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# A randomized controlled trial comparing the physiological and directed pushing on the duration of the second stage of labor, the mode of delivery and Apgar score

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## ABSTRACT

**Background:** In recent year, there has been an increased trend to the physiological approach to labor. Physiological (spontaneous) pushing in upright position is one of the practices promote the normal physiological process.

**Objective:** Effect of physiological pushing versus directed pushing on the duration of the second stage of labor, mode of birth and Apgar.

**Methods:** A randomized controlled trial was completed on 191 women who gave birth at a maternity unit in Iran between August and December 2009. Randomization occurred upon confirmation of full dilatation of the cervix with using block randomization. In the intervention group (n = 100), with full dilatation of the cervix and a fetal head plus 1, the midwives providing care suggested they commenced pushing in upright position only when they felt the urge to do so and gave no specific instructions about the timing and duration of pushing. In the control group (n =91), women were coached by the midwife to use closed-glottis pushing three to four times in supine position during each contraction immediately as the same period.

**Findings:** Mean duration of the second stage of labor in the primiparous women was 47.38±36.75 mins and 57.12±33.10 mins in the intervention and control groups, respectively; the difference was significant ($p < .0001$). In the multiparous women the second stage of labor lasted for 26.12±23.43 mins and 33.20±22.76 mins in the intervention and control groups, respectively, which was significantly different ($p < .0001$). One woman in the control group and 2 mother in the intervention group undertook cesarean surgery ($p=1$). Apgar scores were similar in both groups.

**Conclusion:** Physiological pushing was not associated with demonstrable adverse outcome. It seems that this technique can reduce the duration of the second stage of labor and it can be a safe method during the second stage of labor without any harm for mother and baby.

**Keywords:** Spontaneous pushing, Directed pushing, Valsalva, Second stage of labor

**Trial Registration:** IRCT138805062248N1

**Funding:** Islamic Azad University, Tehran Medical Branch and Tehran University of Medical Sciences

# Introduction

Traditionally, women are asked to begin pushing as soon as the cervix is completely dilated. Midwives and obstetricians in Iran encourage women to employ the 'Valsalva' maneuver at the beginning of the second stage of labor(once the cervix has been confirmed as fully dilate), regardless of whether they have any urge to bear down which requires repeated, prolonged breath holding and bearing down which causes the glottis to close and increases intrathoracic pressure[1]. This is commonly referred to as 'directed pushing'. Most of the research on pushing method has compared directed, coached, or Valsalva pushing with physiological or spontaneous or self-paced pushing (non-directed, multiple short pushes, with no sustained breath holding). Studies comparing these two techniques have been primarily concerned with the effect of pushing style on neonatal acid-base status and/or the length of second stage[2]. Some studies have directly addressed the relationship between pushing method and perineal or pelvic floor injury, or have included it in their analyses[3]-[4].
Nature' s carefully orchestrated plan for labor and birth is easily disrupted. Because of this, it is critical to understand how to optimally promote, protect, and support the normal physiological process. In recent year, there has been an increased trend to the physiological approach to labor. Six care practices promote the normal physiological process: allowing labor to start on its own, no routine intervention, freedom of movement during labor, continuous labor support, spontaneous pushing in nonsupine positions, and no separation of mother and baby[5]. Physiological (spontaneous) pushing in upright position is one of the practices promote the normal physiological process.
Physiological pushing during second-stage labor decreases the incidence of severe pain, shortens the duration of second stage, and decreases the incidence of abnormal fetal heart rate patterns[6]-[7] .
The purpose of the present study was to compare the effect of physiological pushing during second stage of labor on the duration of the second stage, mode of birth and Apgar score.

# Method

This study was a Randomized controlled trial research design aimed at comparing the effect of spontaneous pushing versus directed pushing in the second stage of the labor with respect to the duration of the second stage of labor, mode of delivery and Apgar score. This study was conducted at Akbar Abadi birth center in Tehran, Iran, between August and December 2009, and Research and Ethics Committee of the institution where data collection took place approved the research project.
The population in this study consisted of women with low risk pregnancies who were singleton and live fetus with estimated birth weight of 2500–4000 g, vertex presentation, gestational age between 37 and 42 weeks, parity between one and five; maternal age between 18 and 40 years, at the labor pain stage who were anticipating a vaginal birth with the spontaneous onset of labor or induction due to premature spontaneous rupture of membranes or post dates pregnancy. Exclusion criteria included the following: did not wish to participate, had maternal medical or obstetric complications which would affect the management of the second stage of labor, had a baby with congenital anomalies or when fetal compromise was suspected. Eligible women were approached for possible participation when they were admitted for labor ward. Those who agreed to participate gave written consent.

When they reached 8-cm cervical dilation, vaginal examinations were performed every 30 min in an attempt to accurately determine when the cervix was completely dilated. When cervical dilation reached 10 cm (second stage of labor) and a fetal head plus 1 below the level of the ischial spines of the pelvis, they were enrolled in the study. Randomization occurred upon confirmation of full dilatation of the cervix (denoting the onset of the second stage) at which point the woman was asked to select one envelope from a set of 10 with using block randomization (Figure 1). This left 191 women who fulfilled the inclusion criteria for randomization: 100 were assigned to the intervention group, in whom the second stage of labor was managed by physiological pushing; and 91 were assigned to the control group, in whom the second stage of labor was managed by directed pushing. The women were followed from the time of birth to the end of the second stage of labor.

In the *directed pushing group* women were coached by the midwife to use closed-glottis pushing three to four times during each contraction immediately when cervical dilation reached 10 cm and a fetal head plus 1 and to continue pushing using this method with each contraction until birth. The midwife counted to 10 during each pushing effort to assist the woman in holding her breath for at least 10 s. They were limited to bed in supine position.

*In the physiological pushing group* women were assessed as having full dilatation of the cervix and a fetal head plus 1, the midwives providing care suggested they commenced pushing only when they felt the urge to do so and gave no specific instructions about the timing and duration of pushing. Women in this group used upright position including, standing, sitting and squatting. In both groups, if midwives or obstetricians were concerned about the maternal and / or fetal wellbeing at any time, or delivery was not imminent after 120 minutes for primiparous women and 60 minutes for multiparous women (prolonged second stage of labor), the woman was reassessed to gauge maternal and fetal condition and adopt whatever clinical management was deemed necessary to facilitate a safe birth.

The duration of the second stage, mode of birth and Apgar score were compared between the two groups. Statistical analysis was performed using Statistical Package for the Social Sciences software (SPSS, Chicago, IL, USA). Independent *t*, chi-square, and Fisher exact were used to compare the findings and the significance level was set at .05.

# Result

The women in the two groups did not differ in terms of maternal age, parity, gestational age, fetal gender, educational status and employment (Table 1).

We examined data for primipara (first birth) and multipara (previous births) separately. Mean duration of the second stage of labor in the primiparus women was shorter than control group (47.38±36.75 vs 57.12±33.10 mins), respectively, which was statistically different ($p<.0001$). In the multiparous women the second stage of labor lasted for 26.12±23.43 mins and 33.20±22.76 mins in the intervention and control groups, respectively, which was significantly different ($p <.0001$). Amongst nuliparus women prolonged second stage of labor ( second stage duration ≥120) occurred in 3 women in the intervention group and 1 women in the control group. There is not any prolonged second stage of labor in the multiparus women in the intervention group, but it occurred in the control group in 1 case. Two mothers in the control group and 1 mother in the intervention group undertook cesarean surgery. There was not any Apgar score at 1 minute under or equal 7 in the spontaneous pushing group. In contrast 2 infants (3.2%) had Apgar score ≤

7at 1 minute in the directed pushing group (p=.02). One infant had Apgar score at 5 minute under or equal 8 in the control group. All babies in the intervention group had 9 or 10 Apgar score at 5 minute (p=.03).

# Discussion

This study compared physiological pushing and directed pushing of the second stage of labor. Physiological pushing was found to shorten the duration of the second stage. Different studies have investigated outcomes of different pushing methods. Substantial evidence supports the use of spontaneous maternal pushing(physiological pushing) for both maternal and fetal benefit and a few studies have specifically compared directed pushing and spontaneous pushing methods[8,9].
Also an extensive review of 25,069 births found that the duration of the second stage was not significantly associated with the risk of a low Apgar score or admission to a special care baby unit[10]. There are no data to support a policy of directed pushing during second stage of labor and some evidences to suggest that it is harmful[11].
In a RCT of nulliparous women with low-risk, term pregnancies, Bloom, Casey, Schaffer, McIntire, and Leneno (2006) Presented similar results that the average length of second stage was 13 minutes shorter in the coached pushing group compared with the uncoached group, but no difference was found in the number who pushed more than 2 to 3 hours, route of delivery, or any other maternal or newborn outcome[12].
Kathleen Rice Simpson (2005) conducted a clinical trial to evaluate effects on fetal well-being, as measured by fetal oxygen saturation, of two different methods of second-stage labor. Forty-five nulliparous women who had progressed to the second stage were randomized to 1 of 2 groups (immediate or delayed pushing). There was a significant difference in the length of the second stage of labor in the immediate pushing was shorter than delayed pushing group (101 vs 139 min). While there was a difference in length of the second stage between groups, there was no difference in the total length of labor. There were no differences in cesarean births, operative vaginal births, Apgar score, a prolonged second stage (%3 hr). They concluded delayed pushing is more favorable for fetal well-being as measured by fetal oxygen saturation[4].
In the present study the length of the second stage was shorter in the spontaneous pushing in contrast with Simpson trial. Also, fetal well-being was improved in the spontaneous pushing as measured by one and five minute Apgar score.
Another randomised controlled trial was undertaken in 2005 by Christine CO LAM to determine any differences between use of the directed and spontaneous pushing techniques in the second stage of labour. Seventy-three nulliparous women were randomly allocated to either the control group (directed pushing method, n=38) or the experimental group (spontaneous pushing method, n=35). Women in the experimental group had longer second stages of labor. The difference between the two groups was not statistically significant. The Apgar score means were similar at 1 minute and 5 minutes after birth[13]. Klein (2006) critiqued the study methods and urged caution in interpreting this study to mean that coached pushing is safe for newborns[14].
AWHONN recommends that women do not begin pushing until they feel the urge to do so, and when they do push, they push spontaneously in response to the urge to push rather than in a directed way[15].

# Conclusion

Physiological pushing was not associated with demonstrable adverse outcome. Importantly,

spontaneous pushing did significantly shorten the duration of second-stage labor. It seems that this technique can be a safe method during the second stage of labor without any harm for mother and baby. Further research should be undertaken to determine the optimal method by which to manage the second stage of labor.

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Table 1: Some maternal and neonatal characteristics

| Characteristics | | Mean±standard deviation/No.(%) | | p-value |
|---|---|---|---|---|
| | | Control group | Experimental group | |
| Maternal age | | 26.18±4.96 | 25.71±5.33 | *P=.52 |
| Parity | | 2.09±1.37 | 1.86±1.16 | **P=.28 |
| Birth weight | | 3238.80±395.87 | 3238.80±395.87 | *P=.76 |
| Gestational age | | 39.5±71.4 | 39.4±72.24 | **P=.67 |
| Employees | | 1(1.1%) | 1(1%) | ***P=1 |
| Infant sex | female | 40(43.5%) | 42(42%) | *** |
| | male | 52(56.5%) | 58(58%) | |
| Maternal education | Non educated | 34(36.9%) | 37(37%) | **p=.32 |
| | Secondary school | 24(26.1%) | 32(32%) | |
| | High school-Diploma | 32(34.8%) | 25(25%) | |
| | Post-graduated | 2(2.2%) | 6(6%) | |

* Independent *t* ** chi-square ***Fisher exact

Table 2: Obstetric outcomes of the two study groups

| variables | | Mean±standard deviation/No.(%) | | P-value |
|---|---|---|---|---|
| | | Control group(n=91) | Experimental group(n=99) | |
| Length of 2nd stage of labor(min) | primiparae | 57.12±33.10 | 47.38±36.75 | *P<.0001 Z=-3.66 |
| | multiparae | 33.20±22.76 | 26.12±23.43 | *P<.0001 Z=-6.965 |
| Mode of birth | NVD | 90(98.9%) | 98(98%) | **P=1 |
| | S/C | 1(1.1%) | 2(2%) | |
| Apgar score | Minute1≤7 | 2(2.2%) | 0(0%) | **P=.22 |
| | Minute 5≤8 | 1(1.1%) | 0(0%) | **P=.29 |

*Man-whitney **Fisher exact

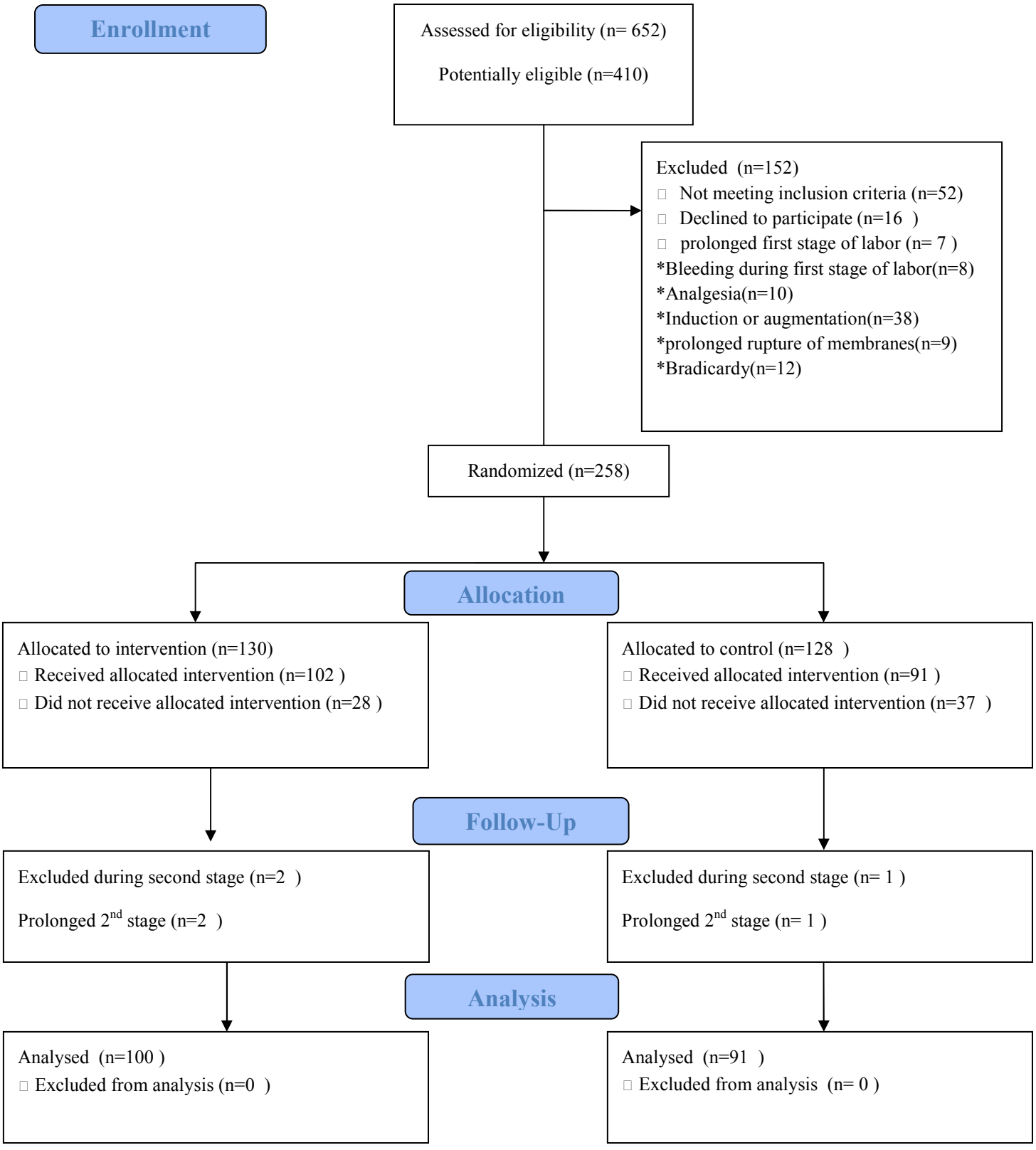


Figure 1: Flow diagram of trial recruitment and follow-up