Original Article

Effectiveness of back massage on pain relief during first stage of labor in primi mothers admitted at a Tertiary care center

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Abstract

Background: Labor pain is one of the most severe pains a woman experiences in her life, causing an increase in the anxiety and stress levels. Massage therapy has proven beneficial for relaxation purposes. **Aim:** To evaluate the effectiveness of back massage in relieving pain during the first stage of labor in primi mothers. **Methodology:** The study included 40 primipara mothers belonging to the age group 22–25 years, equally divided into 2 groups: Experimental (massage therapy) and control (routine care). The socio-demographic data, labor assessment parameters (cervical dilation, status of fetal membranes, frequency and duration of uterine contractions during the latent and active phase of labor, and the total duration of the first stage of labor), and the level of labor pain (numerical rating pain scale) were recorded. Data analysis was performed by one-way ANOVA and two independent samples *t*-test ($P \leq 0.05$ as significant). **Results:** During the latent and active phase of labor, majority of the mothers experienced 4–5 contractions in a span of 10 min. During the latent phase of labor, uterine contractions for 20–40 s were exhibited by 90% and 75% mothers in the experimental and control group, respectively; and during active phase, contractions of >40 s were exhibited by 85% mothers in both groups. A significant difference in the post-test pain scores was noted between the 2 groups ($P < 0.0001$). **Conclusion:** Our study proved that back massage was effective in reducing pain during the first stage of labor in primipara mothers in comparison to those who were subjected to routine care.

Keywords: Anxiety, first stage labor, labor pain, massage

Introduction

Labor pain is one of the most severe pains a woman experiences in her life, which occurs with uterine contractions, cervical dilation, and effacement.[1,2] Adequate knowledge about the labor and delivery process can impart a sense of emotional well-being and confidence to ensure successful labor.[1,2] During labor, increased anxiety enhances the pain perception, increases labor duration and catecholamine secretion which reduces blood flow in the uterus. This decreases the uterine contractions and increases labor duration.[3,4] The release of catecholamines further adds to the emotional stress and causes a delay in the labor process, which in turn increases the demand for cesarean section from mothers.[5] In India, the cesarean section rate has increased from 2.9% in 1990–1993 to 17.2% in 2015–2016.[6]

Encouraging the mother to embrace the natural birthing process by providing a few comfort measures such as patterned breathing, music, hydrotherapy, relaxation, and visualization increases the production of endogenous endorphins that bind to receptors

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in the brain for pain relief.[7-9] Another comfort measure is massaging, which is an ancient method that women have received for relaxation purposes. It is widely used and in turn reduces the duration of labor by increasing the uterine contractions.[10-13] Massage therapy has proven beneficial in varying conditions such as prenatal depression, pre-/full-term infants, autism, skin conditions, hypertension, aging-related problems such as Parkinson's disease and dementia, and sports-related injuries.[14]

The intensity of labor pain varies in every individual. The pain is either moderate or severe, which is unbearable and increases the stress levels in the mother.[15] Based on the information available in the literature on the type of massaging technique and lubricant, this study was conducted using 2 types of massaging techniques - Effleurage (gliding strokes) and Petrissage (Kneading strokes) along with jasmine oil as the lubricant to soothe labor pain.[14,16] The main aim of the study was to assess and compare the effectiveness of back massage on pain during the first stage of labor in primipara mothers at a tertiary care center in Karad, Maharashtra.

Methodology

Study design

This interventional study was conducted at a tertiary care center in Karad, Maharashtra, after receiving approval from the institutional ethics committee (KIMSDU/IEC/01/2015 Dated:05-03-2015, Protocol number: 0334/2017-18) was acquired along with written informed consent from primi mothers participating in the study. The study plan was explained in detail to all the participating mothers.

Study subjects

The study included a total of 40 primipara mothers, 18–29 years old, either with full-term pregnancy or with fetus in cephalic presentation, and mothers willing to participate. They were allotted to 2 groups using the lottery method, a simple random sampling technique. The 2 groups were: Experimental (n = 20, mothers received back massage during the first stage of labor) and control (n = 20, mothers did not receive back massage). Multipara mothers, mothers with high-risk pregnancy or skin infection on the back, and mothers who had a fully dilated cervix at the time of admission were excluded from the study.

The sample size for the study was calculated using the proportionality formula from a study conducted by Joseph and Fernandez.[16] The post-test visual analog scale (VAS) score was 3.1 ± 1.1 and 7.95 ± 1.5 in the experimental and control groups, respectively. At the statistical power of 80% the following formula was used

$$N = \frac{\left(SD_1^2 + SD_2^2\right)\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}\right)}{M_1 - M_2}$$

Based on the formula, a minimum of 30 mothers were required to conduct the study. We included 10 more, resulting in a final sample size of 40.

Study procedure

Only 2 primipara mothers, one from each group, were attended to daily during the course of the study. The socio-demographic data such as age, education, religion, occupation, and family's income of the mothers were recorded.[17] The assessment of progress of labor, i.e., from the time of admission until the end of first stage of labor, was performed by evaluating the cervical dilation, status of fetal membranes on admission, frequency, and duration of uterine contractions during the latent and active phase of labor, and the total duration of the first stage of labor. This labor assessment proforma was validated by 9 experts from the Department of Obstetrics and Gynecological Nursing. The numerical rating pain scale (0 = no pain, 1-3 = mild pain, 4-6 = moderate pain, 7-10 = severe pain) was used to assess the level of labor pain of primipara mothers during first stage of labor.[18]

Mothers in the experimental group were given a back massage with jasmine oil (extra pure), diluted with grapeseed carrier oil. Back massage was given by using routine back massage techniques such as Effleurage (gliding strokes) and Petrissage (Kneading strokes) in between contractions; and during contractions, obstetrical back rub was performed.[14] Effleurage was performed by gliding a flat palm smoothly over the entire back in a slow circular motion followed by Petrissage, which was performed by using kneading and knuckling movements. Kneading was performed by squeezing fleshy mass of lower back between fingers and thumb and knuckling was performed by using knuckles of fingers to knead and lift in a circular and upward motion. Obstetrical back rub was performed during contractions by placing the palm of the hand against the spot identified by the mother. That spot and the adjacent area was massaged by moving the palm in a circular manner without lifting. Mothers received 20 back massages, i.e., 13 times in the latent phase and 7 times in the active phase of labor, every half an hour for 10 min. Mothers in the control group received only routine care.

Labor pain was assessed in terms of pre-test and post-test amongst mothers. In the experimental group, pain was assessed 20 times before and after every back-massage session. In the control group, pain was assessed 20 times pre and post routine care.

Statistical analysis

Data was analyzed using R v386 3.6.0 software. The pain levels and comparison between duration of first stage of labor and demographic data of mothers were assessed by one-way ANOVA and two independent samples t-test and represented as mean ± SD. The level of significance was set at $P \leq 0.05$.

Results

The study included mostly primipara mothers –9 (45%) in experimental and 7 (35%) in control group, aged 22–25 years. The demographic data of the study participants is represented in Table 1.

During labor assessment of mothers, majority of them, i.e., 19 (95%) in experimental and 18 (90%) had no cervical dilation. The fetal membranes were still intact in all mothers. During the latent phase of labor, most of the mothers experienced 4-5 contractions in a span of 10 min (14 [70%] in experimental group; 15 [75%] in control group); and uterine contractions for 20-40 s (18 [90%] in experimental group; 15 [75%] in control group). During the active phase of labor, most of them experienced 4-5 contractions in a span of 10 min (18 [90%] in experimental group; 16 [80%] in control group); and also uterine contractions >40 seconds (17 [85%] in experimental group; 17 [85%] in control group) [Table 2].

The average mean pain scores for pre-test in the experimental and control groups were 5.04 and 5.72, respectively. The average mean pain scores for post-test were 2.71 and 6.457 in the experimental and control groups, respectively. A significant difference in the post-test pain score was noted between the experimental and control groups when assessed all 20 times ($P < 0.0001$) [Table 3].

The mean duration of the first stage of labor in the experimental and control groups was 12.95 ± 0.938 and 13.3 ± 1.07 hours, respectively, but the difference was insignificant ($P = 0.243$). On comparing the mean duration of first stage labor with that of the demographic data of primipara mothers, statistical insignificance ($P > 0.05$) was noted within the experimental and control groups as also between the two groups ($P > 0.05$) [Table 4]. Similar insignificance ($P > 0.05$) was also noted when the mean duration of first stage labor was compared with the labor assessment proforma of mothers [Table 5].

Table 1: Demographic data of study participants

Variables	No. of Mothers *n* (%)	
	Experimental (*n*=20)	Control (*n*=20)
Age (years)		
18-21	3 (15)	6 (30)
22-25	9 (45)	7 (35)
26-29	8 (40)	7 (35)
Education		
Primary to middle school	5 (25)	5 (25)
High School	3 (15)	4 (20)
Diploma and above	12 (60)	11 (55)
Religion		
Hindu	15 (75)	16 (80)
Other	5 (25)	4 (20)
Occupation		
Heavy	2 (10)	0
Moderate	4 (20)	6 (30)
Sedentary	14 (70)	14 (70)
Monthly Family Income		
Rs. 6,327-18,949/-	8 (40)	12 (60)
Rs. 18,953-31,589/-	7 (35)	6 (30)
Rs. 31,591-47,262/-	5 (25)	2 (10)

Discussion

Childbirth is a physiologic and a natural process that women have undergone over several centuries. Although it has no underlying pathological process, labor is linked with a painful experience, causing women to worry on how to soothe the pain.[19] In our study, we aimed to reduce the pain experienced by primipara women during the first stage of labor by providing them with a back massage, which is a useful technique for rehabilitation and relaxation.

In our study, the age group was comparable to our study have been reported earlier.[20-22]

Massage around the lower back with jasmine, clary sage, rose, and lavender oils has been reported to provide subjective benefit in labor.[23,24] It stimulates the body to release endorphins, which are natural pain-killing and mood-lifting substances.[25] Massaging is therefore recommended by child-birth experts as it has been shown to ease pain and reduce anxiety in the first stage of labor.

Table 2: Labor assessment proforma of primipara mothers

Variables			No. of Mothers *n* (%)	
			Experimental (*n*=20)	Control (*n*=20)
Cervical dilation (cm)		No.	19 (95)	18 (90)
		1	1 (5)	1 (5)
		2	0	1 (5)
		>3	0	0
Fetal membrane		Intact	20 (100)	20 (100)
		Rupture	0	0
Latent phase	Frequency of contractions in 10 min	3-4	6 (30)	5 (25)
		4-5	14 (70)	15 (75)
	Duration of uterine contractions (seconds)	<20	2 (10)	5 (25)
		20-40	18 (90)	15 (75)
Active phase	Frequency of contractions in 10 min	3-4	1 (5)	1 (5)
		4-5	18 (90)	16 (80)
		>5	1 (5)	3 (15)
	Duration of uterine contractions (seconds)	20-40	3 (15)	3 (15)
		>40	17 (85)	17 (85)

Table 3: Numerical assessment of pain among the mothers

No. of repeats	Experimental (Mean±SD)		$P^{(1)}$	Control (Mean±SD)		$P^{(2)}$	$P^{(3)}$
	Pre-test	Post-test		Pre-test	Post-test		
1	2±0.794	0.35±0.587	<0.0001*	1.5±0.76	1.6±1.142	0.7463	<0.0001*
2	1.75±0.55	0.3±0.470	<0.0001*	1.85±0.67	2.1±1.334	0.4586	
3	2.15±1.49	0.65±1.089	0.0008*	2.6±0.882	3.8±0.767	<0.0001*	
4	3±1.257	0.95±1.146	<0.0001*	3.25±1.164	3.85±0.812	0.0664	
5	3.25±0.966	1±0.794	<0.0001*	3.85±1.04	4.6±1.429	0.0653	
6	3.85±0.933	1.45±1.05	<0.0001*	4.4±1.429	4.95±1.468	0.2373	
7	3.95±0.998	1.65±1.182	<0.0001*	5.2±1.196	6.05±1.317	0.0391*	
8	4.55±1.468	2.15±1.663	<0.0001*	5.3±1.174	6.2±0.951	0.0113*	
9	4.8±1.735	2.5±1.821	0.0002*	6.05±0.887	6.7±0.864	0.0242*	
10	5.45±1.395	2.85±1.694	<0.0001*	6.15±1.04	7.15±0.988	0.0035*	
11	5.55±1.356	3±1.622	<0.0001*	6.55±1.099	7.2±1.473	0.1220	
12	5.9±1.447	3.45±1.504	<0.0001*	6.7±1.342	7.35±1.387	0.1403	
13	5.8±1.542	3.45±1.701	<0.0001*	6.85±1.226	7.45±1.276	0.1377	
14	7±1.338	4.2±1.436	<0.0001*	6.65±1.089	7.55±1.099	0.0132*	
15	6.6±1.231	4.15±1.387	<0.0001*	7.2±1.24	8.35±1.137	0.0041*	
16	6.8±1.735	4.35±1.461	<0.0001*	7.4±0.94	8.3±0.978	0.0052*	
17	6.6±1.759	4.2±1.735	0.0001*	7.55±1.276	8.45±1.234	0.0291*	
18	8±1.686	4.5±1.67	<0.0001*	8.2±1.361	8.95±0.998	0.0542	
19	7.35±1.785	4.6±1.875	<0.0001*	8.4±1.046	9.05±0.887	0.0406*	
20	6.45±0.944	4.45±0.887	<0.0001*	8.8±1.152	9.5±0.827	0.0334*	

*Significant. $P^{(1)}$ represents analysis within the experimental group; $P^{(2)}$ represents analysis within the control group; $P^{(3)}$ represents analysis of post-test scores between the experimental and control groups

Table 4: Comparison of mean duration of first stage labor with the demographic data of mothers

Variables	Sub-category	Duration (hours) (Mean±SD)		*P*
		Experimental (*n*=20)	Control (*n*=20)	
Age (years)	18-21	13±1	13.6±1.30	0.513
	22-25	12.9±1.10	13.4±0.898	0.391
	26-29	13±0.833	13.1±1.13	0.606
	P	0.961	0.703	
Education	Primary to middle school	13.3±0.673	13.6±1.06	0.574
	High School	13.3±0.577	13.5±1.12	0.837
	Diploma and above	12.7±1.06	13.1±1.12	0.358
	P	0.374	0.703	
Religion	Hindu	13±1	13.1±0.993	0.688
	Other	13±0.812	14.2±0.957	0.073
	P	0.0523	0.989	
Occupation	Heavy	14±0	0	-
	Moderate	13±0.756	13.1±0.777	0.709
	Sedentary	12.8±0.981	13.4±1.19	0.153
	P	0.139	0.615	
Monthly Family Income	Rs. 6,327-18,949/-	12.9±1.07	13.7±1.03	0.126
	Rs. 18,953-31,589/-	13.0±0.63	13.1±1.05	0.768
	Rs. 31,591-47,262/-	13.1±1.23	12.1±0.14	0.149
	P	0.704	0.133	

P values have been calculated by one-way ANOVA and two independent samples *t*-test

It is also linked with shorter labor durations and a low risk for postpartum depression.[26]

In the present study, on assessing the progress of labor after hospital admission, it was noted that majority of the mothers in both the groups had no cervical dilation. All the mothers had intact fetal membranes. In contrast to our findings, Bolbol-Haghighi *et al.* reported a cervical dilation of 2–3 cm in both the experimental and control groups.[13] Chauhan *et al.* reported intact fetal membranes in 36.67% and 26.6% mothers in the experimental and control groups, respectively.[27]

Majority of the women in the study conducted by Chauhan *et al.* (83.3% experimental group; 86.75% control group) were reported to have 3 contractions, and the duration of the contractions was of 20–40 s in 83.3% mothers in the experimental and 90% in the control groups during the active phase of labor.[28]

The significant difference pain score was similar with previously conducted studies.[16,28] In our study, we observed that all mothers experienced all levels of pain, i.e., mild, moderate, and severe. However, the study signifies the effect of back massage in reducing the labor pain during the first stage. Previously conducted studies corroborate our findings, highlighting the advantages of back massage (rhythmic massage, circular strokes, stoking the lower back, relaxing the pelvic region, lateral strokes, etc.) to reduce labor pain.[29,30]

Bolbol-Haghighi *et al.* reported significant findings ($P < 0.0001$), contradictory to our observations, because massaging was not restricted only to the back but included shoulders, legs, upper belly, and thighs for over 30 min.[13]

The limitations of our study included smaller sample size and only primipara mothers in a single tertiary care center. Future recommendations would be to conduct a similar

Table 5: Comparison of mean duration of first stage of labor with the labor assessment of mothers

Variables			Duration (hours) (Mean±SD)		*P*
			Experimental (*n*=20)	Control (*n*=20)	
No cervical dilation (cm)			13±0.956	13.3±1.10	0.422
Intact fetal membrane			12.95±0.938	13.33±1.07	0.243
Latent phase	Frequency of contraction in 10 min	3-4	13±0.931	13.5±1.05	0.516
		4-5	12.9±0.973	13.3±1.11	0.34
		P	0.776	0.767	
	Duration of uterine contractions (seconds)	<20	12.2±0.247	12.7±0.819	0.252
		20-40	13.04±0.949	13.54±1.08	0.172
		P	0.224	0.13	
Active phase	Frequency of contraction in 10 min	4-5	12.93±0.989	13.396±1.136	0.22
		>5	13.15±0	12.76±0.68	-
		P	-	0.256	
	Duration of uterine contractions (seconds)	20-40	12.38±0.664	14.06±1.617	0.205
		>40	13.05±0.958	13.20±0.956	0.657
		P	0.454	0.214	

P values have been calculated by one-way ANOVA and two independent samples *t*-test

study in multiparous women, during the antenatal and postnatal periods. The study could also include different non-pharmacological methods such as breathing exercises, music therapy, etc., and the duration of these methods could be varied. Therefore, on comparing different non-pharmacological pain relief measures, we can suggest a method that could be suitable for majority of the women to soothe labor pain.

Conclusion

Our study proved that back massage was effective in reducing pain during the first stage of labor in primipara mothers in comparison to those who were subjected to routine care and could be made as routine practice in primary care. Although the difference in the duration of labor among mothers in both the experimental and control group was insignificant, the massaging technique can be successfully implemented as a non-pharmacological method in reducing labor pains in the clinical area, thereby making it tolerable to a certain extent during childbirth.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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