

Factors related to labor pain: review articles

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Abstract:

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Labor pain is usually described as cramping, aching, tiring, intense, pushing and exhausting. There are many potential factors relating to labor pain, such as age, education, parity, maternal position, painful menstruation, rupture of membranes, weight/height ratio, fetal factors, psychological status, childbirth preparation, expectations of labor, support, cultural factors, and monitoring.

Key words: pain, labor pain, childbirth

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บทคัดย่อ:

ความเจ็บปวดในระยะคลอด จะมีลักษณะปวดแบบ ตะคริว คั้น เหนื่อยล้า ปวดตึง ๆ ปวดเหมือนถูกดึงกระชาก และ อ่อนล้ามาก มีปัจจัยหลายประการที่มีผลต่อความเจ็บปวดในระยะคลอด เช่น อายุ การศึกษา จำนวนครั้งของการตั้งครรภ์ ท่าของมารดาในระยะคลอด ประวัติการปวดประจำเดือน การแตกของถุงน้ำ สัตส่วนของน้ำหนักต่อส่วนสูงของมารดา ปัจจัยด้านทารก ปัจจัยด้านจิตสังคมของมารดา การได้รับการเตรียมการคลอด ความคาดหวังต่อการคลอด การได้รับการสนับสนุนในระยะคลอด ปัจจัยทางด้านวัฒนธรรม และการได้รับการติดเครื่องบันทึกการเต้นของหัวใจทารกในครรภ์และการหดตัวของมดลูก ตลอดเวลา

คำสำคัญ: ความเจ็บปวด, การเจ็บครรภ์, การคลอด

Introduction

Pain is "an unpleasant sensory and emotional experience due to potential tissue damage."¹ Labor pain is a pain that occurs during childbirth, localized in the area of the abdomen and back and primarily associated with uterine contractions and cervical dilation.²⁻⁴ Labor pain is usually described as cramping, aching, heavy, tiring, intense, pushing and exhausting.⁵ It was the most intense pain when compared to menstruation, neuralgia, phantom limb phenomena, cancer, tooth problems, diseases of the spinal discs, and arthritis.⁶

Factors related to labor pain

There are many factors that have an effect on labor pain, such as age, education, parity, painful menstruation, rupture of membranes, weight/height ratio, fetal factors, maternal position, psychological status, risk factors, childbirth preparation, expectations of labor, nursing support, family support, and cultural factors. The effects of these factors on labor pain will be discussed.

Age. Age relates to labor pain. Some studies show that younger age is related to reports of more intense labor pain. Sheiner and his colleague⁷ reported a series of 447 women and found that pain during the early part of labor decreased significantly with increased age.

The lower intensity of labor pain in older women can be explained; older women are usually multiparas and if that is the case, they have less intense uterine contractions and the cervix is softer and less sensitive than that of younger women.^{8,9} Thus, older women are more likely to experience less pain in the first stage of labor except in the late active phase.^{8,9}

However, Davenport and Nettlebladt^{10,11} found no correlation between labor pain intensity and age. Pathanapong¹² reported no significant relationship between age and labor pain responses in 32 Thai women aged 17 to 38 years; younger women had a tendency to communicate pain verbally while the older women had a tendency to communicate pain nonverbally.

Education. Education has been shown to have an effect on labor pain. Weisenberg¹³ reported 30 Middle-Eastern women who were born in Western countries and 53 women born in the Middle-East about their labor pain experiences. The investigators measured pain with a 100 mm VAS (Visual Analogue Scale) and observed behavioral pain. The results showed that in the first stage of labor those born in the Middle-East who had less education reported significantly higher sensory pain ($z = 1.78, p < .05$) and had higher behavioral pain scores ($z = 3.46, p < .01$) than those who were more educated. In Western women, levels of education had no effect on pain. Conversely, a study of 155 Canadian primiparas showed that higher education was related to lower ratings of pain during the active phase ($r = -.28, p < .05$) and the transition phase ($r = -.23, p < .05$).¹⁴ This may be because the more highly educated women cope with pain better than less educated women.

Parity. There are some differences in labor pain between primiparas and multiparas. Multiparas experienced less pain than primiparas in the latent phase¹⁵⁻¹⁹ and in the active phase,^{7, 15, 17, 18, 20, 21} and in the transition phase.^{15, 16} The reason that pain in the latent phase of the primiparas is higher than that of multiparas is that there is a little progress of cervical dilation before effacement is well advanced whereas in the multiparas, both may occurred simultaneously.²²

Painful menstruation. A history of painful menstruation relates to labor pain. It is believed that painful menstruation is related to the release of the prostaglandin,¹⁷ causing uterine contractions and pain. Three studies have been done to test the association between painful menstruation and labor pain. Mel-zack²³ showed that menstrual difficulty in multiparas was a predictor of labor pain ($F = 5.92$, $R^2 = .14$, $p = .02$). A study of 40 primiparas and 65 multiparas by Lowe¹⁷ showed significant correlations between menstrual pain and sensory labor pain in three phases of the first stage ($r = .31$, $p < .001$, $r = .25$, $p < .05$, and $r = .26$, $p < .05$, respectively) and also significant correlation between menstrual pain and affective pain ($r = .21$, $r = .24$, and $r = .24$, $p < .05$, respectively). Another study of 178 women found that multiparas with a history of greater menstrual pain had more sensory pain in the latent phase and primiparas in the transition phase.²⁰

Rupture of membranes. Only one study tested the effect of artificial rupture of membranes on pain. A study in 1,132 English women showed that artificial rupture of membranes shortened term labor in primiparas for an hour but did not have an effect on labor pain or analgesic intake.²⁴ Other investigators studied 2,564 parturients and found that spontaneous membrane rupture was related to more rapid cervical dilation²⁵, which has been shown to increase pain.^{26, 27}

Weight/height ratio. Melzack and his colleague²⁸ reported weight/height ratio of women was significantly associated with labor pain ($p < .05$). This may be because a higher weight/height ratio may reflect a smaller pelvic structure, which may lead to more pain due to greater resistance of the passenger through the birth canal. In another study the weight/height ratio of a woman did not have a significant effect on labor pain, but greater weight/height ratio was associated with a longer duration of the active phase ($r = .20$, $p < .05$).¹⁴ Two studies showed that weight has no significant effect on labor pain even if women are extremely heavy.^{28, 29}

Fetal factors. Fetal weight, position, and lie may influence labor pain. Greater fetal weight has been related to greater labor pain,²⁸ which may be due to fetal pressure in the late first stage and the second stage of labor.³⁰ During the first

stage, the fetus begins its descent in the latent phase although some begin in the early part of the active phase. Progressive descent occurs in the later part of the active phase.³¹ It is believed that occiput posterior position of the fetus is the major cause of intense back pain during labor.³² Wuitchik¹⁴ showed that women whose fetuses were in the occiput posterior position had a tendency toward greater pain in the latent phase. In another study, no relationship was found between fetal size and pain.³³ However, logically, larger fetuses may have more difficulty passing through the birth canal and multiple fetuses may overdistend the uterus, so the contraction would be more painful.

Maternal position. Maternal position may also be related to labor pain, but studies have produced inconsistent results due to the difference in time of measuring pain.^{34, 35} Mixed findings were obtained regarding the amount of pain in relation to position. Two studies found that sitting or standing positions resulted in significantly less continuous back pain and less pain in the abdomen and back during contraction than the side-lying positions in the active phase.^{34, 36} In the second stage of labor as well, a study of 517 women found that the vertical position led to lower pain than the horizontal position.³⁷ However, one out of the seven studies found that the horizontal position led to lower pain than the vertical position in the first stage of labor³⁵ and another of 294 women showed less pain in the second stage of labor in the semirecumbent position compared to the supine position.³⁸

Further, it was found that the side-lying position was preferred over the vertical position in the first stage of labor.^{35, 39} In one of these studies,³⁹ women preferred the sitting position until cervical dilation reached 6 cm, but after 6 cm of dilation the side-lying position was preferred. Theoretically, it is believed that the side-lying position in the first stage of labor leads to stronger contractions but decreased frequency of contraction.²⁶

Psychological status. Anxiety and fear influence the experience of pain of women. Anxiety is an emotional factor that tends to magnify the perception of nociceptive stimuli at the cortical level.³⁰ High anxiety increases catecholamine levels, which may magnify pain by decreasing pelvic blood flow and

increasing muscle tension.³⁰ A study of primiparas showed that increased anxiety as measured with the State Trait Anxiety Inventory during the 32 weeks of gestation is a predictor of increased sensory labor pain on a VAS ($R^2 = .10$, $p < .01$, $n = 64$) and the McGill Pain Questionnaire (MPQ) ($R^2 = .05$, $p < .01$, $n = 68$); and affective pain on the MPQ ($R^2 = .05$, $p < .05$, $n = 69$). In addition, anxiety at 32 weeks during labor pain is a predictor of (1) increased sensory labor pain ($R^2 = .10$, $p < .01$, $n = 64$), (2) increased evaluative pain by the MPQ ($R^2 = .07$, $p < .05$, $n = 70$), and (3) increased MPQ total score ($R^2 = .09$, $p < .01$, $n = 68$),⁴⁰ while another study found that reported degrees of depression during labor predicted affective pain.⁴¹

Fear of labor pain occurs in most women. Lowe¹⁷ found that fear of pain correlated significantly with: (a) sensory labor pain in the latent phase, $r = .26$, $p < .05$, the active phase, $r = .35$, $p < .001$, and the transition phase, $r = .21$, $p < .05$; (b) affective labor pain in the latent phase, $r = .24$, $p < .05$, the active phase, $r = .41$, $p < .001$, the transition phase, $r = .30$, $p < .001$, and in the second stage, $r = .26$, $p < .05$. Also fear during the early active phase (cervical dilation 3-5 cm) was related to the amount of pain relief received during labor, $r = .44$, $p < .01$. Alehagen⁴² found that primiparas reported higher levels of fear than multiparas, $t(73) = 3.91$, $p < .01$. Also a cold pressure stimulating pain was examined in 20 women who feared labor pain and 20 who did not. The results showed that those in the fear group experienced higher pain than those in the other group ($p < .001$).⁴³

Expectations of labor. Expectation of labor may influence women's experience of pain. A study of 52 primiparas showed that high self-efficacy expectancies (ability to control pain without medication) and outcome expectancies (ability to control pain) correlated with less pain medication ($r = -.47$, $p < .001$ and $r = -.39$, $p < .01$, respectively).⁴⁴ Conversely, another study of 29 women during labor showed that there was no correlation between expectation of labor and either labor pain or pain coping.²¹ They did not explain what instrument was used to measure expectation of labor.

Dannenbring and colleague⁴¹ found that primiparas who had the outcome expectancy that childbirth education would

help them to be medication-free during childbirth had significantly higher affective pain than those who did not. They concluded that women who reported high affective pain had longer labor and were depressed after childbirth education; longer labor and depression together with expectation of a medication-free labor, influenced women to experience more pain. Another study of 99 Australian primiparas showed that women's expectation of labor pain did not differ from their experience of pain in the active phase; they experienced significantly less pain than they expected in the latent phase ($t = 6.77$, $p < .001$) but they experienced significantly more pain than they expected in the transition phase ($t = 8.37$, $p < .001$).⁴⁵

Childbirth preparation. Some studies have shown that childbirth preparation decreased labor pain. Childbirth preparation influences women to have accurate expectations about uterine contractions, which improves emotional responses, and increases coping methods such as using controlled breathing during labor.⁴⁶ A comparison study of 29 women who had attended Lamaze class and 19 women who had not, showed that the Lamaze group experienced significantly less pain during the active labor than the control group, $F(1, 22) = 14.61$, $p < .001$; they also found that women in a Lamaze group reported significantly less fear, $F(1, 22) = 7.44$, $p < .01$, less tiredness, $F(1, 22) = 21.76$, $p < .001$, and more energy, $F(1, 22) = 5.06$, $p < .03$.⁴⁶ Primiparas who received childbirth preparation reported significantly less sensory and affective pain than did unprepared women;²³ however, they still experienced severe pain. Average pain reduction was about 30% compared with those who did not have childbirth training.^{23, 28} However, this study did not give the details of the statistical test.

Nursing support. Nursing support may have an effect on the pain of women. Most studies did not directly measure the effect of nursing support on labor pain.⁴⁷⁻⁴⁹ A study of 200 Finnish women showed that the main source of emotional support for women during labor came from the nurses, $X^2(1, N = 139) = 4.25$, $p < .05$.⁴⁸ Another study showed that 43 (68%) of Taiwanese women received emotional support and 36 (72%) received comfort help including pain

coping, from the nurses.⁵⁰ A descriptive study of 13 postpartum women showed that explanations and response of the nurses to the needs of women during labor influence a more positive labor experience.⁴⁹ Another study in 413 primiparas showed that one-to-one nurse support decreased oxytocin intake by 17% (relative risk experimental vs. control = .83; 95% CI = .67, 1.04); however this had no significant impact on the amount of epidural analgesia received.⁴⁷ Klein⁵¹ stated that nurses who spent more time with laboring women were rated as more helpful than nurses who spent less time. This may have an effect on the emotional status and pain of women.

Family support. Family support has an influence on a woman's experience of pain. According to a study of 109 primiparas in Botswana, receiving a female relative's support (53%) resulted in significantly less analgesic intake than not having such support (73%), and significantly fewer oxytocin inductions, fewer amniotomies, and fewer vacuum extractions ($p < .05$).⁵² A study of 25 women with premature labor (support group $n = 14$; control group $n = 11$) showed that women who received support from their mothers who were teachers of Lamaze classes ($n = 6$, 43%) received significantly fewer injections of pethidine than women in a control group ($n = 9$, 82%).⁵³ They did not report the statistics used to analyze the data. Conversely, a study by Yim⁵⁴ showed that the Chinese women who had husband support used pethidine more than those who did not, $t(61) = 2.37$, $p < .05$.

In a study of 40 primiparas, women reported that the husband's support during labor was significantly more helpful than the nurse's support ($p < .05$).⁵¹ This may be because the husband performed significantly more touching and staying at the bedside than the nurse. Likewise, a study by Niven⁵⁵ showed that a group of 60 Scottish women with husband support had significantly lower affective pain on the MPQ than 38 women with no husband support, $t(96) = 1.6$, $p < .05$. Similarly, another study showed that a laboring women who had husband as a coach during labor reported significantly less pain when cervical dilation was 5–8 cm ($p < .05$) and lower receipt of analgesic than those who did not ($p < .01$).⁵⁶ A retrospective study of 80 primiparas during postpartum days 1–4 showed that during labor women who received pain control methods,

such as abdominal and back massage from their husbands received significantly fewer epidural blocks than the women who received less support from their husbands, $X^2(1, N = 80) = 18.01$, $p < .001$.⁵⁷

Cultural factors. Culture usually influences the beliefs and attitudes of a person. Culture has an effect on the experience of pain.⁵⁸ It influences the meaning that is ascribed to pain that then affects the person's experience of the pain.⁵⁹ People from Western cultures have become less tolerant of pain because of the overuse of analgesic drugs.⁶⁰ The differences of ethnocultural background have an effect on labor pain. A comparative study of 57 Korean-Americans and 67 Euro-Americans in labor showed that the two groups differed significantly in both the number of words used to describe affective pain on the MPQ: Korean $mean = 2.54$, $SD = 1.15$, American $mean = 2.96$, $SD = 1.05$, $t(122) = 2.08$, $p < .05$, and sensory pain on a VAS; Korean $mean = 8.49$, $SD = 1.24$, American $mean = 7.97$, $SD = 1.24$, $t(122) = 2.07$, $p < .05$.⁶¹ These data showed that Korean-Americans had lower affective pain but higher sensory pain than Euro-Americans. Weisenberg¹³ reported Middle-Eastern women experienced greater labor pain on both a VAS and pain behavior ratings than the Middle-Eastern women who were born in Western countries.

A variety of different beliefs and attitudes can influence the expression of pain.⁵⁹ Religious beliefs may cause people to think of pain as punishment, which can increase fear.⁵⁹ In Oriental societies, relieving childbirth pain is not encouraged; therefore women have a tendency to have more self control for pain.⁶² Generally, Thai people believe that the ability to keep silent or not to cry because of pain is a sign of maturity; women who cry and cannot control themselves are usually considered immature.⁶³ This has an effect on women's expression of pain, especially older Thai women who use non verbal pain communication more than younger women.¹²

Additional potential factors. Biological rhythm, monitoring, and risk factors may have an effect on labor pain, but there were some limitations of the studies in this area. Diurnal rhythm might have an effect on pain. Harkness⁶⁴ showed that there was no significant difference in pain during the first stage

of labor between day and night, but a significant difference in the second stage between day and night.⁶⁴ However, the small sample size limits the validity and generalization of these results.

The use of any type of monitor may have an effect on pain because of the consequent position and limitation of movement, but there is little research about the effects of using monitors on labor pain. Simkin⁶⁵ found that the restrictions of movement in bed caused 27% of 89 women to experience the most stress and 40% to experience moderate stress. It is believed that stress is related to the experience of pain in women; thus these women may have experienced more pain.

Risk factors of pregnancy and complications during pregnancy may have an effect on the experience of labor pain, but only one study was found. The researchers studied perinatal factors that correlated with pain and distress during labor in the third trimester of 115 primiparas and during their labor. The results showed that obstetric risk factors correlated with labor pain only in the latent phase ($r = .21, p < .05$).³³ However, they did not define clearly the obstetric risk factors.

Conclusion

Labor pain is a phenomenon that is related to many factors, especially age, parity and receiving support. Furthermore the factors involved with the psychological status of the women, either before labor or during labor, can also influence women to experience labor pain.

References

1. Merskey H, Bonica JJ, Carmon A, Dubner R, Kerr FWL, Lindblom U, et al. Pain terms: A list with definitions and notes on usage. *Pain* 1997; 6: 249-252.
2. Burroughs A. *Maternity nursing: An introductory text*. 6th ed. Philadelphia: W. B. Saunders, 1992.
3. Jayasinghe C, Blass NH. Pain management in the critically ill obstetric patient. *Crit Care Clin* 1999; 15:201-229.
4. Melzack R. Labour pain as a model of acute pain. *Pain* 1993; 53: 117-120.
5. Niven CA, Gijbsers K. Obstetric and non-obstetric factors related to labour pain. *J Reprod Infant Psychol* 1984; 2: 61-78.
6. Melzack R. The myth of painless childbirth. *Pain* 1984; 19: 321-337.
7. Sheiner E, Sheiner EK, Shoham-Vardi I. The relationship between parity and labor pain. *Int J Gynecol Obstet* 1998; 63: 287-288.
8. Bonica JJ, McDonald JS. The pain of childbirth. In: Bonica JJ, ed. *The management of pain volume II*. 2nd ed. Philadelphia: Lea and Febiger, 1990: 1313-1343.
9. Bonica JJ. Labor pain. In: Wall PD, Melzack R, eds. *Textbook of pain*. 3rd ed. New York: Churchill Livingstone, 1994: 615-640.
10. Davenport-Slack B, Boylan CH. Psychological correlates of childbirth pain. *Psychosom Med* 1974; 36: 215-223.
11. Nettlebladt P, Fagersjö M CF, Uddenberg N. The significance of reported childbirth pain. *J Psychosom Res* 1976; 20: 215-221.
12. Pathanapong P. *Childbirth pain communicative behaviors among selected laboring Thai women*. [dissertation]. Arizona: The University of Arizona, 1990.
13. Weisenberg M, Caspi Z. Cultural and educational influences on pain of childbirth. *J Pain Symptom Manage* 1989; 4: 13-19.
14. Wuitchik M, Bakal D, Lipshitz J. The clinical significance of pain and cognitive activity in latent labor. *Obstet Gynecol* 1989; 73: 35-42.
15. Brown ST, Campbell D, Kurtz A. Characteristics of labor pain at two stages of cervical dilation. *Pain* 1989; 38: 289-295.
16. Gaston-Johansson F, Fridh G, Turner-Norvell K. Progression of labor pain in primipara and multiparas. *Nurs Res* 1988; 37: 86-90.
17. Lowe NK. Critical predictors of sensory and affective pain during four phases of labor. *J Psychosom Obstet Gynaecol* 1991; 12: 193-208.

18. Lowe NK. Differences in first and second stage labor pain between nulliparous and multiparous women. *J Psychosom Obstet Gynaecol* 1992; 13: 243-253.
19. Ranta P, Jouppila P, Jouppila R. The intensity of labor pain in grand multiparas. *Acta Obstet Gynecol Scand* 1996; 75: 250-254.
20. Fridh G, Kopare T, Gaston-Johansson F, Norvell KT. Factors associated with more intense labor pain. *Res in Nurs Health* 1988; 11: 117-124.
21. Niven C, Gijbsbers K. A study of labor pain using the McGill Pain Questionnaire. *Soc Sci Med* 1984; 19: 1374-1351.
22. Ellwood D, Embrey MP. The cervix in pregnancy and labour: Clinical and biochemical investigations. New-York: Churchill Livingstone, 1981.
23. Melzack R, Taenzer P, Feldman P, Kinch RA. Labour is still painful after prepared childbirth training. *Can Med Assoc J* 1981; 125: 357-363.
24. Johnson N, Lilford R, Guthrie K, Thornton J, Baker M, Kelly M. Randomized trial comparing a policy of early with selective amniotomy in uncomplicated labour at term. *Br J Obstet and Gynaecol* 1997; 104: 340-346.
25. Rosen MG, Peisner DB. Effect of amniotic membrane rupture on length of labor. *Obstet Gynecol* 1987; 70: 604-607.
26. Blackburn ST, Loper DL. Maternal, fetal, and neonatal physiology: a clinical perspective. Philadelphia: W.B. Saunders, 1992.
27. Lanahan CC. Variables affecting pain perception during labor. In: McNall LK, Galeener JT. eds. Current practice in obstetric and gynecologic nursing: volume two. Saint Louis: The C. V. Mosby, 1978.
28. Melzack R, Kinch R, Dobkin P, Lebrun M, Trenzer P. Severity of labour pain: Influence of physical as well as psychologic variables. *Can Med Assoc J* 1984; 125: 357-363.
29. Ranta P, Jouppila P, Spalding M, Jouppila R. The effect of maternal obesity on labour and labour pain. *Anesthesia* 1995; 50: 322-326.
30. Lowe NK. The pain and discomfort of labor and birth. *J Obstet Gynecol Neonatal Nurs* 1996; 25: 82-92.
31. Masten Y. *Obstetric nursing*. Aurora: Skidmore-Roth. 1997: 32.
32. Hodnett E. Nursing support of the laboring women. *J Obstet Gynaecol Neonatal Nurs* 1996; 25: 257-264.
33. Wuitchik M, Hesson K, Bakal DA. Perinatal predictors of pain and distress during labor. *Birth* 1990; 17: 186-191.
34. Melzack R, Belanger E, Lacroix R. Labor pain: Effect of maternal position on front and back pain. *J Pain Symptom Manage* 1991; 6: 479-480.
35. Molina FJ, Soll PA, Lopez E, Pires C. Pain in the first stage of labor: Relationship with the patient's position. *J Pain Symptom Manage* 1997; 13: 98-103.
36. Mendez-Bauer C, Arroyo J, Ramos CG, Lavilla M, Izquierdo F, Elizaga V, et al. Effects of standing position on spontaneous uterine contractility and other aspects of labor. *J Perinat Med* 1975; 3: 89-100.
37. De Jong PR, Johanson RB, Baxen P, Adrians VD, van der Westhuisen S, Jones PW. Randomised trial comparing the upright and supine positions for the second stage of labour. *Br J Obstet Gynaecol* 1997; 104: 567-571.
38. Waldensjö U, Gottvall K. A randomized trial of birthing stool or conventional semirecumbent position for second-stage labor. *Birth* 1991; 18: 5-10.
39. Roberts J, Malasanos L, Mendez-Bauer C. Maternal positions in labor: Analysis in relation to comfort and efficiency. *Birth Defects* 1981; 17: 97-128.
40. Ryding AE, Cox DN. Psychosocial predictors of labor pain. *Pain* 1985; 22: 309-315.
41. Dannenbring D, Stevens MJ, House AE. Predictors of childbirth pain and maternal satisfaction. *J Behav Med* 1997; 20: 127-142.
42. Alehagen S, Wigman K, Wijma B. Fear during labor. *Acta Obstet Gynecol Scand*, 2001; 80: 315-320.
43. Saisto T, Ylikorkala O, Halmesmaki E. Factors associated with fear of delivery in second pregnancies. *Obstet Gynecol* 1999; 94: 79-682.

44. Manning M, Wright TL. Self-efficacy expectancies, outcome expectancies, and the persistence of pain control in childbirth. *J Pers Soc Psychol* 1983; 45: 421-431.
45. Lawrence SMF, Percival P. Comparison of expected and experienced labour pain of primiparous women. *J R Coll Nurs Aust* 1995; 2: 32-38.
46. Leventhal EA, Leventhal H, Shacham S, Easterling DV. Active coping reduces reports of pain from childbirth. *J Consult Clin Psychol* 1989; 57: 365-371.
47. Gagnon AJ, Waghorn K, Covell C. A randomized trial of one-to-one nurse support of women in labor. *Birth* 1997; 24: 71-80.
48. Tarkka M, Paunonen M. Social support and its impact on mothers' experiences of childbirth. *J Adv Nurs* 1996; 23: 70-75.
49. VandeVusse L. Decision making in analyses of women's birth stories. *Birth* 1999; 26: 43-50.
50. Chen CH, Wang SY, Chang MY. Women's perceptions of helpful and unhelpful nursing behaviors during labor: A study in Taiwan. *Birth* 2001; 28: 180-185.
51. Klein RP, Gist NF, Nicholson J, Standley K. A study of father and nurse support during labor. *Birth Fam J* 1981; 8: 161-164.
52. Madi BC, Sandall J, Bennett R, Macleod C. Effects of female relative support in labor: a randomized controlled trial. *Birth* 1999; 26: 4-10.
53. Cogan R, Spinnato J. Social support during premature labor: effects on labour and the newborn. *J Psychosom Obstet Gynaecol* 1988; 8: 209-216.
54. Yim W. Chinese husbands' presence during labour: A preliminary study in Hong Kong. *Int J Nurs Pract* 2000; 6: 89-96.
55. Niven C. How helpful is the presence of the husband at childbirth? *J Reprod Infant Psychol* 1985; 3: 45-53.
56. Hennborn WJ, Cogan R. The effect of husband participation on reported pain and probability of medication during labor and birth. *J Psychosom Res* 1975; 19: 215-222.
57. Copstick SM, Taylor KE, Hayes R, Morris N. Partner support and the use of coping techniques in labour. *J Psychosom Res* 1986; 30: 479-503.
58. Meinhart NT, McCaffery M. Pain: a nursing approach to assessment and analysis. Norwalk: Appleton-Century-Crofts, 1983.
59. Hawthorn J, Redmond K. Pain. Causes and management. Malden: Blackwell Science, 1998.
60. Bendelow GA, Williams SJ. Transcending the dualism: Towards a sociology of pain. *Sociol Health Illness* 1995; 17: 139-165.
61. Lee KA, Kieckhefer GM. Measuring human responses using visual analogue scales. *West J Nurs Res* 1989; 11: 128-132.
62. Oriol N, Warfield CA. Pain relief during labor. *Hospital Practice* 1984; 19: 151, 154-155, 159.
63. York R, Bhuttarawas P, Brown LP. The development of nursing in Thailand and its relationship to childbirth practices. *MCN Am J Matern Child Nurs* 1999; 24: 145-150.
64. Harkness J, Gijsbers K. Pain and stress during childbirth and time of day. *Ethol Sociobiol* 1989; 10: 255-261.
65. Simkin P. Stress, pain, and catecholamines in labor: part 2. Stress associated with childbirth events: A pilot survey of new mothers. *Birth* 1986; 13: 234-240.