Original Research Article

Evaluating the effects of back massage during labour on delivery outcomes: A prospective study on primigravida mothers

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ABSTRACT

Background and Objectives: The labor and delivery process can be stressful for parturient women, especially for primigravida mothers. Birth companions providing massage and emotional support can help make more pleasant birthing experience. This study aimed to assess the impact of back massage by trained birth companions on reducing analgesic use, pain intensity scores, and labor duration.

Materials and Methods: The study was conducted on primigravida women. During antenatal care visits, companions in the intervention group were trained in massage techniques, while no training was imparted to companions in the control group. Data were collected using a pre-tested questionnaire during antenatal clinic visits and delivery A multivariable logistic regression model was used to assess the impact of massage on delivery outcomes while adjusting for significant confounding variables.

Results: The study demonstrated a positive impact of back massaging on labor and delivery outcomes. Mothers in the massaged group were 2.27 times less likely to receive analgesics and 3.71 times more likely to experience a reduction in pain intensity scores of > 2 compared to those receiving usual care. Additionally, the massaged group had a 2.24 times higher likelihood of reducing labor duration to < 12 hours compared to the usual care group.

Conclusion: Back massaging by trained birth companions is an effective intervention for reducing the use of analgesics, pain intensity scores, and the length of labor in primigravida women.

1. Introduction

The labor and delivery process can be stressful for all mothers, especially for primigravida.[1,2] Soet et al. (2003) reported traumatic experiences in 34% of mothers, with 1.9% experiencing posttraumatic stress disorder.[3] Studies on primigravida women emphasize the importance of having family and friends present for assistance, companionship, and empathy, leading to less anxiety and a more satisfying birthing experience.[4] The World Health Organization (WHO) encourages labor companionship to enhance the quality of care during labor. In line with this, the Government of India has also decided to allow birth companions during delivery.[5,6] When trained companions called Doula are present to help, mothers are less likely to receive painkillers and report more satisfying labor and delivery experiences.[7–9] Studies have evaluated the effectiveness of back massage on pain relief and rates of cesarean section deliveries.[10–12] Massage manipulates soft tissues, relieving stress and providing calmness to the mind,

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resulting in shorter labor duration, reduced reliance on oxytocin, anesthesia, instrumental deliveries, and cesarean sections. [13–16] Since hospitals often cannot provide one-to-one care by health personnel, this study was undertaken to assess the effect of massage by trained birth companions on reducing analgesic use, pain intensity scores, and labor duration in primigravida mothers.

2. Materials and Methods

2.1. Study design and sample size

This prospective comparative non-randomized interventional study was conducted from January 2019 to September 2021 at the Department of Obstetrics and Gynaecology of Sir Sunderlal Hospital, Banaras Hindu University, Varanasi, India, focusing on primigravida women. The required sample size was determined by considering reduction in pain intensity score as the primary outcome. Preliminary data on pain reduction were obtained from a pilot investigation involving 10 patients each receiving back massage and those receiving usual care. Sample size for each group was determined using statistical formula for comparing the difference of means between two independent groups. The mean score of pain intensity in control group was 1.97 and, in the Intervention, group was 1.64. The standard deviation in respective group to be 0.81 and 0.86. By considering a reduction in pain intensity score of 0.33 units to be a significant reduction between in the intervention and control groups, with a significance level of 5%, power of 80%, and an attrition rate of 30% during labor, the study required 146 participants in each group. Thus, 146 primigravida women were allocated to the intervention group receiving massage during delivery, and 146 primigravida women, matched for education and occupation, were assigned to the control group receiving usual care. The final analysis was carried on 102 subjects per group.

2.2. Inclusion criteria

Primigravida women aged 18 to 35 years, with a normal course of pregnancy and gestational age between 20 and 32 weeks, who consented to participate in the study

2.3. Exclusion criteria

Primigravida women with a high-risk pregnancy condition, such as a history of obstetric complications, uterine fibroids, kidney disease, heart disease, severe anemia, platelet disorders, neurological disorders, pre-eclampsia, eclampsia, pregnancy-induced hypertension, placenta previa, multiple pregnancies, or fetal complications. Additionally, women who do not consent to participate in the study are excluded.

2.4. The intervention and the outcomes

Pregnant mothers in the intervention group received back massages from birth companions who were trained in massage techniques by the researcher during ANC visits. The massage technique involved placing the palm of the hand on the identified spot and applying deep pressure to the tissue in a circular manner without lifting. Mothers were encouraged to take deep breaths during the massage. The massage was initiated during the first stage of active labor and continued for 10 minutes. After that, the massage was repeated at 30-minute intervals, each lasting for 10 minutes, until delivery. The massage technique performed by the companions for mothers in the intervention group is illustrated in Figure 1.

Figure 1: Different ways of massaging technique given to mothers by birth companions

The outcomes assessed in this study were pain intensity score, reduction in the use of analgesics, and labor duration. Pain intensity was measured using the Numerical Rating Pain Scale (NRPS), a standardized scale ranging from 0 to 10. In both the intervention and control groups, pain intensity scoring was initially conducted during the first contraction. For the intervention as well as control groups, scoring was repeated during contractions and then after 10 minutes of massaging.

2.5. Data collection

Data collection was done on a predesigned and pre tested structured questionnaire. Mother's demographic, socio-economic, anthropometry, dietary pattern, practice of physical activity and resting duration as well as history of chronic disease were collected at enrollment for ANC; while data on hemoglobin levels for different trimesters were extracted from medical reports of the mothers either at the time of enrolment or at subsequent visits for ANC or during the time of delivery. At the time of delivery, information was collected on the pain intensity score before and after the massage in the intervention group, as well as in the control group. Additionally, the use of analgesics and total labor

duration were recorded in both groups.

2.6. *Statistical analysis*

The analysis was conducted using SPSS version 20. Qualitative variables were presented as frequencies and percentages separately for the intervention and control groups. Quantitative data were presented as mean and standard deviation (SD). The association of predictor variables between the intervention and control groups was assessed using chi-square or Fisher's exact tests for qualitative variables, while t-tests were used for testing the difference in means between the groups for quantitative data. To identify the effect of massage on the considered outcomes, conditional multivariable logistic regression was used, incorporating all predictor variables found to significantly associated in bivariate analysis. Statistical significance was determined at $\alpha = 0.05$.

2.7. *Ethical clearance*

The study was approved by Ethical Committee of the Institute of Medical Sciences, Banaras Hindu University, Varanasi, India vide-letter No. Dean/2020/EC/2300 dated 07-12-2020. Informed consent was obtained from pregnant women who consented to participate in the study. The confidentiality of each selected participant was maintained by assigning a code to them.

3. Results

The baseline characteristics of the study population are presented in Table 1. The mean age of women in the intervention and control groups was 25.0±3.2 years and 25.1±2.9 years, respectively. Education, occupation, family type, height, medical history of chronic diseases, number of ANC visits, weight gain during pregnancy, type of birth companion, and hemoglobin levels during the first and second trimesters including age were comparable between the two groups. However, the family size was statistically higher in the intervention group (6.1±1.1) compared to 5.8±0.9 in the control group (p = 0.006). More mothers in the intervention group (52.0%) were vegetarian compared to 35.3% in the control group (p = 0.016). Additionally, significantly more mothers in the control group (80.4%) were booked for ANC in the first trimester compared to 58.8% in the intervention group (p = 0.001). Spontaneous onset of labor was observed in significantly more mothers (91.2%) in the intervention group than in the control group (76.5%) (p = 0.004). Furthermore, a higher percentage of mothers in the control group (36.3%) had indications for LSCS delivery compared to the intervention group (20.6%) (p = 0.013). The mean hemoglobin (Hb) level in the third trimester was significantly higher in the intervention group (11.70±0.97 gm%) compared to 11.33±1.28 gm% in the control group (p = 0.019).

Table 2 compared the outcomes i.e., use of analgesic, reduction in pain intensity score and duration of labour time between mothers of intervention and control groups. Compared to 18.6% mothers of intervention group, almost twice of the mothers (35.3%) of control group had used analgesic which differed significantly between the groups (p = 0.007). Reduction of > 2 in pain intensity scores was noted almost three-fold (40.2%) in intervention group as compared to 14.7% in control group which differed significantly (p < 0.001). Duration of labour < 12 hours was significantly higher in mothers (53.9%) of intervention group as compared to 34.3% mothers in control group (p = 0.005).

Finally, the effect of massaging on the reduction of analgesic use, pain intensity score, and duration of labor was evaluated using conditional multivariable logistic regression (Table 3). Variables that differed significantly between the intervention and control groups were included in the model as confounders. These variables included family size, type of diet, timing of ANC booking, Hb level in the third trimester, onset of labor, mode of delivery, and indication for LSCS. The analysis indicated a significant impact of massaging on each of the three considered outcomes. The reduced use of analgesics was 2.27 times higher (OR = 2.27; 95% CI: 1.15 – 4.55) in mothers of the intervention group compared to the control group. The reduction in pain intensity score of > 2 was 3.71 times higher (OR = 3.71; 95% CI: 1.73 – 7.98) in the intervention group compared to the control group. Similarly, the duration of labor < 12 hours was 2.24 times higher (OR = 2.24; 95% CI: 1.19 – 4.21) in the intervention group compared to the control group.

4. Discussion

The labour and delivery process creates a situation of anxiety, stress and fear to pregnant mothers and the companions as well.[1] It is generally more common in primigravida women.[2] Soet et al (2003) reported that 34% women during childbirth had traumatic experience and 1.9% of these had posttraumatic stress disorder too.[3] Kungwimba et al (2013) in their study on primigravida women had stressed the presence of family and friends for practical assistance, company, and empathy to lessen anxiety.[4] Government of India on the recommendation of WHO, made a key decision to allow birth companions during delivery as an innovative step to target in reducing Maternal Mortality Ratio and Infant Mortality Rate.[5,6] It was reported that women were less likely to undergo caesarean delivery and less likely to receive pain-killers and claimed more satisfying labour and delivery when assisted by trained women, so called "Doula". Continuous support of Doula lessen labour and need for clinical and cesarean interventions and increases mother satisfaction with labour and delivery. It was also pointed that strong contact and massage aids in stress reduction and oxytocin generation

Table 1: Baseline characteristics of study population

Characteristic	Control group n=102	Intervention Group n=102	P value
Age (years)			
Mean ± SD	25.1±2.9	25.0±3.2	0.749
Mother's education			
Higher secondary/Intermediate, n (%)	45 (44.1)	54 (52.9)	
Graduate, n (%)	52 (51.0)	44 (43.1)	0.450
Post graduate/Ph.D., n (%)	5 (4.9)	4 (3.9)	
Mother's occupation			
Government Job, n (%)	5 (4.9)	7 (6.9)	
Private Job, n (%)	14 (13.7)	13 (12.7)	0.828
House wife, n (%)	83 (81.4)	82 (80.4)	
Type of family			
Nuclear, n (%)	8 (7.8)	9 (8.8)	0.800
Joint, n (%)	94 (92.2)	93 (91.2)	
Family size			
Mean ± SD	5.8±0.9	6.1±1.1	0.007
Height (cm)			
145-155, n (%)	85 (83.3)	84 (82.4)	0.853
>155, n (%)	17 (16.7)	18 (17.6)	
Diet type			
Vegetarian, n (%)	36 (35.3)	53 (52.0)	0.016
Non-vegetarian, n (%)	66 (64.7)	49 (48.0)	
Medical history of chronic diseases			
Hypertension, n (%)	14 (13.7)	17 (16.7)	
Diabetes, n (%)	10 (9.8)	5 (4.9)	0.371
None, n (%)	78 (76.5))	80 (78.4	
Time of booking for ANC			
First trimester, n (%)	82 (80.4)	60 (58.8)	0.001
Second trimester, n (%)	20 (19.6)	42 (41.2)	
Number of ANC visits			
< 4, n (%)	3 (2.9)	4 (3.9)	0.222
≥ 4, n (%)	99 (97.1)	98 (96.1)	
Onset of labour			
Spontaneous, n (%)	78 (76.5)	93 (91.2)	0.004
Induced, n (%)	24 (23.5)	9 (8.8)	
Weight gain at delivery (Kg.)			
<10, n (%)	63 (61.8)	58 (56.9)	0.476
≥10, n (%)	39 (38.2)	44 (43.1)	
Mode of Delivery			
LSCS, n (%)	37 (36.3)	21 (20.6)	0.013
SVD, n (%)	65 (63.7)	81 (79.4)	
Haemoglobin (g/dl)			
First trimester (Mean ± SD)	10.8 ±1.33	10.79±1.13	0.553
Second trimester (Mean ± SD)	11.45±1.13	11.51±1.10	0.698
Third trimester (Mean ± SD)	11.33±1.28	11.70±0.97	0.019
Relation with birth companion			
Mother/Mother-in-law, n (%)	81 (79.4)	75 (75.5)	0.154
Sister/ Sister-in-law, n (%)	21 (20.6)	27 (26.5)	

Table 2: Bivariate comparison of outcomes between intervention and control groups

Characteristic	Control Group (n = 102)	Intervention Group (n = 102)	P value
Use of analgesics			
Yes, n (%)	36 (35.3)	19 (18.6)	0.007
No, n (%)	66 (64.7)	83 (81.4)	
Change in pain intensity score			
≤ 2, n (%)	87 (85.3)	61 (59.8)	< 0.001
> 2, n (%)	15 (14.7)	41 (40.2)	
Duration of labour pain (hours)			
<12, n (%)	35 (34.3)	55 (53.9)	0.005
≥12, n (%)	67 (65.7)	47 (46.1)	

Table 3: Effect of massaging on use of analgesic, reduction in pain intensity score and duration of labor

No use of analgesic		Reduction in pain intensity score of > 2		Reduction in labour duration of < 12 hours	
OR	95% CI	OR	95% CI	OR	95% CI
2.27	1.15 – 4.55	3.71	1.73 – 7.98	2.24	1.19 – 4.21

Note: Confounding variables for each outcome were family size, type of diet, booking time for ANC, Hb level in third trimester, onset of labour, mode of delivery, indication of LSCS

that causes uterine contractions and cerebral sleepiness and an increased pain tolerance.[7–9] Wang et al (2018) suggested continuous presence of birth companions to provide one-on-one assistance during labour to primiparous pregnant women to reduce caesarean section delivery caused by anxiety, stress and discomfort.[11] It was pointed that massage during delivery manipulates soft tissues of the body and relieve stress, calm the mind, and relax the muscles during delivery resulting in shorter labour, reduced the need for oxytocin, anesthesia, and instrumental and caesarean deliveries as well as reduces anxiety, postpartum depression, hemorrhage and fever.[13,14] In our present study, presence of trained birth companions and giving massaging showed significant impact in reducing the use of analgesic, pain intensity score and length of labour time. Reduced use of analgesic was higher by 2.27 times (OR = 2.27; 95% CI: 1.15 – 4.55) in mothers of intervention group than the control group. Pain intensity score reduction of > 2 was significantly higher by three and half times (OR = 3.71) in massaged group mothers as compared to those on usual care. While, length of labour time < 12 hours was significantly more than twice (OR = 2.24) in massaged group when compared with mothers on usual care. Similar to our study, Pawale and Salunkhe (2020) for primigravida women had reported significant difference in post-test pain scores between mothers of massaged and usual care.[10] Nigerian study had evidenced less anxiety, require fewer medical treatments, and experience fewer difficulties who received help throughout labour by either a female relative or a partner or a doula, or another social support person.[12] Mortazavi et al (2012) in a randomized trial with three groups i.e., massaged group, attendant group and control group concluded that a 30-minutes massage during labour in three phases led to reduced pain, decreased anxiety, and greater satisfaction during delivery.[15] Bolbol-

Haghighi et al. (2016) had also showed impact of massage therapy throughout the first and second phases of labour in shortening significantly the length of labour.[16] Thus, the present study strengthen the presence of trained companions and giving back massage for satisfying birthing process.

The labor and delivery process often induces anxiety, stress, and fear in pregnant mothers and their companions,[1] especially in primigravida women.[2] Soet et al. (2003) found that 34% of women experienced traumatic childbirth, with 1.9% developing posttraumatic stress disorder.[3] Kungwimba et al. (2013) emphasized the importance of having family and friends present to provide practical assistance, companionship, and empathy to reduce anxiety.[4] Following the WHO's recommendation, the Government of India allowed birth companions during delivery as a strategy to reduce Maternal Mortality Ratio and Infant Mortality Rate.[5,6] Studies have shown that women assisted by trained companions are less likely to undergo cesarean delivery, receive painkillers, and report more satisfying labor experiences. Continuous support during labor reduces the need for medical interventions and increases satisfaction with the birthing process.[7–9] Massage during delivery has been shown to manipulate soft tissues, relieve stress, calm the mind, and relax muscles, resulting in shorter labor, reduced need for medical interventions, and decreased anxiety, postpartum depression, hemorrhage, and fever.[13,14] In our study, the presence of trained birth companions providing massage significantly reduced the use of analgesics, pain intensity scores, and duration of labor. The reduction in analgesic use was 2.27 times higher in the intervention group compared to the control group (OR = 2.27; 95% CI: 1.15 – 4.55). Pain intensity score reduction of > 2 was significantly higher (OR = 3.71) in the massaged group compared to the usual care group. Similarly, the duration of labor < 12 hours was more

than twice as likely (OR = 2.24) in the massaged group compared to the usual care group. Consistent with our findings, Pawale and Salunkhe (2020) reported significant differences in post-test pain scores between massaged and usual care groups for primigravida women.[10] A Nigerian study found that continuous support during labor from a female relative, partner, doula, or another social support person reduced anxiety, medical treatments, and difficulties during labor.[12] Mortazavi et al. (2012) conducted a randomized trial showing that a 30-minute massage during labor led to reduced pain, decreased anxiety, and greater satisfaction during delivery.[15] Bolbol-Haghighi et al. (2016) also demonstrated that massage therapy during the first and second phases of labor significantly shortened the length of labor.[16] This study reinforces the importance of back massage by trained companions for a satisfying birthing experience.

5. Conclusion

Massaging by a trained birth companion proves to be an effective intervention in reducing the use of analgesics, pain intensity scores, and labor duration. The study suggests that birth companions should be trained in effective massage techniques for labor and childbirth which may be implemented at gross root level through the community health workers.

6. Source of Funding

7. Conflict of Interest

The author(s) declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

Acknowledgments

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