

## Uterine Fundal Pressure on the Duration of the Second Stage of Labor in Iran: A Randomized Controlled Trial

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### ABSTRACT

**Background:** The role of fundal pressure (FP) during the second stage of labor is controversial. The prevalence of its use is unknown. There is little evidence to demonstrate that the use of fundal pressure is effective to during the second stage of labor and several anecdotal reports suggest that fundal pressure is associated with neonatal complications.

**Objectives:** To find out what percentage of pregnant women who have referred to the hospitals underwent FP, Also to determine the time of second stage of labor and show neonatal complication.

**Methods:** This is a randomized controlled trial that was performed on 2631 pregnant women with 38-42 gestational age, single birth and cephalic presentation, who went to Tehran's hospitals for delivery since 2005 for three years. During the second stage of delivery FP was used for some of the mothers and we researched for the frequency of use of FP and the duration of the second stage.

**Results:** FP was applied for 1171 women. There were differences in the mean duration of the second stage of labor for nullipara and multipara. There was some evidence that use of maneuver was a disadvantage to the fetus.

**Conclusions:** Application of fundal pressure on a delivering woman was effective in shortening the second stage of labor. Nevertheless, newborn, s Apgar score was unsatisfactory.

**KEY WORDS:** Labor; fundal pressure; second stage.

### INTRODUCTION

Fundal pressure Also known as the 'Kristeller manoeuvre', is described as external force applied at the uppermost portion of the uterus with one hand on the uterine fundus at a 30 to 45 angle to the maternal spine in the direction of the pelvis. Thus, the pressure is applied in a longitudinal direction. It is important to avoid direct downward pressure on the maternal spine because it could cause direct vena cava compression and maternal hypotension, with the intent of shortening the duration of the second stage of labor (Rommel., 1999). The second stage was defined as the time (in minutes) between the cervix being fully dilated together with the spontaneous urge to push and to expulsion of the fetus (Olus et al., 2009; Rouse et al., 1999) Although, there is a controversy over FP, but A nationwide review in 1990 found that 84% of surveyed US institutions practiced fundal pressure but only 11% documented the practice in the medical record (Olus et al., 2009). This is expressed that application of manual pressure to the uterine fundus directed toward the birth canal is to avoid operative delivery (Justus et al., 2009). Also this manoeuvre is applied in many hospitals in Iran. But the prevalence of its use is unknown. This study evaluated if the use of fundal pressure is effective in shortening the second stage of labor and assessed fetal outcome.

### METHODS

This study was double blind clinical trial that was performed in the hospitals related to the Azad University in Tehran. This study was done on 2631 pregnant women admitted to the hospitals from 2005 until 2008 for normal vaginal delivery. The number of women who actually met the criteria of the study was 2236. They were divided in two unequal groups of multipara and nulipara. Experienced group and control group were formed by randomized selection but groups were examined and observed for measuring the duration of second stage.

Participants From 2631 pregnant women who complied with the criteria of this research still, 395 were excluded before the second stage by cesarean section or vacuum delivery because they had medical or obstetrical problems Such as abnormal baseline heart rate, dysfunction of uterus, and failure in progress of labor. The remaining women were 2236 of whom 1207 were nulipara and the rest were multipara. The inclusion criteria required active labor at term with a singleton fetus in vertex presentation Exclusion criteria included: preterm labor (gestational age below 37 weeks), no vertex presentation (breech or transverse),

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Neither epidural nor combined spinal epidural analgesia was used ,abnormalities of placentation (low lying placenta, abruption placenta), uterine and pelvic structural abnormalities, history of previous shoulder dystocia and previous uterine scar. Physicians, hospital personnel and mothers didn't know that Researchers oversee the delivery process. Fundal pressure often was applied manually by impatient obstetricians or midwives on part of the uterus at a 30\_45 angle to the maternal spine in the direction of the pelvis with each uterine contraction when the cervix was fully dilated. 1 and 5 minutes after delivery neonatal, s apgar scores is determined and recorded .Each of the five characteristics –heart rate, respiratory effort, muscle tone, reflex irritability, and color is assessed and assigned a value of 0 to 2.

The onset of second stage was defined as full dilatation of the cervix identified by digital examination. These researchers observed and examined the patients in terms of dilatation, duration and apgar scores. All mothers received the median dose of Oxytocin for augmentation and Oxytocin infusion was not stopped during the second stage of labor.

Collected data were recorded in the especial form which includes demographic variables, number of parity, duration of the second stage of labor, multiplicity and duration of fundal pressure, and first and fifth minute Apgar scores.

For the data analysis, the SPSS 17 statistical package was used. Comparisons of the variables between the control and the study groups were performed by the student t- and Pearson chi-squared tests. Measurements were considered significantly different at a p-value of <0.05 and 95% confidence limits were used for the difference between two means to indicate the variability the difference would have in other samples.

**Findings**

The results of the comparisons between nulliparous control groups and study groups showed that the two groups were homogeneous in terms of age, body mass index and birth weight (table 1).

Table 1- The comparison of demographic characteristics in nulliparous women

	Control group n=519	Study group n= 688	t	p-value
Age	25.12 ± 5.06	24.98 ± 5.19	1.2	0.52
BMI*(kg/m <sup>2</sup> )	26.14± 4.02	25.79± 4.75	0.93	0.61
Birthweight(g)	3179± 425	3202±430	0.85	0.68

Also the results showed multiparous control groups and study groups were homogeneous in terms of age, body mass index and birth weight (table 2).

Table 2- The comparison of demographic characteristics in multiparous women

	Control group n=519	Study group n= 688	t	p-value
Age	29.5 ± 5.27	30.01± 4.99	0.99	0.59
BMI(kg/m <sup>2</sup> )	27.35± 3.9	27.85± 3.88	1.02	0.54
Birthweight(g)	3251 ± 436	3304± 429	0.75	0.7

Nulliparous group were younger than multiparous group and there were more nulliparous women in the study group than multiparous group. In this research 52% of participant received FP. Mean of the number of FP was 3 times and mean of the duration of FP found 58 seconds. Since the groups were not homogenous in terms of parity ,therefore the mean duration of the second stage was measured separately in the nulliparous and multiparous women (tables 3 and 4).The difference between the mean duration of second stage was significant between the intervention and control groups in the nulliparous p<0.001 and multiparous women p<0.001.

Table 3- Comparison of duration of the second stage of labor in nulliparous (minute)

Control group n=519	Study group n=688	t	p-value	95% Confidence interval of the difference
54± 29	31±12	18.69	0.001	20.9 to 25.1

Table 4- Comparison of duration of the second stage of labor in multiparous (minute)

Control group n=519	Study group n=688	t	p-value	95% Confidence interval of the difference
18±9.1	7±4.03	24.39	0.001	10.26 to 11.74

Of 1171 newborns were born with fundal maneuver in the first minute after delivery, 3.1% of newborns had apgar score less than 4 and 26.9% less or equal 7. After heart and Respiratory resuscitation in the fifth minutes after delivery, 6% of newborn had Apgar score below 7. Atlas 3.4% of newborn were transferred to neonatal intensive care unit after ten minutes .Fortunately there wasn't any mortality (table 5).

Table 5- Comparison of apgar in two groups of with and without fundal pressure

Apgar score	Control group N=1065			Study group N=1171			X <sup>2</sup>	df	P-value
	0-3	4-7	8-10	0-3	4-7	8-10			
1 <sup>st</sup> min.	-	1.9%	98.2%	3.2%	26.9%	69.9%	6.2	2	0.001
5 <sup>th</sup> min.	-	0.4%	99.6%	2%	4.2%	93.8%	3.2	2	0.67

In the first minute after delivery ,neonate's apgar scores between the intervention and control groups were different (p<0.001,df=2, x<sup>2</sup> =6.20) But in the fifth minute after delivery neonate's apgar scores between the intervention and control groups were not different (p>0.05,df=2,x<sup>2</sup>=3.2) Color ,respiratory effort , and muscle tone were highest Apgar characteristics which were altered.

### DISCUSSION

The results of this study showed that 52% of pregnant women received fundal pressure. But this wasn't documented in the medical record. In the different countries the use of fundal pressure varies and seems to be routine practice during delivery in low and middle income countries .In France in 2002 near 50% of pregnant women announced it (Verspeck .,2008). A United Nations population fund study of child birth practices and experiences in rural central Bangladesh found the use of FP and tight abdominal bands to be prevalent (Pan et al., 2002) while fundal maneuver used in the second stage of labor at 84% of the obstetric services in the USA, in only 11% of cases this was documented in the patient's charts, which may reflect the controversial nature of this maneuver (Olus et al., 2009; Rouse et al., 1999). According to the findings of this study it is quite clear that the finding about duration of second stage is very important. The mean of second stage duration FP and no FP groups were for nullipara (31±12, 54±29 minutes p<0.05) and for multipara (7 ± 4, 18 ± 9.1 minutes p<0.05). We found out that the use of fundal pressure is effective in shortening the second stage of labor. The reduction of duration of the second stage is good in some respects Such as, less time of the pain and anxiety that the mother usually feels during delivery. Unfortunately FP can cause maternal and fetal complications, such as uterine rupture, amniotic fluid embolism, maternal anal sphincter lacerations, fetal fractures and brain damage (Merhi et al., 2005; Kline-Kaye et al., 1990; Cosner., 1996; Simpson, Knoxl., 2001). Although In this research the mean duration of the second stage in both groups was shorter than the median time usually reported. But the mean duration of labor, including the second stage, is highly variable and can be explained by ethnic, genetic, and cultural backgrounds of the study populations (Martin .,2008; Matsuo et al.,2009; Catalin et al.,2002).In this research impatience delivery's agents ordered to use abdominal pressure before the end of the usual time of the second stage (20 minutes for nulipara and 60 minutes for multipara) .Although there is no evidence that prolonged second stage of labor is a serious disadvantage to the fetus, even if adequate monitoring is provided (Janni et al.,2002).

This was noted that application of manual pressure to the uterine fundus directed toward the birth canal is to avoid prolonged second stage and/or operative delivery (Justus Hofmeyr et al., 2009; Matsuo et al., 2009).One of the main issue recently published a randomized controlled trial about the role of fundal pressure on the duration of the second stage of labor. Their study randomized a total of 197 women between fundal pressure concomitant with each uterine contraction and normal pushing during second stage, without a medical indication. The authors concluded that fundal pressure was ineffective in shortening the second stage of labor, with no adverse outcomes of mother or child. There was no significant difference in severe perineal laceration (Olus et al., 2009). Another RCT using an inflatable girdle also found no difference in duration of labor (Cox et al., 1999).

In this research mean of the number of FP was 3 times and mean of the duration of FP found 58 seconds. Majority of studies don't give any information about the indication of fundal pressure, the number and the duration of the maneuver (Merhi et al., 2005; Kline-Kaye, Miller-Slade., 1990; Cosner., 1996; Matsuo et al., 2009; Catalin et al., 2002).This research believes that the indication of fundal pressure is important for the interpretation of the data. Studies suggest that Fundal pressure together with the Valsalva maneuver applied during the uterine contraction increases the intrauterine pressure by 86% over baseline (Justus Hofmeyr et al., 2009; Kline-Kaye, Miller-Slade., 1990). But they do not specify the number, duration and amount of the pressure applied. This investigation showed significant difference

between intervention and control groups Apgar score in the first minute after delivery. In the research published in *Acta Obstetrica et gynecologica Scandinavica*, apgar score was less than 7 after five minutes but in the present study the researchers didn't find any difference of fifth minute apgar between study and control groups (Api *et al.*, 2009). Such results express that FP can be dangerous for neonatal outcome.

However, this study has some limitations. The pressure applied was not the same because different Obstetricians and midwives with different physical strengths did the FP and the fundal pressure wasn't measured.

The finding of this study suggests that documentation of fundal pressure when applied with clear indication seems to be the first step towards insight in the obstetrical practice of fundal pressure. Fundal pressure is not recommended for routine care, as its effectiveness and safety in women with a prolonged second stage of labor are unknown. Moreover some of the birth centers don't have enough equipment for emergency cases. So we believe that caution should be exercised using this maneuver until it is proven to be safe and effective.

### Acknowledgement

Special thanks to Dr. Mahboobe Safavi, the dean of Nurse and midwifery branch of Tehran, Islamic Azad University and also we are grateful to Deputy of Research of Tehran medical branch, Islamic Azad University and we would like to thank managers of public hospitals which accompanied us.

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