Original Article
Effect of mind map assisting midwife-led labor on pain management and childbirth outcome

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Abstract: Objective: To explore the value of mind map in assisting midwife-led labor in pain management and its effect on pregnancy outcome. Methods: A total of 100 pregnant women were selected and grouped by random number table method. In the observation group (n=50), mind maps were used to assist midwives in labor pain management, while in the control group (n=50), routine analgesia was performed. The scores of self-efficacy, delivery mode, labor pain, childbirth experience, nursing satisfaction, and quality of life were compared between two groups. Results: After intervention, the self-efficacy expectations and the outcome expectations in the childbirth self-efficacy inventory were increased in both groups (all P<0.05), and the increase in the observation group was more significant than that in the control group (both P<0.05). The vaginal delivery rate was higher and the cesarean delivery rate was lower in the observation group than that in the control group (both P<0.05). In the assessment of labor pain, the sensory pain, affective pain, evaluative pain, and miscellaneous pain were all lower in the observation group than those in the control group (all P<0.05). In the assessment of childbirth experience, the scores of participation, self-ability, security, and professional support were all higher in the observation group than those in the control group (all P<0.05). The nursing satisfaction was higher in the observation group than that in the control group (P<0.05). Besides, the quality of life in all dimensions improved in both groups after intervention, and the improvement in the observation group was more significant than that in the control group (all P<0.05). Conclusion: Mind map assisting midwives in labor pain management can significantly enhance patients' self-efficacy, reduce cesarean delivery rate, reduce pain, obtain an ideal delivery experience, improve nursing satisfaction, and improve the quality of life, so it is worthy of promotion.

Keywords: Pregnant women, midwife, mind map, labor pain management, pregnancy outcome

Introduction

Pain is normal during childbirth, but long-lasting and severe pain can increase the incidence of cesarean delivery and threaten the safety of both the mother and fetus [1, 2]. Labor pain management by midwife is a commonly used nursing method in clinical obstetrics at present [3, 4]. It is the sophisticated and comprehensive nursing provided by experienced midwives, in order to enhance pregnant women's maternal confidence and eliminate fear of childbirth. Mind map is a graphic tool that accurately expresses the ideas and viewpoints, as well as converts boring content into easy-to-remember, highly organized, and colorful maps by using images, symbols, and vocabularies. At present, the application of mind maps for nursing in China is in an exploratory phase, mainly focusing on nursing teaching, clinical nursing management, and health education. Fan et al. applied mind map in the nursing care for patients with secondary urinary incontinence after benign prostatic hyperplasia, and found lower incidence and shorter time of urinary incontinence, as well as reduced anxiety score and improved nursing satisfaction [5]. Chen et al. summarized the key contents and

direction of perioperative nursing for breast cancer patients by applying mind maps in nursing interventions, which showed improved quality of perioperative life and reduced postoperative complications [6]. However, experimental research and systematic evaluation under the guidance of scientific methods are still lacking. This study aimed to explore mind map as a new way to assist midwives in labor pain management so as to improve the pregnancy outcome because studies related to this subject is still rare in Chinese population.

Materials and methods

General data

A total of 100 pregnant women admitted to the Obstetric Department of Gaomi Municipal Hospital from August 2018 to August 2019 were included and assigned in two groups by random number table method, with 50 people in the observation group and 50 in the control group. Written informed consent was obtained from all the patients, and this study was approved by the Ethics Committee of Gaomi Municipal Hospital.

Inclusion & exclusion criteria

Patients were eligible if they were given childbirth for the first time; were proved to be singleton pregnancy by professional obstetrician; had gestational week in the range of 36-42 weeks; had a normal range of pelvic diameter; and requested for eutocia voluntarily.

Patients were excluded if they had gestational diabetes or hypertension during pregnancy according to the Obstetrics and Gynecology (8th edition) [7]; had contraindications to vaginal delivery; had speech impairment, mental illness or unconsciousness; requested for cesarean delivery; or planned to give birth somewhere else.

Methods

In the control group, obstetric routine analgesic cares were applied, including posture care, music therapy, and respiratory training. In the observation group, mind map was used to assist midwife in labor pain management. Namely, the professional nurses cooperated with the midwife to analyze and summarize the contents that need to be explained based on the maternal pain, and then a "labor analgesia management map" was produced in the form of a mind map (with colorful tables, keywords, pictures, lines, etc) according to the explanation steps and analgesic processes. The headwords were "labor analgesia management", with 4 branches: pain education before childbirth, childbirth pain assessment, labor analgesia method, and pain control satisfaction follow-up. Among them, pain education before childbirth included opening clinic, group teaching, issuing a health manual, and establishing a pregnant women exchange group; childbirth pain assessment include evaluation time and evaluation tool; labor analgesia methods included psychotherapy, analgesic breathing technique, massage, compression method, music, and relaxation; pain control satisfaction follow-up included asking about birthing experience and lessons learned (**Figure 1**). The production of mind maps was according to the order of childbirth analgesia management contents, with corresponding pictures and notes under each part. A display board was made, and studied by responsible nurses, patients, and their families. The board was placed at a conspicuous place for patients and their families to learn and watch at any time. Besides, the nurses should understand the patient's condition in time.

Outcome measures

There were 3 main outcome measures. First, self-efficacy, which was evaluated with the use of childbirth self-efficacy inventory (CB-SEI-C32), included the self-efficacy expectations and outcome expectations [8]. Both subsets contained 16 questions, and each of them had a total score of 10 points, with a minimum of 16 points and a maximum of 160 points each. The standard score formula was used to obtain the standard score, and higher scores indicated a stronger sense of self-efficacy. Second, delivery mode, which included vaginal delivery and cesarean delivery, presented as rate. Third, labor pain intensity was measured by the Digital Analog Scale and the McGill Pain Questionnaire after intervention [9, 10]. The McGill Pain Questionnaire included the following aspects: sensory, affective, evaluative, and miscellaneous. Each item was
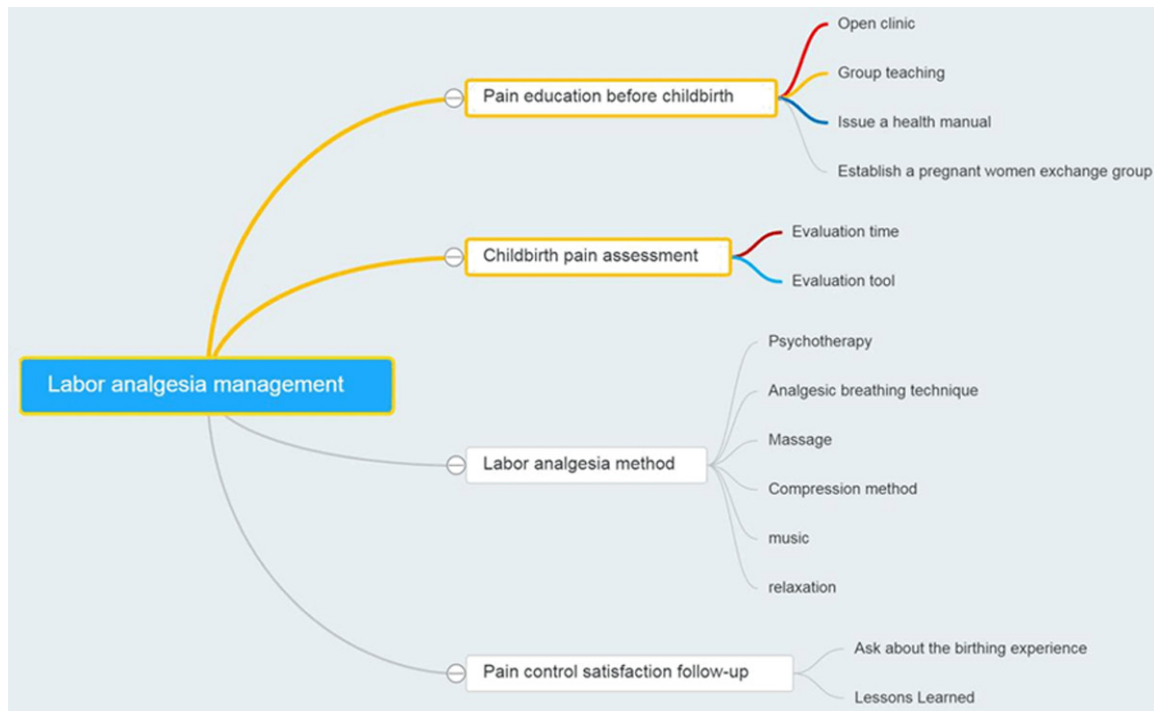
Figure 1. Mind map of labor analgesia management.

Table 1. Comparison of baseline data

Group	Age (year)	Mean gestational week (week)	Body weight (kg)	Height (cm)
Observation group (n=50)	27.4±2.4	38.3±0.4	67.93±8.92	160.92±3.44
Control group (n=50)	27.5±2.5	38.2±0.5	68.24±9.17	161.31±4.03
t	0.204	1.104	1.607	1.219
P	0.839	0.272	0.411	0.225

assessed in a range of 0-3 points, and higher score indicated stronger pain. The Digital Analog Scale is usually used in conjunction with the McGill Pain Questionnaire to assess the present pain intensity, in a range of 0-5 points, and higher score indicated stronger pain.

There were 3 secondary outcome measures. First, the delivery experience, which was surveyed before and after the intervention, included four dimensions: participation, self-ability, security, and professional support. The scores were evaluated individually by Kikert4 grading system, and higher score indicated better experience. Second, nursing satisfaction was evaluated by questionnaire, with a total score of 100: 90-100 points for great satisfaction; 70-89 points for satisfaction; <70 points for dissatisfaction. Nursing satisfaction

= (number of great satisfaction + number of satisfaction)/total number of cases × 100%. Third, quality of life, which was surveyed before and after the intervention, included four dimensions: cognitive function, social function, role function, and physical function, with a total score of 100 for each dimension, and higher score indicated better quality of life.

Statistical methods

Data were accurately input into SPSS22.0 for statistical processing. The measurement data between groups were expressed as mean ± sd, compared within the same group between before and after the intervention using paired t-tests, and compared between the two groups at the same time point using two independent sample t-test. The count data were expressed as (n, %), and compared using chi-

Table 2. Comparison of childbirth self-efficacy inventory (point)

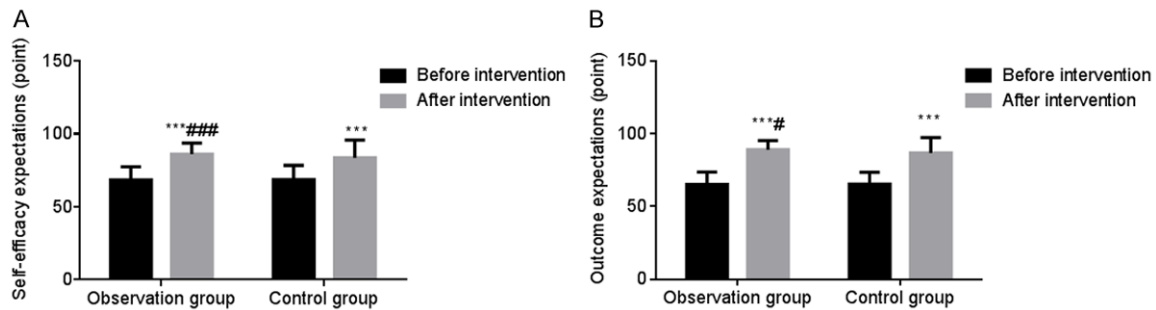| Item	Time	Observation group (n=50)	Control group (n=50)	t	P
Self-efficacy expectations	Before intervention	70.14±9.13	71.55±9.76	0.746	0.457
	After intervention	91.22±7.42	80.25±12.29	5.403	0.000
	t	9.805	6.241	-	-
	P	0.000	0.000	-	-
Outcome expectations	Before intervention	61.39±8.73	62.77±7.99	0.825	0.412
	After intervention	90.22±7.09	86.70±8.92	2.184	0.023
	t	17.433	14.183	-	-
	P	0.000	0.000	-	-

Figure 2. Comparison of childbirth self-efficacy inventory. A. Comparison of self-efficacy expectations; B. Comparison of outcome expectations. Compared with before treatment, ***P<0.001; compared with control group, #P<0.05, ###P<0.001.

Table 3. Comparison of vaginal delivery rate (n, %)

Group	Vaginal delivery	Cesarean delivery
Observation group (n=50)	45 (90.00)	5 (10.00)
Control group (n=50)	37 (74.00)	13 (26.00)
χ^2	4.336	4.336
P	0.037	0.037

square test. P<0.05 was considered statistically significant.

Results

Comparison of baseline data

There was no significant difference in age, mean gestational weeks, body weight, and height between the two groups (all P>0.05). See **Table 1**.

Comparison of general self-efficacy scale

Before analgesia interventions, the self-efficacy expectations and the outcome expectations in the CBSEI-C32 were not significantly

different between the two groups (both P>0.05). After the intervention, all tested values increased, and the increases were more significant in the observation group than those in the control group (all P<0.05). See **Table 2** and **Figure 2**.

Comparison of vaginal delivery rate

The vaginal delivery rate was significantly higher and the cesarean delivery rate was lower in the observation group than that in the control group, with significant differences (both P<0.05). See **Table 3**.

Comparison of pain intensity during childbirth

In the assessment of labor pain intensity, the scores of sensory pain, affective pain, evaluative pain, and miscellaneous pain in the observation group were all lower than those in the control group, with statistically significant differences (all P<0.05). See **Table 4** and **Figure 3**.

Comparison of childbirth experience

In the evaluation of childbirth experience, the scores of participation, self-ability, security,

Table 4. Comparison of pain intensity during childbirth (point)

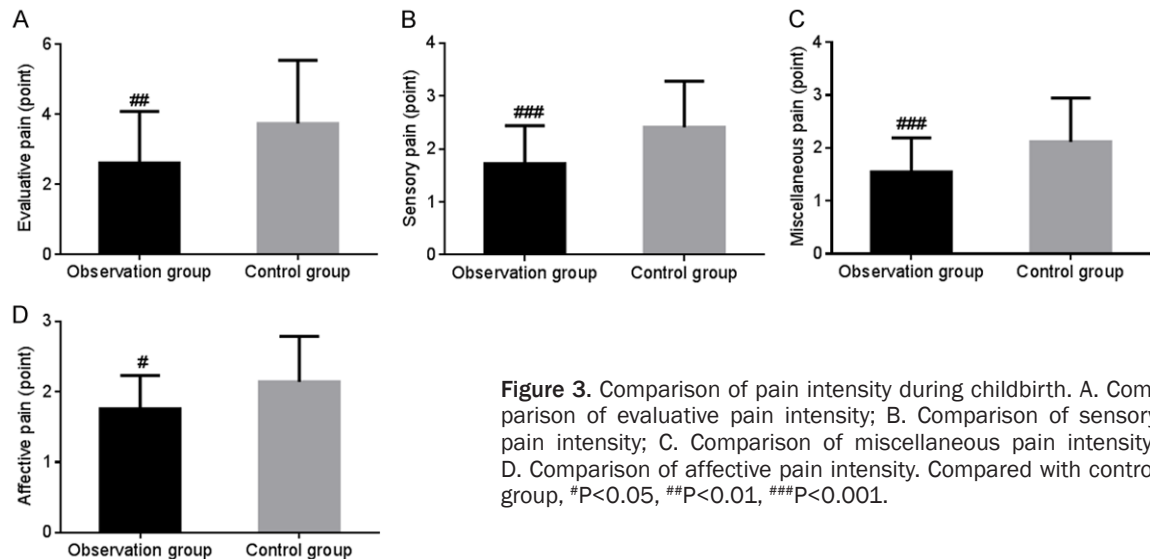| Group	Evaluative pain	Sensory pain	Miscellaneous pain	Affective pain
Observation group (n=50)	2.61±1.47	1.72±0.72	1.55±0.62	1.88±0.47
Control group (n=50)	3.73±1.81	2.41±0.87	2.12±0.83	2.14±0.65
t	3.396	4.320	3.890	2.292
P	0.001	0.000	0.000	0.024

Figure 3. Comparison of pain intensity during childbirth. A. Comparison of evaluative pain intensity; B. Comparison of sensory pain intensity; C. Comparison of miscellaneous pain intensity; D. Comparison of affective pain intensity. Compared with control group, #P<0.05, ##P<0.01, ###P<0.001.

Table 5. Comparison of childbirth experience (point)

Group	Participation	Self-ability	Security	Professional support
Observation group (n=50)	3.59±0.94	3.83±1.56	4.51±0.66	4.45±0.91
Control group (n=50)	2.76±1.27	2.91±1.24	3.91±1.36	3.75±1.03
t	2.976	2.941	3.336	2.764
P	0.004	0.004	0.001	0.007

and professional support in the observation group were higher than those of the control group, with significant differences (all P<0.05). See **Table 5** and **Figure 4**.

Comparison of nursing satisfaction

The nursing satisfaction in the observation group was 96.00%, which was significantly higher than 72.00% in the control group. See **Table 6**.

Comparison of quality of life

There was no significant difference in quality of life in terms of cognitive function, social function, role function, and physical function between the two groups before intervention (all

P>0.05). After the intervention, the values of all items were improved, and the improvements in the observation group were more significant than those in the control group (all P<0.05). See **Table 7**.

Discussion

The nursing tasks in obstetrics department are burdensome, so precise care for patients receiving conventional analgesic interventions is limited [11-13]. The use of mind maps to assist midwives in labor pain management can simplify the nursing process and enhance patients' knowledge and understanding, so that patients can exert subjective initiative throughout the delivery process and cooperate with midwives to complete various operational matters [14]. Additionally, through the use of multiple colors and graphics, mind maps focus on the patients' pain experience, and the radioactive thinking mode displaying in the form of graphics in a hierarchical man-
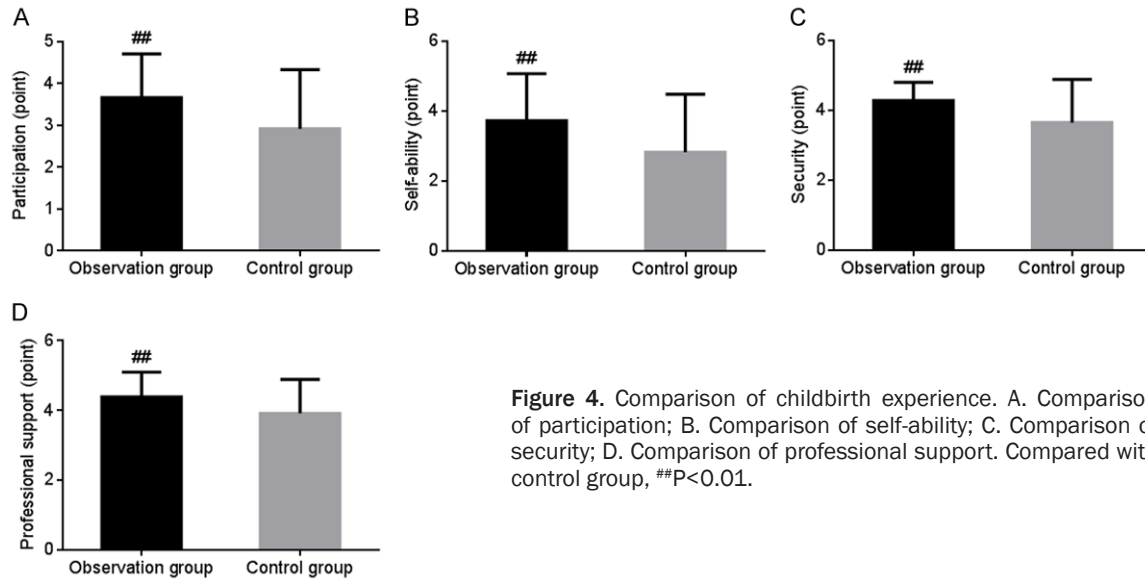
Figure 4. Comparison of childbirth experience. A. Comparison of participation; B. Comparison of self-ability; C. Comparison of security; D. Comparison of professional support. Compared with control group, ##P<0.01.

Table 6. Comparison of nursing satisfaction (n, %)

Group	Great satisfaction	Satisfaction	Dissatisfaction	Satisfaction rate
Observation group (n=50)	22 (44.00)	26 (52.00)	2 (4.00)	48 (96.00)
Control group (n=50)	16 (32.00)	20 (40.00)	14 (28.00)	36 (72.00)
X^2	-	-	-	10.714
P	-	-	-	0.001

Table 7. Comparison of quality of life (point)

Item	Time	Observation group (n=50)	Control group (n=50)	t	P
Cognitive function	Before intervention	64.12±1.13	64.17±1.10	0.224	0.823
	After intervention	90.64±2.89	81.33±2.56	17.051	0.000
	t	60.432	43.545	-	-
	P	0.000	0.000	-	-
Social function	Before intervention	66.34±1.03	66.38±1.13	0.185	0.854
	After intervention	92.57±3.89	84.22±2.87	45.717	0.000
	t	46.091	44.898	-	-
	P	0.000	0.000	-	-
Role function	Before intervention	64.12±1.23	64.17±1.25	0.201	0.841
	After intervention	88.56±3.19	76.64±2.89	19.581	0.000
	t	50.547	28.003	-	-
	P	0.000	0.000	-	-
Physical function	Before intervention	65.22±1.38	65.24±1.35	0.093	0.926
	After intervention	93.39±2.87	85.22±2.37	15.521	0.000
	t	62.550	51.798	-	-
	P	0.000	0.000	-	-

ner is helpful to guide and deepen the patients' memory, to improve the quality of labor analgesia, and to remind midwives all the procedures needed [15, 16].

The results of this study showed that, the scores of self-efficacy, childbirth experience, and quality of life, as well as the rates of vaginal delivery and nursing satisfaction were higher

in the observation group than those in the control group, while the scores of labor pain in the observation group were lower than those of the control group. The self-efficacy is a kind of belief of puerperae, that they had the confidence and perseverance to overcome pain, mastered the techniques of psychotherapy, analgesic breathing, massage, compression, music, and relaxation in the process of childbirth, so that their pain was relived, and they could provide an ideal conditions for natural vaginal delivery [17-21]. Thereafter, they could have a good childbirth experience, and present a high rate of nursing satisfaction and improved quality of life [22]. Li et al. applied mind map in 200 puerperae for discharge guidance, and showed significantly improved nursing satisfaction and quality of life, which is consistent with the results of this study [23].

There were some shortcomings in this study. The sample size is limited and we did not include cases with multiple pregnancy and puerperae with childbirth experience before. In addition, we did not follow up the prognosis of the cases. Therefore, further studies with expanded sample size and prolonged observation time will be carried out.

In conclusion, mind map assisting midwives in labor pain management can significantly enhance patients' self-efficacy, reduce cesarean delivery, reduce pain, provide an ideal delivery experience, improve nursing satisfaction, and improve the quality of life, so it is worthy of promotion.

Disclosure of conflict of interest

None.

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