A Prospective Observational Study to Predict Labour Pain Epidural Drug Consumption and Maternal Satisfaction based on Prelabor Psychological Tests

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ABSTRACT

Introduction: The expression and interpretation of pain during labour may vary depending upon the parturient's prelabour psychological characteristics. This study was done to determine whether validated psychological questionnaires could be used to predict the labour pain experience.

Material and methods: The study population comprised of women undergoing induction of labour, excluding those who ended up requiring a caesarean section. A validated psychological questionnaire i.e. Anxiety Severity Index (ASI), and 3-scaled ratings of anxiety, confidence and analgesic expectations were completed at the time of last antenatal visit. Time to request for epidural analgesia, epidural local anaesthetic consumption in ml/hour and maternal satisfaction with labour analgesia were documented as outcome measures. Bivariate correlations and regression modeling were used to assess the relationship between psychological predictors and the various outcomes measures.

Result: ASI showed a statistically significant relationship with drug consumption (P value- 0.013) and time to request for labour analgesia (P value- 0.005). Women with higher ASI scores opted for labour analgesia earlier & also consumed more local anaesthetic during labour. Similarly, simple scaled ratings of anxiety, confidence, and analgesic expectations also showed some potential to predict epidural drug consumpation and time to request for labour analgesia, with women having higher scores opting for labour analgesia relatively early in labour.

Conclusion: Both ASI and simple-scaled rating questionnaire scores correlated with time to request for labour analgesia and epidural LA consumption; however, ASI was found to be superior. However, in contrast to ASI, simple-scaled rating questions could not predict maternal satisfaction with labour analgesia. Thus, it is suggested that prelabour psychological characteristics could be used to predict labour outcomes.

Keywords: Labour Pain, Epidural Drug, Consumption and Maternal Satisfaction, Prelabor Psychological Tests

INTRODUCTION

The labour pain experience is affected by many factors including psychological, social and obstetric factors.[1,2] Moreover, nociceptive receptors send impulses to the brain during the process of labour and delivery which is in turn interpreted and expressed as pain. Since the duration of labour, obstetric outcome and various other unknown measures evolve as labour progresses, determining the labour pain experience is extremely difficult. Previous studies found that various psychological factors such as anxiety and fear of pain have been shown to impact severity of postoperative pain and analgesic requirement in a surgical-setting.[3-10] In addition, the expression of pain may vary depending on the parturient's personality traits.[11,12]

The role of various pre-labour psychological factors in predicting the labour pain experience and maternal satisfaction with labour analgesia are recently being studied. A better understanding of these psychological factors that influence the labour pain experience could help improve intrapartum pain management by tailoring labour analgesia doses as well as the timing of administering epidural analgesia in accordance with the antepartum psychological questionnaire scores.

The current study may help us estimate the drug requirements of each parturient during labour based on her psychosocial characteristics and may also improve our understanding of the labour pain experience and the parturient's expectations from labour analgesia.

The aim was to determine if psychological characteristics measured antepartum, using validated questionnaires and simple-scaled ratings of anxiety, confidence, and analgesic expectations, could predict labour pain scores, epidural local anaesthetic requirement and maternal satisfaction with labour analgesia.

MATERIAL AND METHODS

After receiving institutional ethics committee approval, a prospective observational study was conducted to predict the relationship of prelabour psychological status to labour pain, epidural drug consumption and maternal satisfaction with labour analgesia. 38 full term primigravidae (37-42

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weeks gestation) in the age group of 18-40 years & of ASA II physical status with singleton fetus in vertex presentation in active phase of labour, planning to opt for labour analgesia, were included in the study. Women below 18 years or above 40 years; morbidly obese; history of medical or obstetric disease; history of chronic opioid or anti-depressant use; undergoing trial of labour after cesarean section and those refusing or having contraindications for labour epidural analgesia were excluded from the study. In the data, the patients who progressed to a caesarean delivery were not analyzed.

At the time of last antenatal visit, a validated questionnaire-Anxiety Sensitivity Index [ASI], was completed. The Anxiety Sensitivity Index (ASI) comprises of 16 questions that assess the degree of anxiety associated with potentially unpleasant events and determine possible negative consequences related to the experience of anxiety.[17] Each question is scored as very little, a little, some, much, and very much (0–4 points for each option) and the responses summated to a total score. In addition, a questionnaire of three simple-scaled rating questions with the potential to predict the labour pain experience was completed. This questionnaire included the following questions: (1) How anxious are you about experiencing labour and labour pain? (0 = no anxiety, 100 = extreme anxiety); (2) How confident are you that you will be able to cope with labour pain? (0 to 100% confident); (3) What is your expected analgesic requirement? (0 = no analgesia, 10 = highest possible amount).

The following parameters were recorded: (1) Time to epidural analgesia request (minutes) after the onset of labour (2) Pain score (according to numerical rating scale, 0-10) at epidural analgesia request (3) The amount of local anesthetic required for labour analgesia, recorded in ml/hour, and (4) overall maternal satisfaction with labour analgesia (0–100, 0= totally unsatisfied, 100= totally satisfied) recorded 6 hours after delivery. The onset of painful contractions as reported by the parturient, was noted as the time of onset of labour.

The hospital protocol was followed for the induction of labour. The pain score was noted hourly from the onset of labour and again at the time of maternal request for epidural labour analgesia.

Epidural analgesia was administered as per standard of care at our institution as follows: After obtaining written informed consent, patient was placed in the sitting position. The epidural space (L3-L4 or L4-L5) was identified using the midline approach and loss of resistance to air technique. The epidural catheter was inserted 3-5 cm into the space. Epidural bolus of 15cc of 0.0625% bupivacaine with 2 mcg/ml of fentanyl was given. Additional top-ups of 0.125% bupivacaine were given when NRS was >3. These boluses were recorded on the patient's record (after equating to ml of 0.0625% bupivacaine) and were included in the data collection.

After delivery, the total amount of local anesthetic used was determined by adding the boluses and recording them in ml per hour of analgesia. The epidural infusion was stopped at the time of delivery of the placenta. After 6 hours of delivery, patient was asked about her delivery experience and satisfaction with labour analgesia.

STATISTICAL ANALYSIS

Cronbach's alpha coefficients were used to test the Internal reliability for ASI. To assess the association between scores Spearman's correlation coefficients were used. SPSS version 15 was used to analyze the data. To indicate statistical significance $P < 0.05$ was considered.

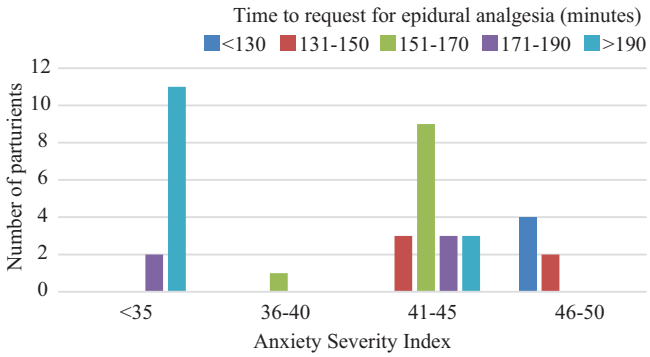
RESULT

The average time to request for labour analgesia was in the range of 120-220 mins after the onset of labour. Out of 38 parturients, 13 had ASI score less than 35 and 11 out of these 13 parturients requested epidural insertion after 190 minutes while 6 parturients had a score of more than 45, of which 4 requested epidural analgesia in less than 130 minutes (graph 1). The association between ASI and time to request for labour analgesia was statistically significant; P value- 0.005 (Table 1).

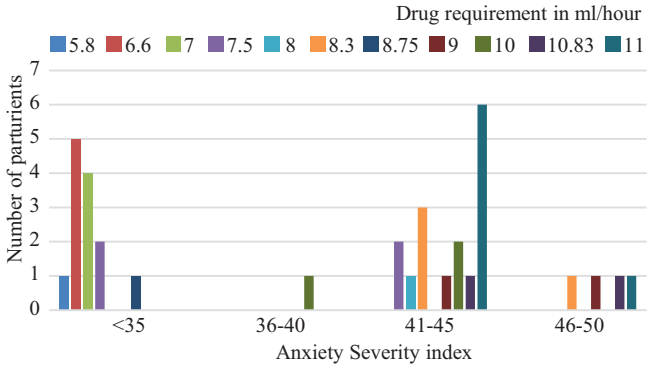
Women with scores of <40 required 7-10ml of drug per hour while those with scores >40 required more than 10 ml of drug per hour (graph 2). The P value between ASI and drug consumption was 0.013 which suggests a significant relationship of ASI with drug consumption (Table 1).

24 out of 38 parturients gave a score of more than 80/100 for overall maternal satisfaction (graph 3). The association between ASI scores and maternal satisfaction was found to be statistically significant (Table 1).

With respect to simple scaled ratings of analgesic



Graph-1: Time to request for labour analgesia from onset of labour correlated with antenatal anxiety severity index (ASI) score.



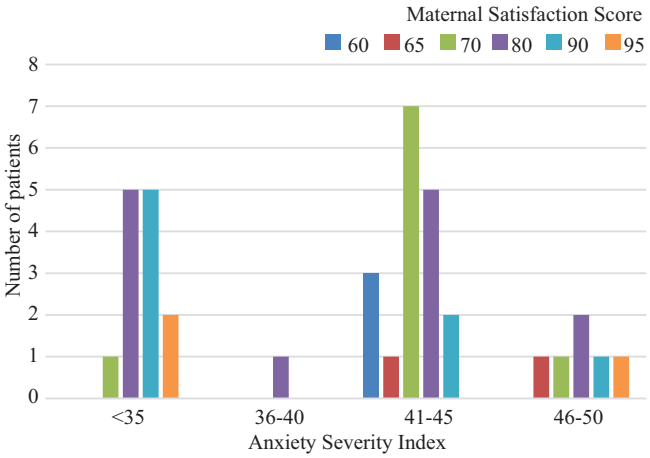
Graph-2: Drug requirement in ml/hour correlated with Anxiety Severity Index (ASI) score

		Anxiety Severity Index (ASI)				P value
		<35	36-40	41-45	46-50	
Drug requirement in ml/hour	5.80	1	0	0	0	0.005
	6.60	5	0	0	0	
	7.00	4	0	0	0	
	7.50	2	0	2	0	
	8.00	0	0	1	0	
	8.30	0	0	3	1	
	8.75	1	0	0	0	
	9.00	0	0	1	1	
	10.00	0	1	2	0	
	10.83	0	0	1	1	
	11.00	0	0	6	1	
	11.25	0	0	1	2	
	11.60	0	0	1	0	
Time to request for labour analgesia (minutes)	<130	0	0	0	4	0.013
	131-150	0	0	3	2	
	151-170	0	1	9	0	
	171-190	2	0	3	0	
	>190	11	0	3	0	
Maternal satisfaction with labour analgesia	60	0	0	3	0	0.010
	65	0	0	1	1	
	70	1	0	7	1	
	80	5	1	5	2	
	90	5	0	2	1	
	95	2	0	0	1	

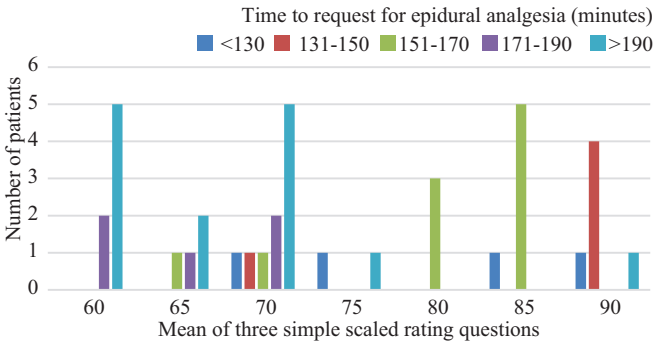
Table-1: Number of parturients requesting for labour analgesia at different time intervals, drug requirements in ml/hour and maternal satisfaction with labour analgesia correlated with anxiety severity index (ASI) score.

		Mean score of three simple-scaled rating questions							P value
		60	65	70	75	80	85	90	
Drug volume in ml/hour	5.80	1	0	0	0	0	0	0	0.041
	6.60	4	1	0	0	0	0	0	
	7.00	1	1	2	0	0	0	0	
	7.50	0	2	1	1	0	0	0	
	8.00	0	0	1	0	0	0	0	
	8.30	1	0	3	0	0	0	0	
	8.75	0	0	1	0	0	0	0	
	9.00	0	0	1	1	0	0	0	
	10.00	0	0	0	0	2	1	0	
	10.83	0	0	0	0	0	2	0	
	11.00	0	0	1	0	1	2	3	
	11.25	0	0	0	0	0	1	2	
	11.60	0	0	0	0	0	0	1	
Maternal satisfaction	60	0	0	0	0	1	1	1	0.014
	65	0	0	0	0	0	0	2	
	70	0	1	4	0	0	2	2	
	80	1	1	4	1	2	3	1	
	90	5	2	0	1	0	0	0	
	95	1	0	2	0	0	0	0	
Time to request for labour analgesia (minutes)	<130	0	0	1	1	0	1	1	0.052
	131-150	0	0	1	0	0	0	4	
	151-170	0	1	1	0	3	5	0	
	171-190	2	1	2	0	0	0	0	
	>190	5	2	5	1	0	0	1	

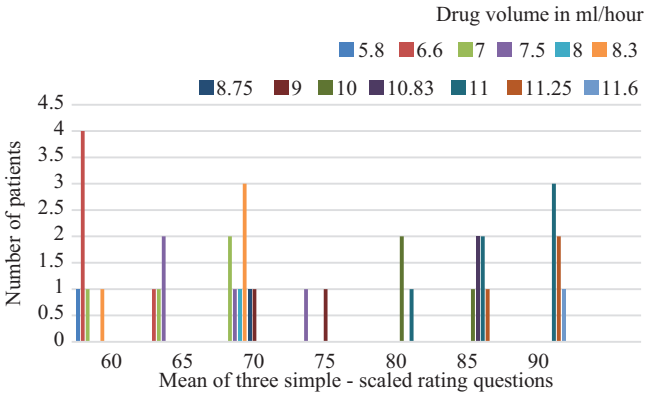
Table-2: Number of parturients requesting for labour analgesia at different time intervals, drug requirements in ml/hour and maternal satisfaction with labour analgesia correlated with mean score of three simple-scaled rating questions.



Graph-3: Maternal satisfaction correlated with antenatal anxiety severity index (ASI) score.



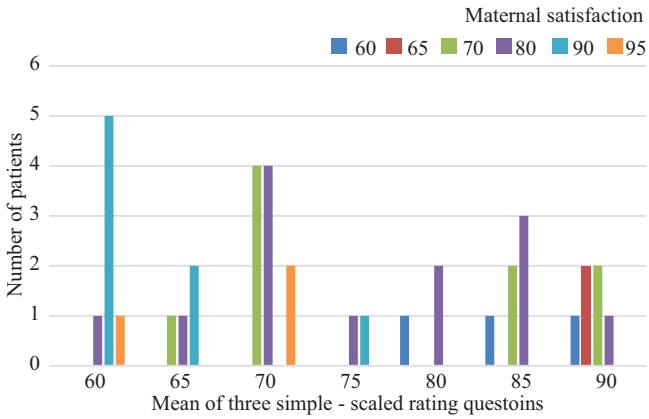
Graph-4: Time to request for labour analgesia from the onset of labour correlated with mean score of three simple-scaled rating questions.



Graph-5: Total drug consumption in ml/hour correlated with mean score of three simple-scaled rating questions.

expectations, confidence, & anxiety; out of 12 parturients who had scores in excess of 85, 6 asked for commencement of epidural analgesia within 150 mins, 5 of them asked between 151 and 170 mins and only 1 took more than 190 minutes to request for analgesia (graph 4). A statistically significant relation was observed between the mean score of the questionnaire and time to request for labour analgesia (Table 2).

Furthermore, parturients who had a higher mean score of the three simple-scaled rating questions required more drug in ml/hour for adequate labour analgesia (graph 5) and this correlation was also statistically significant (Table 2).



Graph-6: Maternal satisfaction correlated with mean score of the three simple-scaled rating questions.

Unlike the ASI score, mean score of the simple-scaled rating questions were not predictive of maternal satisfaction with labour analgesia (graph 6) and the relationship was statistically insignificant with a p value >0.05 (Table 2).

DISCUSSION

The results imply, ASI (Anxiety Severity Index) may contribute in predicting maternal satisfaction, epidural local anaesthetic requirement and severity of labour pain.

ASI scores of 38 parturients in the study were able to predict the outcome during the course of delivery as higher scores lead to more drug consumption and request of epidural analgesia at an early stage of labour. In the same way, lower scores lead to comparatively less drug requirement and request of epidural analgesia at much later stages. The P value was 0.013, between ASI & drug consumption and 0.005 between ASI & time to request for epidural analgesia, suggesting a statistically significant relationship between the variables.

Adequate labour analgesia has led to better labour experience and maternal satisfaction. The pain relief in less anxious parturients with lower ASI scores led to more acceptable and satisfactory experience. The anxiety of these parturients and fear of pain seemed to be easily negated by adequate pain relief. ASI showed a correlation with the parturient's satisfaction with labor analgesia.

Previous studies have concluded that anxiety has a negative impact on pain experienced during labour[13-16]. Although most clinical trials used the (STAI) Spielberger State-Trait Anxiety Inventory, ASI was used in this study. It was selected because it is a validated questionnaire that is quicker to administer and thus it is more suited to the dynamic labour setting. Also, the efficacy of ASI & STAI is comparable. In previous studies it has been observed that for pain prediction in an obstetric setting the utility of STAI has been modest.[17]

The most significant predictor of pain during active labour was confidence in ability to handle labour. This was concluded in a previous study which investigated the relationships between the perception of pain during active labour and among 9 predictor variables (frequency of uterine contractions, cervical dilation, fear of pain, concern

regarding the outcome of labour, confidence in ability to handle labour, state anxiety, childbirth preparation, parity & age)[18] However, in the current study, confidence to cope with labour pain was assessed specifically and focus was not paid on ability to handle labour. There was no significant correlation found between ASI and simple scaled anxiety 0 to 100, which suggested that anxiety assessments require a more complex assessment tool beyond a global rating scale. Although in this paper, a number of predictive psychological factors were measured, but some of the psychological factors that affect labour pain were not assessed.[19,20] The factors such as confidence, fear of pain & anxiety were selected because these factors have already been proven to be associated with pain in a surgical setting. Mood was not assessed because it was felt that a depression score done just before the induction of labour would not accurately reflect the women's baseline mood.

Overall, the findings of this research suggest that the psychological questionnaires like ASI and similar questionnaires completed before the onset of labour may help predict the labour pain experience.

Summary

To evaluate the clinical outcome of the labour pain experience is very difficult since there is no ideal pain outcome variable to assess the experience.

This prospective observational study was conducted to predict the correlation of antepartum psychological questionnaires with labour pain, labour epidural drug consumption and maternal satisfaction with labour analgesia. The study group comprised of 38 term parturients, primigravida with singleton fetus with vertex presentation of ASA class 2 in active phase of labour.

ASI scores had a statistically significant relationship with time to request for epidural analgesia, epidural drug consumption and maternal satisfaction with labour analgesia, and hence, was a good predictor of these outcomes. Parturients with higher ASI scores requested epidural analgesia at an early stage of labor, require more local anesthetic for adequate analgesia and were overall less satisfied with their delivery experience.

Similarly, simple scaled ratings of analgesia expectations, confidence, & anxiety showed some potential to predict time to epidural analgesia request & epidural drug consumption, however, it could not predict maternal satisfaction with labor analgesia.

CONCLUSION

We conclude that ASI is a good predictor, while simple scaled ratings of analgesia expectations (0–100), confidence (0–100), & anxiety (0–100) showed some potential to predict time to epidural analgesia request, epidural local anesthetic use, and labour pain.

Although, these psychological questionnaires are validated in a surgical setting, they have not been validated in a labour-setting. It is acknowledged that these outcome variables may not be completely representative of the labour pain experience. Further studies with larger sample size are required to better refine & validate the ideal psychological measurement tools that can be administered before the onset of labour to predict the labour pain experience and to determine whether modifying labour analgesia methods based on these predictors would improve outcomes.

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