MODESTUM
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Original Article

Electron J Gen Med 2018;15(3):em21
ISSN:2516-3507
https://doi.org/10.29333/ejgm/85941

Effect of normal physiologic childbirth program in mother-friendly hospitals on duration of labor

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ABSTRACT

Introduction: Normal physiologic childbirth program was implemented in mother-friendly hospitals of Iran after 2008. The aim of present study is to assess the effect of normal physiologic childbirth program in a mother-friendly hospital on duration of active phase and second stage of labor.

Methods: This study was a clinical trial that was conducted at the Sina and Ommolbanin mother-friendly hospitals in Ahvaz, Mashhad, Iran, in 2016. The intervention group of 77 women was offered the childbirth preparation classes during pregnancy and normal physiologic childbirth program during labor and the control group of 77 women received routine care.

Results: The results showed that after controlling the confounding factors, the active phase and second stage of labor were significantly shorter in the intervention group ($p<0.001$).

Conclusion: Complete implementation of normal physiologic childbirth program can reduce the duration of labor.

Keywords: natural childbirth, prenatal education, non-pharmacologic approaches, first stage of labor, labor duration, second stage of labor

INTRODUCTION

A Mother-Friendly Hospital is a place in which every mother, at any time during pregnancy, childbirth, and up to six weeks after delivery with any condition of health, receives an effective and productive health service (1). In Iran, mother-friendly hospitals started their activity in 2008. A mother-friendly hospital must fulfill ten steps of mother-friendly care. One of the most important steps is a normal vaginal delivery using non-pharmacological pain relief approaches named as "physiologic delivery". Special emphasis is given to use of a combination of non-pharmacological pain relief methods based on the mothers' will and satisfaction. These methods are including massage therapy, aromatherapy, heat therapy, acupressure, birth ball, water immersion, music therapy, reflexology, relaxation, respiratory techniques. Furthermore, in physiologic delivery, the absence of unnecessary medical interventions in the natural course of childbirth, the personal support of women in childbirth by a reliable person, freedom of movement in the labor, non-supine positions, skin contact of the newborn and mother immediately after delivery and breast feeding are recommended (1, 2).

Shortening the duration of labor without any complication for mother and child is an extremely important aspect of obstetrical care and a desirable objective of physiologic childbirth (3). Slow labor progress is becoming increasingly common in obstetrical practice (4). Some previous studies have shown that women who experienced longer labor duration, had lower the chance of spontaneous vaginal birth and the higher the risk of serious maternal or perinatal complications (5-7). The cesarean section (C/S) rate remains very high in many parts of the world as well as in the Iran. It has been reported that the risk of maternal death after a C/S is five times higher than normal vaginal birth (8). Despite this, women with longer labor duration are subjected to more vaginal examinations; meanwhile, some women find this process distressing and uncomfortable (9, 10).

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Received: 2 Jan 2018, Accepted: 12 Feb 2018

The present study assessed the effect of the normal physiologic childbirth in mother-friendly hospitals on duration of labor.

METHODS

This was a clinical trial study that its design was approved by the institutional Ethics Committee of Mashhad University of Medical Sciences and registered within the Iranian registry of clinical trials (http://irct.ir); IRCT No.: **IRCT201508132204N4**. The study was conducted at two large mother-friendly hospitals in east and west of Iran: Sina in Ahvaz and Ommolbanin in Mashhad, in 2016. A pilot study was carried out to calculate the sample size in each center. A total of 154 samples were included within the study.

Participants were recruited from the antenatal clinic of the hospitals after they had received information on the purpose and course of the study from the investigator and had provided the written consent during the first-half visits of pregnancy. Selection of samples was purposeful. It should be noted that the matching method used to control external variables. In this way, for each subject in the intervention group, a single subject was selected as the control for important external variables. Women who were satisfied with participation in the normal physiologic childbirth program were placed in the intervention group. Control group was included of those who did not consent to participate in the program and only received routine care. According to normal physiologic childbirth program, pregnant women who are going to have a normal physiologic childbirth should attend childbirth preparation classes during pregnancy. For this purpose, the participants of the intervention group attended in these classes from the beginning of the 20th week of pregnancy in eight sessions over a period of ninety minutes per session, in a standard classroom in the hospital. Content of each session was according to the Iran's Ministry of Health's booklet.

Inclusion criteria were included: low risk 18-35 years-old pregnant women (no risk factor such as: premature rupture of membranes, thick meconium, fetal bradycardia (<100 bpm), bleeding, preterm and post-term pregnancy, preeclampsia), singleton pregnancy, lack of medical contraindications for vaginal delivery, estimation of fetal weight between 2500 and 4000 grams, full participation in childbirth preparation classes for the intervention group, refer to the normal physiologic childbirth unit for birth for intervention group, cervical dilatation of 3-4 cm or less at baseline and consent to participate in the study. Exclusion criteria were included presence of risk factors at any time of the delivery, such as severe hemorrhage, long-term drop in the fetal heart rate, arrest of delivery, unnecessary and routine medical interventions such as the use of drugs such as atropine to accelerate labor, induction of labor and use of fundal pressure.

The intervention was normal physiologic childbirth using a combination of non-pharmacological pain relief methods. In the normal physiologic childbirth program, at the time of labor women were allowed to eat fluids such as water, fresh fruit juices, soups, porridges and dates. Routine amniotomy, induction of labor, serum therapy, and urinary catheterization were not performed. Complete bed rest was not mandatory and women were allowed to be in any comfortable position. In the active phase of labor, a combination of non-medical pain relief methods, including using a birth ball, warm water bathtub and aromatherapy with lavender were used. The bathtub was filled with warm water (36-39° C), so that the surface of the water was on the abdomen and under the women's breasts. Women were in a half-sitting position. The bathtub was used from the beginning of the active phase and at least one hour was essential. Furthermore, during the active phase of labor, mothers were sitting on the birth ball (knee bending at 90 degrees) for 30 minutes and moving the pelvis back and forward, or right and left. Throughout the whole of this period, a trained companion or researcher were attended as a supporter along with a pregnant woman. At the beginning of the active phase until delivery, aromatherapy was carried out using 15cm × 15cm napkins impregnated with 0.1 cc Lavender oil 3% mixed with 1 cc sterile water, which were fitted on the collar of the clients.

Vaginal examinations were performed every two hours, and fetal heart rates were measured every half an hour in active phase. In the second stage of labor, vaginal examinations were performed every half an hour and the fetal heart rates were measured every 15 minutes. The progress of labor of all mothers was plotted on the partogragh form.

Upon completion of cervical dilation, a few minutes before the delivery women were transmitted to the special bed of physiologic childbirth and were placed in an upright position and simultaneously with uterine contractions and a feeling of defecation, encouraged to pushing. Episiotomy was not routine. It should be noted that at any time from the first or second stage of labor, when the mothers had a risk factor that requires medical intervention, they were excluded from the study.

The participants of the control group received routine care. At the time of admission, peripheral venous catheter was connected. Complete bed rest was a part of the routine. Vaginal examination and fetal heart auscultations were as the same as the intervention group. At the time of delivery, mothers were placed in lithotomy position. At this stage, using

Table 1: *Demographic data and qualitative characteristics related to pregnancy and labor of the two study groups**

			Intervention group (n=77)	Control group (n=77)	p-value
Age		<20 years	9 (11.7)	13 (16.9)	0.37
		20-24 years	21 (27.3)	27 (35.1)	
		25-30 years	30 (39.0)	21 (27.3)	
		>30 years	17 (22.1)	16 (20.8)	
Education level		Primary school	41 (53.3)	45 (58.5)	0.87
		High school	23 (29.9)	23 (29.9)	
		College degree	13 (16.9)	9 (11.7)	
Mother's Job		Housekeeper	71 (92.2)	72 (93.5)	1.0
		Beautifier	4 (5.2)	4 (5.2)	
		Photographer	2 (2.6)	1 (1.3)	
Parity		Primiparous	48 (62.3)	44 (57.1)	0.62
		Multiparous	29 (37.7)	33 (42.9)	
BMI prior to pregnancy		<18.5	11 (14.3)	7 (9.1)	0.28
		18.5-24.9	40 (51.9)	49 (63.6)	
		25-29.9	14 (18.2)	15 (19.5)	
		>30	12 (15.6)	6 (7.8)	
Fetal membranes at admission		Intact	49 (63.6)	52 (67.5)	0.60
		Rupture	28 (36.4)	25 (32.5)	
Uterine contractions at beginning of study	Numbers in 10 min	3	24 (31.2)	26 (33.8)	0.38
		4	32 (41.6)	32 (41.6)	
		5	21 (27.3)	19 (24.7)	
	Severity	Moderate	46 (59.7)	41 (53.2)	0.51
		Severe	31 (40.3)	36 (46.8)	
Delivery mode		Vaginal delivery	52 (91.23)	51(89.47)	0.66
		C/S	5 (8.77)	6 (10.53)	
Sex of neonate		Female	41 (56.9)	34 (48.6)	0.40
		Male	31 (43.1)	36 (51.4)	
First min APGAR		7	2 (2.8)	1 (1.4)	0.68
		8	12 (16.7)	9 (12.9)	
		9	58 (80.6)	60 (85.7)	
5 min APGAR		9	6 (8.3)	3 (4.3)	0.49
		10	66 (91.7)	67 (95.7)	

*Data are shown as numbers (percent)

the Valsalva maneuver, the mother was asked to force. In primiparous mothers, episiotomy was performed routinely. In multiparous women, episiotomy was performed based upon the diagnosis of the midwife.

It should be noted that in order to prevent the bias, all the interventions were carried out by midwives with a 5 to 10-years history of working at maternity. The number of these midwives was also limited, and they were attended in both physiological and conventional delivery wards of the hospital. Throughout the study, the researcher was present in both physiological and conventional wards and supervised the unified implementation of interventions.

The data-collection tool was a form that was prepared by the investigators and validated through content validity, and its reliability has been confirmed with r=0.9. This form consisted of two parts. The first part was related to the demographic characteristics of the samples. The second part was related to pregnancy and labor information. As the study outcomes, the duration of active phase and second stage of labor were measured. The beginning of the active phase of labor was defined as cervical dilatation of 3-4 cm in the presence of moderate uterine contractions. Moderate uterine contractions were defined as those during which fingers could still be indented in the abdominal wall bat underlying fetal parts were not palpable. At the time when full cervical dilatation was noted on vaginal examination, the second stage of labor begun. The second stage of labor was defined as the time between full cervical dilation and the completion of delivery.

Data were then analyzed using SPSS version 11.0 at 95% confidence interval. Descriptive statistics were used to estimate means, standard deviations and ratios. The Kolmogorov–Smirnov test, independent t-test, General Linear Model and chi-square were used.

RESULTS

There was no significant difference in demographic data and characteristics of pregnancy and labor between two study groups (**Table 1** and **2**).

Table 2: *Quantitative characteristics related to pregnancy and labor of the two study groups**

	Intervention group (n=77)	Control group (n=77)	p-value
Gestational age (days)	274.8±8.1	273.3±9.1	0.26
Weight gain in pregnancy (kg)	11.8±4.7	12.8±4.3	0.17
Uterine contraction duration at beginning of study (sec)	45.7±7.8	45.0±7.8	0.53
BISHOP score	6.7±1.3	6.5±1.2	0.25
Baseline cervical dilatation (cm)	4.1±0.7	3.9±0.7	0.21
Baseline cervical effacement (%)	51.2±12.0	48.8±13.8	0.26
Neonate's weight (gr)	3224.8±442.1	3250.49±358.8	0.27
Neonate's head circumference (cm)	34.3±1.2	34.3±0.9	0.63
First min APGAR	8.7±0.5	8.8±0.4	0.38
5 min APGAR	9.9±0.3	9.9±0.2	0.32

*Data are shown as mean ± standard deviation

Table 3: *Comparison of duration of active phase and second stage of labor in two study groups**

	Intervention group (n=77)	Control group (n=77)	p-value
Active phase (min)	210.02±86.38	269.54±107.21	<0.001
Second stage (min)	36.61±20.58	43.08±23.90	0.08

*Data are shown as mean ± standard deviation

Table 4: *The duration of the activephase of labor using the general linear model*

		B	Std.Error	t	p-value
group	intervention	-48.66	16.24	-2.99	0.003
	control	0*			
parity	primiparous	86.90	15.27	5.69	<0.001
	multiparous	0*			
Bishop score		11.18	5.56	2.01	0.04
Baseline cervical effacement		-1.66	0.59	-2.80	0.006
Baseline pain score		-12.20	3.94	-3.09	0.002

Table 5: *The duration of the second stage of labor using the general linear model*

		B	Std.Error	t	p-value
group	intervention	-6.26	3.05	-2.04	0.04
	control	0*			
parity	primiparous	24.32	3.18	7.64	<0.001
	multiparous	0*			
Duration of active phase		0.04	0.01	2.57	0.01
Neonatal weight		0.01	0.04	2.92	0.004

Based on the independent t-test, the active phase was significantly shorter in the intervention group (p<0.001) (**Table 3**). Subgroup analysis showed significantly shorter duration of active phase of labor in both primiparous (230.39±101.19 min vs. 315.21±107.33 min, p<0.001) and multiparous women (179.82±44.51 min vs. 215.31±79.03 min, p=0.03) of intervention group than the control group. Duration of second stage of labor was not significantly different between two study groups (**Table 3**). However, based on the subgroup analysis the duration of the second stage of labor was significantly shorter in primiparous (46.65±20.40 min vs. 56.05±21.65 min, p=0.04) women of intervention group compared to the control group.

General Linear Model revealed that as confounding factors, the variables of the group, parity, baseline Bishop score, baseline cervical effacement and baseline labor pain score showed a significant effect on the duration of the active phase of labor. After controlling these variables, the active phase of labor was significantly shorter in the intervention group (p<0.001) (**Table 4**).The confounding variables of group, parity, duration of active phase of labor and neonatal weight showed a significant effect on the duration of the second stage of labor. After controlling them, the second stage of labor was significantly shorter in the intervention group (p<0.001) (**Table 5**).

DISCUSSION

The objective of this trial was to assess the effects of the normal physiologic childbirth program on duration of labor. The results showed a statistically significant decrease in duration of active phase and second stage of labor when the normal physiologic childbirth program is fully executed.

In Iran's mother-friendly hospitals, the first part of the normal physiologic childbirth program is holding childbirth preparation classes for pregnant women (1). In the present study, because of participation in the childbirth preparation classes and visit the maternity ward during pregnancy, the participants of the intervention group were mentally prepared for childbirth. Antenatal education is in a strong position to improve normal birth. A review by Ferguson et al. has demonstrated some positive emotional effects of antenatal education on women's labor and birth. One of these effects is a reduction in maternal anxiety (11). Fear of childbirth, anxiety and unfamiliarity with the maternity environment bring feelings of deep insecurity for women during childbirth (12-14). Based upon some evidences maternal anxiety during labor can affect the labor progress by increase the release of adrenaline and cortisol. So this process can lead to a decrease in the effective uterine contractions and consequently a prolonged labor (15, 16)

It seems that each of the non-pharmacological methods used in this study, like a piece of a puzzle, had a role in shortening labor and when combined, can shorten the duration of labor as much as possible.

Based on the studies, warm water bathtub reduces the release of catecholamines in the body, increases uterine perfusion, enhances uterine rhythmic contractions, accelerates cervical dilation, and shortens the duration of labor(17, 18). According to some evidences, pelvic movements on the birth ball in upright positions during labor and freedom of movement can assist the normal power of gravity to facilitate fetal head descent, enhance the effectiveness of uterine contractions and reduce duration of labor (19). Furthermore, the reduction of the duration of labor was probably caused by the anxiolytic and sedative effects of the lavender (20). The components of lavender oil are linalool (51%) and linalyl acetate (35%). Linalyl acetate has narcotic effects and linalool also acts as a sedative (21-23).

The decrease in labor length that occurs with physiologic delivery might be attributed to a decrease in labor pain. Some previous studies have revealed that using non-pharmacological pain relief methods such as birth ball, water immersion or lavender aromatherapy decreases the labor pain intensity in parturient women (24). Increased adrenaline and cortisol caused by severe labor pain and anxiety resulting from that can lead to a decrease in the effective uterine contractions and consequently a prolonged labor (15, 16).

One of the limitations of this study was that randomization was impossible. The normal physiologic childbirth was an emerging phenomenon in Iran and was relatively unknown to pregnant women. According to the policies behind the normal physiologic childbirth program, we cannot force the pregnant women to have a normal physiologic delivery or conventional delivery. Because one of the principles of the normal physiologic childbirth program is to give decision-making power to women. In other words, in mother-friendly hospitals, all of clients were suggested to participate in childbirth preparation classes and deliver, physiologically; however, the decision-making power in this regard was on their own. So we had to use purposive sampling. But use of matching method controlled the external variables.

ACKNOWLEDGEMENTS

This study was a part of PhD thesis by SM and was supported by a grant from vice chancellor of research, Mashhad University of Medical Sciences, Mashhad, Iran.

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