Findings and interpretation

This study was part of a non-inferiority trial in which Dutch pregnant women were randomly allocated to receive either routine EA during labor or AOR [21]. PCS turned out to be the most important independent factor contributing to the BEAQ subscales. Catastrophizing is significant related to a more positive *attitude* towards EA, were more vulnerable to the influence of health care professionals and the immediate social environment on the choice of EA (*subjective norms*) and were less confident about their ability to tolerate pain and give birth without EA (*perceived control*). Besides, nulliparous women scored significantly higher on *subjective norms*. Van den Bussche also showed catastrophizing about pain to be related to beliefs about EA [11]. In the AOR group, women who requested pain relieve showed that the more they had preexisting catastrophizing thoughts about the expected pain, the more they experienced childbirth in retrospect as negative. This association was not found in women who delivered without request for any analgesia. Obviously, receiving adequate pain relief on request, including EA, did not change the negative childbirth experience in these women. Pain catastrophizing also seemed not to predictive of EA use [11]. The results of other studies also imply the importance of catastrophizing. Labor pain catastrophizing significantly predicts maternity blues and postpartum social functioning [18]. A prospective study showed catastrophizers experienced significantly more intense pain and had poorer physical recovery compared to non-catastrophizes [20]. Women who are pain catastrophizers need additional support or treatment to contribute to a positive labor experience. The mean total score of the PCS in our study population (17.27 SD 11.04) was comparable with earlier studies (16.93 SD 8.53, and 16.56 SD7.78, respectively) [11,23].

Mean scores of the three BEAQ subscales and the PCS were not significantly different between the EA group and the AOR group. Women in the AOR group who requested analgesia were more often nulliparous, and the perceived control score in these women was significantly lower, indicating that they had less confidence in their ability to handle labor pain without EA. They had more frequently an instrumental delivery corresponding to the results of the TREAT trial in which non-inferiority of EA could not be demonstrated [14].

Women younger than 25 years were more influenced by health care professionals and the immediate social environment, and felt that they had a lower degree of coping with pain. Lower educated women had a more positive feeling towards EA in association with a lower degree of coping with pain. Nulliparous women mentioned more frequently that they were influenced by health care professionals and their immediate social environment compared to multiparous women.

Strengths and Weaknesses

The strength of this study is that the beliefs about EA were analyzed in a large group of pregnant women before they were randomly allocated to receive either routine EA or analgesia on request [14]. The study revealed the importance of catastrophizing about labor pain during pregnancy as independent factor in relation to the beliefs about EA, and the subsequent experienced feelings about childbirth after delivery in women who requested pain relief during labor. The study also emphasizes the influence of health care professionals. This suggests that during pregnancy, obstetrical care workers should pay serious attention to the thoughts and feelings of women about the expected pain, which should especially be accounted for in young, nulliparous women with lower education. This might result in reassurance of the pregnant woman and development of a tailor-made pain management plan for the coming delivery.

The study has also some limitations. First, the study was performed in a selected population of pregnant women with a high prelabor preference for EA. However, daily practice in the Netherlands showed an epidural rate of less than 22% in contrast to higher rates in neighboring countries [15]. Second, we have no information about the influence of other factors such as the mode of delivery on the experienced childbirth. It might be that a difficult and non-spontaneous delivery contributes seriously to a negative childbirth experience. The CEQ used in this study was the only available instrument at that time. In the period afterwards, a different childbirth experience questionnaire was developed with exactly the same name. The two instruments cannot totally be compared with each other, since the more recent instrument gives a more extensive view of childbirth experience [22]. Third, several factors such as a previous EA and partner preference which are strongly associated with woman's choice for EA, were not examined [22].

Relevance of the findings: implications for clinicians and policy-makers/health care providers

To increase a positive experience of childbirth, it is important that obstetrical care workers pay attention during women's preparation for delivery to catastrophizing thoughts about expected pain, especially in young, nulliparous, lower educated women. This could be done by asking pregnant women to fill in the PCS questionnaire and to discuss the results with them, especially with the women at risk and their partners. Filling in the CEQ at the postpartum check-up could be a valuable instrument for evaluation of the women's experienced childbirth and discussion about the reasons of possible negative feelings.

Unanswered questions and future research

Future research should focus on the influence of introducing the PCS questionnaire as a routine to pregnant women and, based on its results, development of a tailor-made pain management plan

for the coming delivery. Introducing the CEQ questionnaire and discussion of its results might improve possible negative feelings of the individual woman after delivery regarding the experienced childbirth.

Conclusion

Catastrophizing thoughts during pregnancy about expected labor pain are the most important factor associated with beliefs about EA during labor and the feelings about childbirth after delivery, especially in young, nulliparous women with lower education. To reassure these women, a tailor-made pain management plan for the coming delivery should be made, based on the thoughts about the expected labor pain.

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