

Effect of Directed Versus Spontaneous Pushing During the Second Stage of Labor on Birth Outcome among Primiparas

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Abstract:

Background: Although spontaneous and directed pushing techniques adopted during labor have been studied during the past several decades, controversy still surrounds the results regarding obstetric variables. **Aim:** The aim of this study was to compare the effect of directed pushing versus spontaneous pushing during the second stage of labor on birth outcome. **Setting & Subject:** The study was conducted in Maternity and Childhood Hospital at Zagazig University Hospitals. It comprised a purposive sample of 200 parturient women in their second stage of labor. The study subjects were divided into equal groups of 100 "spontaneous and directed pushing groups". **Tools:** three tools were used for data collection (a structured interview sheet, physical assessment sheet, visual analogue scale, modified fatigue symptom checklist and birth outcome sheet). **Results:** revealed that spontaneous pushing had a better and positive effect on maternal vital signs. The duration of pushing was lower in the spontaneous pushing group than directed pushing. Most of the women in the spontaneous pushing group had significantly a lower pain index after 1 hour from full cervical dilatation and perceived less fatigue within 1-4 hours of childbirth ($p=0.000$). They also had significantly lower rates of episiotomy, perineal lacerations, postpartum hemorrhage and cesarean section. Their newborn had the highest Apgar score at the first and fifth minutes and none of them had fetal complications. **Conclusion:** It can be concluded that improved fetal status, neonatal and maternal outcomes have been identified when women were allowed to bear-down in response to their own natural urges rather than in response to commands for repeated, sustained pushes using Valsalva maneuver. **Recommendations:** It is recommended that; the utilization of the spontaneous pushing technique must be encouraged, with randomized clinical trial to provide further confirmation of the study findings.

Keywords: Pushing method, Second stage of labor, Valsalva, Fatigue.

Introduction:

Evidence based maternity care uses the best available research on the safety and effectiveness of specific practices to help guide maternity care decisions and facilitate optimal outcomes for mothers and their newborns. ⁽¹⁾ Evidence is mounting that the care given to women during the second stage of labor directly impacts maternal and fetal outcomes. ⁽²⁾ Nurses are in a unique position to provide these care practices and to help

childbearing women take informed choice based on evidence. ⁽³⁾

The second stage of labor is a challenging phase for the birth attendant who must consider the objective aspects of labor progression as well as helping the woman to cope with the pronounced sensations and pain that accompany fetal descent and birth. It can also be a challenge to provide appropriate care to a woman as there are conflicting opinions about the

various aspects of care and strategies for achieving the best birth outcome for the mother as well as her newborn.⁽⁴⁾

During the second stage of labor, maternal bearing down efforts aid in fetal descent as the fetus completes the cardinal movements of labor, rotating and descending through the maternal pelvis.⁽⁵⁾ The best approach to maternal bearing down during the second stage of labor has long been of interest to maternity care providers. Two distinct approaches to bearing down have been described in the literature: directive and supportive.⁽⁶⁾

When using the directive approach, the maternity nurse offers specific directions for women to use sustained Valsalva maneuver (strenuous sustained bearing down against a closed glottis) from the time of complete cervical dilatation until the birth of the newborn.⁽⁷⁾ This means instructing the woman to take a deep breath at the onset of a contraction, holding it and pushing for 8 to 10 seconds against a closed glottis, aiming for three pushes per contraction.⁽⁸⁾

Such maneuver leads to an increase in intra-thoracic pressure, which in turn reduces the venous return to the heart. A drop in blood pressure then occurs which causes a fall in cardiac output and a subsequent reduction in the perfusion of oxygenated blood to the uterus, placenta and ultimately the fetus, resulting in reduced pH levels, hypoxia and compromising changes in the fetal heart rate. Other effects of prolonged directed Valsalva pushing are the increased risk of maternal fatigue and increasing the amount of pressure on the pelvic floor with subsequent adverse pelvic floor and perineal outcomes.⁽⁹⁾ In contrast, when using the supportive approach, the maternity nurse encourages women to push in response to the involuntary physiologic

urges that normally occur during second stage of labor⁽⁷⁾ When women push spontaneously, they push multiple times per contraction (3–5) for 3 to 5 seconds per effort, followed by about 2 seconds of breath and the release of air.⁽¹⁰⁾

Support of the woman's spontaneous bearing-down efforts is an appropriate, evidence-based approach to care that avoids the adverse outcomes of sustained strenuous pushing.⁽¹¹⁾ In fact, both maternal and neonatal outcomes as fetal oxygenation, neonatal Apgar scores, perineal and long term uro-gynecological outcomes are improved when women are allowed to push in response to their own spontaneous urges.⁽¹²⁾

Significance of the study:

Despite a lack of evidence regarding directive pushing efficiency and safety, it has been widely used by maternity care providers for many decades to hasten fetal descent and shorten the length of the second stage of labor.⁽²⁾ This study was conducted to evaluate any benefit or harm for the mother and her baby of Valsalva pushing versus spontaneous pushing to enable nursing staff to apply the ideal management of the second stage which allow the greatest chance of spontaneous delivery with the least risk of maternal, fetal and neonatal morbidity and mortality.

Aim of the study:

The aim of the current study was to compare the effect of directed pushing versus spontaneous pushing during the second stage of labor on birth outcome.

Research hypothesis:

Second stage laboring women who follow spontaneous pushing with uterine contractions exhibit more positive birth outcome than those who follow directed pushing.

Subjects and methods:

Research design:

A comparative quasi-experimental design was adopted where a comparison between two independent variables (spontaneous and directed pushing technique) during the second stage of labor on dependent variables (maternal and fetal outcome) was determined.

Setting:

The study was conducted in Maternity and Childhood Hospital at Zagazig University Hospitals.

Subjects:

The sample size was taken according to statistical equation ⁽¹³⁾ with confidence interval (CI=95%), Power (80%) and odds ratio (OR=1).

$$\text{Sample size (n)} = \frac{P(1-P)}{D^2} Z^2$$

N : Sample size

P : Proportion of level of the women used the directed pushing techniques for than half the expulsive phase = 65.6%

Z : a percentile of standard normal distribution determined by 95% confidence level = 1.96

D : One half the width of the desired sample confidence interval = 5%

Two hundred women were recruited and divided into two equal groups as follows:

- 1-Spontaneous pushing group (n=100)
- 2-Directed pushing group (n=100)

Inclusion criteria:

- Primiparous women and the age between 20 and 35 years
- Singleton, living fetus presented by vertex with gestational age between 37 and 42 weeks
- No medical or obstetric complications which may affect the second stage of labor

- No epidural analgesia
- The woman at the end of first stage of labor

Tools of data collection:

Data collection was done through the use of the following tools:

- **Tool (I): A structured Interview Sheet:** A structured interview sheet was designed to collect data from parturient women in both groups about the following:
 - **Part 1: Socio-demographic data such as:** age, occupation and education level.
 - **Part 2: Current pregnancy and labor data as:** antenatal care received, weeks of gestation and the symptoms of the onset of labor.
- **Tool (II): Physical Assessment and Observation during labor Sheet:** This sheet was developed by the researcher to collect data about the following: maternal vital signs, anthropometric measurements, uterine contractions, number and duration of pushing during each contraction, fetal heart rate, station at full cervical dilation, mode of rupture of membrane and the color of amniotic fluid.
- **Tool (III): Visual Analogue Scale "VAS":** It was developed by **Wewers and Lowe (1990)** ⁽¹⁴⁾. It is a vertical or horizontal line usually 10 cm. the right end is marked 0 which indicate no pain and the left is marked 10 which indicate sever intolerable pain. The characteristics of the pain intensity were reported by the parturient and the pain level was recorded at two evaluation time points: at 10 cm of cervical dilatation and after one hour after the first pain evaluation. A high score reflects more intense pain and low score means less pain intensity.

- **Tool (IV): Modified Fatigue Symptom Checklist" MFSC":** This was developed by Pugh (1993)⁽¹⁵⁾ to assess women feeling of fatigue during the four hours after delivery. It is a norm referenced, 30-item Likert type scale with a possible score ranging from 30 to 120 (item range =1-4) that provided information on levels of fatigue among postnatal women. The four categories for scoring system are
 - not at all: means the feeling doesn't occur
 - Somewhat: means the feeling rarely occurs
 - 3 -moderately so: means the feeling occurs moderately
 - 4 -very much so: means the feeling is severe

The sum score of each component, its mean and standard deviations were calculated. The highest score indicated the highest level of fatigue and low score reflected less fatigue.

- **Tool (V): Birth Outcome Sheet:**
 - **Part I: Maternal Outcome:** Duration of the second stage of labor, Mode of delivery & Genital tract trauma
 - **Part II: Newborn outcome:** Neonatal Apgar score that developed by Apgar (1953)⁽¹⁶⁾ at first minute and after 5 minutes, need for resuscitation and admission to NICU were all recorded.

Pilot study:

A pilot study was carried out on 20 parturient women (who were excluded from the sample) to assess the clarity and applicability of the data collection tools, arrangements of items, estimate the time needed for each sheet and the feasibility of the study and acceptance to be involved in the study. Labor pushing experience questionnaire was deleted from the sheet due to lack of woman response.

Field study:

Collection of data covered a period of eight months "from the first of October 2012 to the end of May 2013". After getting the official permission, the pilot testing of the study tools was done and analyzed. The researcher attended labor ward the three hot days (Saturday, Monday and Wednesday) per week during morning and afternoon shifts. She filled the interviewing questionnaire sheet individually, after explaining the purpose of the study. Each interview took about 5-10 minutes. General, abdominal and vaginal examinations were done by the on duty physician, assisted with the researcher.

During the second stage of labor, women in the directed pushing group were instructed to take a deep breath in, hold it and push. They held the push for as long as they could (closed-glottis pushing) using Valsalva Maneuver (VM) to facilitate strong effort while the researcher counted to 10 for three to four times during each contraction immediately when cervical dilation reached 10 cm, regardless of whether they felt an urge to push or not and to continue pushing using this method with each contraction until birth. As for the spontaneous pushing group, pushing was delayed until the point after full cervical dilation at which the women felt a strong physical pushing reflex and the fetal head at the +1 level. The researcher 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. The women were followed from the time of birth to the end of the second stage of labor. A watch was used to read and measure the amount of time with numerical values for hours, minutes and seconds. The researcher detected uterine contraction by placing the palms of her hand on the fundus, counted the

number of pushing and measured its duration. The VAS was used to estimate the intensity of pain for both groups.

Limitations of the study:

It was supposed to get a written informed consent from the studied women before participation in the study, but due to their lack of awareness and they were afraid of signing any paper. Accordingly, oral consent was obtained from them. There was lack of randomization in women assignment to study and control groups. The researcher was compelled to follow the same protocol of management during the second stage of labor. This interfered with the possibility of placing the women in the proper birthing position.

Administrative and ethical considerations:

An official permission was granted by submission of an official letter from the Faculty of Nursing to the responsible authorities of the study setting to obtain their permission for data collection. All ethical issues were taken into consideration during all phases of the study: the research maintained an anonymity and confidentiality of the subjects. The inclusion in the study was totally voluntary. Enrolled women would have similar needs for emotional support and would require the relevant pushing information. The aim of the study was explained to every woman before participation and an oral consent was obtained. Every woman was assured that the study maneuver will cause no actual or potential harm to her or her baby and professional help will be provided for her and for her baby whenever needed. Women were notified that they can withdraw at any stage of the research; also they assured that the information obtained during the study will be confidential

and used for the research purpose only.

Statistical design:

After the collection of data, it was revised, coded and fed to statistical software SPSS version 16. The statistical analysis used T test with alpha error = 0.05. Microsoft office excel software was used to construct the needed graphs. For all statistical tests done, the threshold of significance was fixed at the 5% level (p-value). A p-value > 0.05 indicates non significant result and the p-value < 0.05 indicates a significant results and the p-value is the degree of significance. The smaller the p-value obtained, the more significant is the result, the p-value being the probability of error of the conclusion.

Results:

Table (1): Shows that women in the spontaneous group had a statistical lower mean of systolic BP during the first half hour than the directed pushing group (112.8 ± 9.2 vs. 114.7 ± 6.3 respectively). This trend has been changed during the second half hour with slight increase in the mean of systolic BP in both groups with no statistical significant difference. As for the diastolic BP the same trend was also noticed, but with a statistically slightly higher mean of diastolic BP during the second half hour in the spontaneous group compared to those in the directed pushing group ($t=2.4$ & $p=0.018$). As for the mean pulse rate during the first and the second half hour, it was higher in the directed pushing group than those in the spontaneous group, but with no statistical significant difference. It also shows that spontaneous pushing group had lower mean of respiration during the first and second half hour than the directed pushing group (1.58 vs. 1.98).

Table (2): Reveals that, in the first half hour, more fetuses in the directed pushing group had felt tachycardia and bradycardia compared to the

spontaneous pushing group (3.0% & 2.0 vs. 1.0 & 1.0), with no statistical significant differences. While in the second half hour, the rate of tachycardia and bradycardia was increased in the directed pushing group with statistical significant differences ($P = 0.049$).

Table (3): Reveals that women in the spontaneous pushing group were more likely to have an increase in the mean of total number and duration of uterine contractions as well as the mean number of pushing (11.7±3.6, 16.1±4.5, 55.3±15.1 vs. 9.7±2.9, 12.6±3.3, 34.7±10.8, respectively) with statistically significant differences. However the same group encountered a lesser mean of pushing time than that in the directed pushing group (4.4±1.2 vs. 5.8±1.7).

Table (4): Demonstrates that, women in the directed pushing group were more likely to experience sever pain at the beginning of the second stage more than in the spontaneous pushing group ($p=0.109$). However, after one hour, women in the spontaneous pushing group significantly felt less mean of pain than women in the directed pushing group (7.5 ± 2.1 vs. 8.1 ± 1.7) and the difference observed is statistically significant ($p=0.023$).

Table (5) and figure (1): Illustrate that, the majority of women in both groups had normal vaginal delivery, but more women in the directed pushing group had assisted delivery and caesarean section (2.0% & 0.0 vs. 3.0 & 4.0). The four CS in the directed pushing group were due to fetal distress and uterine inertia. Meanwhile, the mean duration of the second stage of labor in the directed pushing group was shorter than the spontaneous pushing group (35.2 ± 9.1 vs. 46.7 ± 10.8min), with statistically difference ($t=8.2$ & $p=0.000$). The table also shows that women in the spontaneous

pushing group were significantly more likely to have an intact perineum compared to the directed pushing group ($p=0.006$).

Table (6): As regards women feeling of fatigue around 4 hours post delivery, the table points to a difference of statistical significance between parturient in the two study groups ($p=0.000$). It is evident that women in the spontaneous pushing group were less likely to have higher mean score of fatigue compared to those in the directed pushing group (83.7±12.3 vs. 94.0±13.5).

Table (7): Shows that women in the spontaneous pushing group had less percentage of genital tract traumas (24.0% vs. 36.0 %) and postpartum hemorrhage (1.0 % vs. 5.0 %) compared to women in the directed pushing group.

Figure (2): Illustrates that newborns of women in the directed pushing group had a higher percentage of asphyxia, need of resuscitation and admission to NICU than those in the spontaneous pushing group (6.0%, 3.0%, 2.0% vs. 13.0%, 9.0%, 6.0%, respectively) without statistically significant differences.

Discussion:

The second stage of labor is a period of increased risk for both mother and fetus. Since the beginning of the 20th century, women in the second stage of labor have been exhorted to strenuously push their babies into the world. The emphasis on haste and forceful pushing in second stage, appears to suggest that the quicker the labor the healthier both mother and baby. Research evidence suggests that using directed pushing to speed the second stage up is a misguided way to keep the baby and the mother safe without undesirable complications.⁽¹⁷⁾

When assessing the effect of pushing techniques on maternal BP, it

was found that the mean systolic and diastolic BP of both groups were higher in the second hour of labor than in the first hour. Moreover, women in the directed pushing group were more likely to have a lower mean of diastolic BP compared to the study group. This was expected since woman's BP normally rises slightly in the second stage of labor because of uterine contractions and her pushing effort, which exaggerate whenever delivery approaches.

In this respect, Monga⁽¹⁸⁾ interpret such finding by the fact that, labor involve strenuous work and effort, which mandates a response from the cardiovascular system. A contraction greatly decreases blood flow to the uterus because it puts pressure on uterine arteries, consequently, this increases the amount of blood flow that remains in the general circulation, leading to an increase in the peripheral resistance, which in turn result in an increase in systolic and diastolic BP.

Maternal pulse rate was also affected by pushing techniques, where its mean value increased in the present result during the second half of the second stage of labor in both groups. Moreover, it was higher in the directed pushing than the spontaneous pushing group. This is supported by the study of Mohamed⁽¹⁹⁾ and it may be attributed to the long breath holding associated with directed pushing which may lead to many cardiovascular changes including increased pulse rate.

In the present result, maternal respiration mean was higher in the directed pushing than the spontaneous pushing groups. This may be due to the attempt of the body to raise its effort to increase the amount of oxygen available to the heart and circulation, which has decreased during directed pushing. This is matching with Lowdermilk and Perry⁽²⁰⁾ who

mentioned that increase physical activity with greater oxygen consumption, during the second stage of labor, is reflected in an increase in the respiratory rate. Such finding is also in line with Ismail⁽²¹⁾ who added that whenever there is an increase in cardiovascular parameters during the second stage of labor, the body responds by increasing the respiratory rate to supply additional oxygen. This can result in severe hyperventilation, which can be avoided by using the appropriate breathing patterns.

When considering the physiological effect on the fetus, it has been suggested that strenuous and sustained pushing against a closed glottis leads to an increase in intra-thoracic pressure which in turn reduces the venous return to the heart and a subsequent reduction in the perfusion of oxygenated blood to the uterus, placenta and ultimately the fetus.⁽²²⁾ Thus, women experienced VM in the present result were significantly more likely to have abnormal fetal heart rate. This is partially in agreement with that of Hansen et al.⁽²³⁾ who found that fetal descent (spontaneous pushing) group experienced fewer incidence of fetal heart rate deceleration. It is also similar to the findings of Simpson and James.⁽²⁴⁾

In this regard, Roberts⁽⁴⁾ emphasized that the most stressful period for the fetus during labor is the active pushing phase of the second stage of labor. Thus minimizing the length of the active pushing by allowing the fetus to descend passively until the woman feels the urge to push (spontaneous pushing) and avoiding prolonged periods of VM (directed pushing) are the critical aspects of promoting fetal wellbeing during the second stage of labor.

The present study revealed that women in the spontaneous pushing group were significantly more likely to

have an increase in the total number and duration of contractions, as well as the total number of pushing, but significantly less pushing duration was encountered among the same group ($p= 0.000$). This is in agreement with the randomized controlled trial done by Hansen et al⁽²³⁾ who noticed that the spontaneous pushing technique results in less time spent actively bearing down. In addition, Brancato, Church and Stone⁽²⁵⁾ found a significant increase in the average length of active pushing among the directed pushing group. This is explained by the fact that women in the spontaneous pushing group delayed pushing until they felt a strong desire to push and this occurred when the fetal head stretches the perineum near the end of the second stage. In practice, it was observed that these women pushed only at the peak of contractions and for about 3 to 5 seconds, which in turn decreased the total pushing time.

In this study, pain was measured using VAS, thus by comparing women's response to labor pain, the present results showed that women in the directed pushing group were more likely to experience severe pain at the beginning of the second stage of labor. In contrast, Chang, et al.⁽²⁶⁾ reported that, the mean score of pain at the beginning of the second stage in the directed pushing group was lower than that in the spontaneous pushing group. The present result also revealed that, after one hour, the women in the spontaneous pushing group felt significantly less pain than the women in the directed pushing group. This is in coherence with Chang, et al.⁽²⁶⁾ who reported that after one hour from full cervical dilatation women in the spontaneous pushing group felt significantly less pain than the women in the directed pushing group (5.67 vs. 7.15, respectively). The results of the present study were also compatible

with Mohamed⁽¹⁹⁾ who mentioned that, women in the directed pushing group had a higher mean of pain score during labor. Gupta, Hofmeyr and Smyth⁽²⁷⁾ have addressed the issue that directed method of pushing may result in increased uterine blood vessel obstruction, uterine muscle hypoxia and decreased effectiveness of uterine contractions so that the pain perception increases during contractions.

The present result showed that more women in the spontaneous pushing group had NVD, and more women in the directed pushing group had assisted delivery and CS. This may be due to the fact that women in the directed pushing group push strongly for long periods of time. This may lead to exertion of a huge effort for an extended period of time and in turn results in increased fatigue, which is an indication for using instrument to assist delivery or inertia which ends up with CS. This corresponds well with the findings of Christine and Susan⁽²⁸⁾ who found that the spontaneous pushing technique increases a woman's chance of NVD and decreases the risk of having CS or instrumental delivery. Conversely, Prins et al.⁽²⁹⁾ found no significant difference between the two pushing groups in terms of mode of delivery. Discrepancies between the above mentioned results may be due to the small sample size and the difference in the management protocol of the second stage of labor.

The present results showed that the mean duration of the second stage of labor in the directed pushing group was significantly shorter than in the spontaneous pushing group. This is supported by the finding of Jahdi et al.⁽³⁰⁾ Furthermore, it also agrees with that of Simpson and James⁽²⁴⁾ who found a significant increase in the length of the second stage of labor among the spontaneous pushing group. Also Bloom et al.⁽²⁾ reported that, the

average length of second stage was 13 minutes shorter in the coached pushing group compared with the un-coached group with a statistically significance. While, Berghella et al. ⁽³¹⁾ noticed a 13-18 minutes difference in the two groups. Recently, the meta-analysis of randomized controlled trials by Prins et al. ⁽²⁹⁾ showed significant reduction of 18.59 minutes in the duration of the second stage of labor in women using Valsalva pushing technique. These studies indicate that the only apparent advantage of VM is a shorter second stage. Furthermore, Chang et al. ⁽²⁶⁾ revealed in their study that primipara in the experimental (spontaneous) group had, on average, a 54-minute longer labor period than women in the control (directed) group (91 vs. 145 minutes respectively). Dissimilarities between the above mentioned results could be attributed to the difference in the birthing position and the use of epidural analgesia.

The current study revealed that women in the spontaneous pushing group were significantly less likely to experience the feeling of fatigue after birth ($p=0.000$). This is consistent with Osborne and Hanson. ⁽³²⁾ This is explained by the fact that during the second stage of labor, the diaphragm muscles undergo obvious fatigue which affects oxygenation. In turn, this pushing method and positioning is imperative to good birth outcome and prevention of postpartum fatigue. ⁽⁷⁾ Additionally, a new mother's fatigue may reduce her ability to handle daily household tasks in the postnatal period and diminish her desire to breast feed and increase incidence of depression.

Reducing genital tract trauma in childbirth is a priority for parturient women and for maternity nurses. Such trauma can cause both short term problems "blood loss, need for suturing and perineal pain" and long term problems "extended pain and various

functional difficulties; such as bowel, urinary and sexual problems" for new mothers and may pose therapeutic challenges for caregivers. The results of the present study revealed a significant increase in the rate of episiotomy, perineal tears and postpartum hemorrhage among the directed pushing group over their counterparts in the spontaneous pushing group. This result is also corroborated with that of Sampsel and Hines ⁽³³⁾ who noticed that women using spontaneous pushing were more likely to have an intact perineum and less likely to have episiotomies or second and third degree tear. It also agrees with Yildirim and Beji ⁽³⁴⁾ who reported that the amount of PPH was small in 50 % and moderate in 48.0 % of women in the spontaneous pushing group. But, it was small in 40.0 % and moderate in 58.0 % of women in the Valsalva group.

Similarly, Cheng et al. ⁽³⁵⁾ in their retrospective cohort study of 15759 nulliparous women reported that, some maternal risks remained significant when using the directed pushing, including the risk for PPH of the second stage. It is also in line with Cooke ⁽³⁶⁾ who noticed an association between directed pushing and poorer maternal outcomes. In addition, Bloom et al. ⁽²⁾ reported that, the episiotomy rate was high in the directed pushing compared to spontaneous pushing group (26% vs. 20 %).

Moreover, Albers et al ⁽¹²⁾ in their secondary analysis of a randomized controlled trial of perineal management techniques, reported that directed pushing with breath holding increased the risk of trauma requiring sutures in primiparous women (37.4% vs. 23.6%; $P < 0.001$) and recommended that use of VM during second stage can be modified or eliminated when caring for healthy women in the second stage of labor in

order to improve outcomes. Meanwhile, Bosomworth and Bettany-Saltikov⁽⁹⁾ found an association between directed pushing and poorer maternal outcomes and concluded that outcome demonstrated a trend towards less frequent and less severe perineal trauma for women in the spontaneous pushing groups.

In this respect, Roberts⁽⁴⁾ mentioned that the open glottis method of pushing maintains the protection of the pelvic floor and that the passive fetal descent that occurs with spontaneous pushing protects the perineum by allowing time for increased tissue compliance. Conversely, Schaffer et al.⁽¹¹⁾ conducted a randomized trial of the effects of coached versus un-coached maternal pushing during the second stage of labor on postpartum pelvic floor structure and function and reported that no significant differences were found in perineal and anal sphincter lacerations. This goes in line with, Yildirim and Beji,⁽³⁴⁾ who mentioned that there were no significant differences between the two groups regarding perineal lacerations or episiotomies. The discrepancy among various studies addressing maternal complications attributed to the variations in medical and nursing intervention utilized during labor.

It was interesting to find in the present result that the mean Apgar score at the first and fifth minute was higher in the spontaneous pushing group than the in the directed pushing group. Similar finding was reported by Ismail⁽²¹⁾ who found a significant difference between the two groups. She explained this in her study by the fact that the fetuses in the directed pushing group had fetal distress, which

was detected through the presence of fetal heart rate acceleration and deceleration, severe molding of fetal skull and passage of meconium. On the contrary, Christine and Susan⁽²⁸⁾ and Chang et al.⁽²⁶⁾ found that Apgar score at 1 and 5 minutes were similar in spontaneous and directed pushing group. Moreover, the results of the present study also revealed that, the proportions of asphyxia, the need of resuscitation and admission to NICU in neonates in the directed pushing group were more common than that in spontaneous pushing group. This is in accordance with Yildirim AND Beji⁽³⁴⁾ who concluded that supporting women to push spontaneously during second stage labor results in improved neonatal outcomes.

Conclusion:

- Spontaneous pushing had a better and positive effect on duration of pushing, the mean score of pain and the exposure to fatigue after labor compared to the directed pushing group.
- Improved fetal status and neonatal outcomes have been identified when women were allowed to bear-down in response to their own natural urges rather than in response to commands for repeated, sustained pushes using VM.

Recommendations:

- Maternity nurses should raise pregnant women awareness about the benefits of spontaneous pushing technique during prenatal preparation for childbirth and should encourage the parturient women to push spontaneously during the second stage of labor to achieve better birth outcome.

Table (1): Distribution of the studied women according to vital signs (n=200)

Vital signs	Groups		t	P
	Spontaneous Pushing group (n=100)	Directed pushing group (n=100)		
	Mean ± SD	Mean ± SD		
Systolic B.P (mmHg)				
• 1 st half hour	112.8 ± 9.2	114.7 ± 6.3	1.8	0.090
• 2 nd half hour	115.9 ± 7.3	115.1 ± 5.7	0.92	0.360
<i>t_p</i> (P)	2.9 (0.004)*	0.64 (0.452)		
Diastolic BP (mmHg)				
• 1 st half hour	76.5 ± 5.0	75.4 ± 5.0	1.6	0.122
• 2 nd half hour	78.2 ± 5.5	76.3 ± 6.0	2.4	0.018*
<i>t_p</i> (P)	3.9 (0.000)*	3.2 (0.002)*		
Pulse rate (b/min)				
• 1 st half hour	77.0 ± 4.0	77.4 ± 3.5	0.78	0.439
• 2 nd half hour	77.9 ± 3.9	80.0 ± 3.3	0.31	0.830
<i>t_p</i> (P)	3.6 (0.001)*	3.4 (0.001)*		
Respiration(c/min)				
• 1 st half hour	19.3 ± 1.4	18.1 ± 1.5	1.58	0.107
• 2 nd half hour	19.5 ± 1.8	20.0 ± 2.0	1.20	0.251
<i>t_p</i> (P)	1.58 (0.185)	1.98 (0.047)*		
Temperature(° C)	36.8 ± 0.4	36.7 ± 0.32	0.01	0.879

t: Independent samples t-test *t_p*: Paired t-test for related samples *P* < 0.05 (significant)

Table (2): Distribution of the women according to their FHR during the second stage of labor

Fetal heart rate	Groups				MCP
	Spontaneous Pushing group (n=100)		Directed pushing group (n=100)		
	No	%	No	%	
1st half hour					
▪ Normal (110-160b/m)	98	98.0	95	95.0	0.706
▪ Tachycardia ≥160 b/m	1	1.0	3	3.0	
▪ Bradycardia ≤100 b/m	1	1.0	2	2.0	
	n = 98		n = 78		
2nd half hour and more					
▪ Normal (110-160b/m)	95	96.9	70	89.8	0.049*
▪ Tachycardia ≥160 b/m	1	1.0	4	5.1	
▪ Bradycardia ≤100 b/m	2	2.1	4	5.1	

* *P* < 0.05 (significant)

Table (3): Distribution of the studied women according to the mean number and duration of pushing and uterine contractions during the second stage of labor (n=200)

Mean \pm SD of Pushing & uterine contractions during second stage	Groups		t	P
	Spontaneous Pushing group (n=100)	Directed Pushing group (n=100)		
Total No. of U.contractions	11.7 \pm 3.6	9.7 \pm 2.9	4.4	0.000*
Total duration of contractions (Min)	16.1 \pm 4.5	12.6 \pm 3.3	6.3	0.000*
Total No. of pushes	55.3 \pm 15.1	34.7 \pm 10.8	11.1	0.000*
Total pushing time (Min)	4.4 \pm 1.2	5.8 \pm 1.7	7.1	0.000*

t: Independent samples t-test * P < 0.05 (significant)

Table (4): Distribution of the studied women according to mean pain intensity level as measured by Visual Analogue Scale (VAS) during the second stage of labor (n=200)

Pain intensity as measured by VAS	Groups				X ²	P
	Spontaneous pushing group(n=100)		Directed pushing group (n=100)			
	No	%	No	%		
During 1st hour						
• Moderate	17	17.0	10	10.0	2.98	0.109
• Severe	83	83.0	90	90.0		
Mean \pm SD	9.5 \pm 0.20		9.9 \pm 0.30		1.25	0.089
During 2nd hour						
• Moderate	50	50.0	29	29.0	9.2	0.002*
• Severe	50	50.0	71	71.0		
Mean \pm SD	7.5 \pm 2.1		8.1 \pm 1.7		t=2.3	0.023*

t: Independent samples t-test * P < 0.05 (significant)

Table (5): Distribution of the studied women according to maternal outcome (n=200)

Maternal outcome	Groups				X ²	P
	Spontaneous pushing group (n=100)		Directed pushing group (n=100)			
	No	%	No	%		
Mode of delivery						
▪ Normal vaginal delivery	98	98.0	93	93.0	4.3	0.115 [^]
▪ Assisted delivery with vacuum	2	2.0	3	3.0		
▪ Cesarean Section(CS)	0	0.0	4	4.0		
Indications of C.S						
▪ Fetal distress & Uterine inertia	0	0.0	4	100.0	NA	NA
Perineum condition						
▪ Intact	12	12.0	2	2.0	7.6	0.006*
▪ Episiotomy	88	88.0	98	98.0		

NA: Not Applicable

[^] P value based on Mont Carlo exact probability

t: Independent samples t-test

* P < 0.05 (significant)

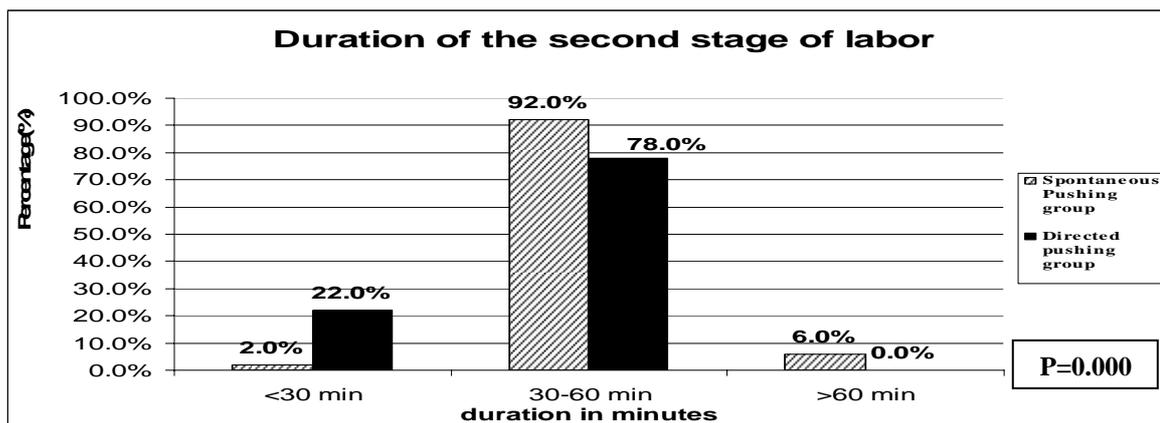


Figure (1): Distribution of the studied women according to the duration of second stage of labor

Table (6): Distribution of the studied women according to postpartum fatigue score (n=200)

Fatigue score	Groups		P
	Spontaneous Pushing Group (n=100)	Directed pushing group(n=100)	
▪ Min	55.0	64.0	0.000*
▪ Max	114.0	118.0	
▪ Mean± SD	83.7±12.3	94.0±13.5	

P: P value for Mann-Whitney test for independent groups * P < 0.05 (significant)

Table (7): Distribution of the studied women according to maternal complications (n= 200)

Maternal complications \$	Groups				X ²	P
	Spontaneous pushing group (n=100)		Directed pushing group (n=100)			
	No	%	No	%		
▪ None	68	68.0	51	51.0	5.9	0.015*
▪ Primary post partum hemorrhage	1	1.0	5	5.0	FEP	0.098
▪ Cervical tears	5	5.0	7	7.0	FEP	0.552
▪ Vaginal tears	3	3.0	6	6.0	FEP	0.307
▪ Perineal tears	24	24.0	36	36.0	3.6	0.066
Degree of Perineal tears	n=24		n=36		0.84	0.759^
▪ 1st degree	19	79.2	25	69.5		
▪ 2nd degree	5	20.8	11	30.5		

\$ More than one answer was allowed

^ P value based on Mont Carlo exact probability

FEP: P value based on Fisher exact probability

* P < 0.05 (significant)

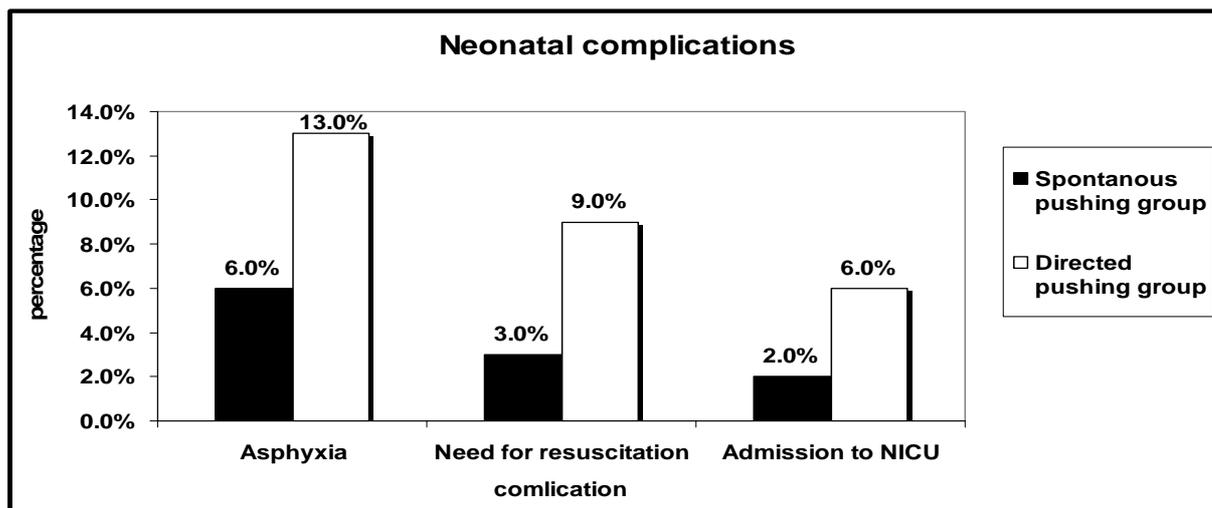


Figure (2): Distribution of the studied women according to neonatal complications

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