

Spontaneous versus Valsalva pushing Techniques At The Second Stage Of Labor Among Primipara Women On Labor Outcomes.

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Abstract: Background: the second stage of labor is a period of increased risk for the fetus. So, providing safe and effective pushing methods to assist women deliver babies is an important goal in the management of the obstetric practice.

Aim of the study: aim of the study was to evaluate the effect of spontaneous versus Valsalva pushing techniques at the second stage of labor among primipara women on labor outcomes.

A Quasi-experimental design was adopted in the current study.

Setting: The study was conducted at the vaginal delivery unit in Benha University Hospital during the period from January 2014 to December 2014.

Subjects: A convenience sample of a total 284 of primipara women were recruited in the current study. 130 primipara women were recruited in the Valsalva pushing group, while 154 women of them were recruited in spontaneous pushing group.

Tools: Three tools were used in the current study to collect the necessary data, structured interviewing questionnaire Sheet, fatigue assessment and analysis scale and Apgar score:

Results of the study showed a highly statistical significant difference between two groups regarding the duration of the second stage, fatigue and energy subscales scores, and Apgar score of the neonate during both first and fifth minute ($p < 0.001^{**}$). Moreover there was a statistical significant difference regarding the incidence of perineal laceration.

Conclusion; spontaneous pushing during second-stage labor shortens the duration of second stage, and decreases the incidence of postpartum fatigue.

Recommendations: Spontaneous pushing during second-stage of labor could be recommended to be included in maternal hospitals protocol.

Keywords: spontaneous, Valsalva, pushing, second stage of labor, primipara women, labor outcomes, Nursing.

I. Introduction

Labor is a normal physiological process whereby the fetus is expelled out from maternal uterus to the outside world. Labor is categorized into three stages. The second stage is really a challenging issue for the woman and the obstetrician as well. ⁽¹⁾ It is often characterized by regular, frequent contractions during which woman in labor feels vaginal pressure, rectal pressure, and an overwhelming urge to bear down. During the second stage, maternal bearing down efforts aid in fetal descent as the fetus completes the cardinal movements of labor, rotating and descending through the maternal pelvis. ⁽²⁾ Maternal bearing-down efforts and their effect on the mother and the fetus have been studied and debated for decades. ⁽³⁾

Two different pushing techniques may be utilized while caring woman in the second stage. Firstly, spontaneous pushing, where woman is self-directed in her bearing-down techniques. She may push with an open glottis and localization or use an intermittent exhalation technique ⁽⁴⁾ Using these self-directed pushing efforts the woman pushes in response to an involuntary urge. She starts pushing from a resting respiratory volume, without first taking a deep breath, she will typically push three to five times for 3–5 seconds followed by a breath and release of air. ⁽⁵⁾

Spontaneous pushing efforts, also referred to as ‘physiological pushing’, vary in intensity and frequency. Secondary, the Valsalva pushing technique, which is commonly utilized as a major component of directive methods of pushing during the second stage of labor. It is widely advocated. It is a steady pushing effort through which, a woman is instructed to take a deep breath at the beginning of the contraction, to hold her breath and push as long and hard as she can in synchrony with her contractions ⁽⁶⁾. Although many care providers encourage pushing that incorporates a Valsalva maneuver, many authors encourage the use of “physiologic bearing down” instead of sustained breath-holding during expulsive efforts ⁽⁷⁻⁹⁾. “Physiologic bearing down resulting in a slightly longer second stage, may result in improved maternal-fetal gas exchange and maternal satisfaction with the birth experience.

1.2 Significance of the study

The management of the second stage of labor remains controversial, and the Valsalva pushing technique during the second stage of labor is widely advocated specifically in Benha university hospital, where woman is instructed to take a deep breath at the beginning of the contraction, to hold her breath and push as long and hard as she can in synchrony with her contractions. However, the growing body of evidence suggests that spontaneous pushing during the second stage of labor results in better outcomes than directed pushing, which usually involves repeated use of the Valsalva maneuver. Maternity nurse has a central role to help and support women through labor and the transition to early parenting. Good 'pushing techniques' are nonmedical practice areas that can bring about significant improvements in maternal and fetal well-being⁽⁹⁾. So the researcher of the present study intended to evaluate the effect of spontaneous pushing versus Valsalva pushing techniques at the second stage of labor among primipara women on labor outcome in order to provide proper nursing management women during her bearing down.

1.3 Aim of the study: aim of the study was to evaluate the effect of spontaneous versus Valsalva pushing techniques at the second stage of labor among primipara women on labor outcomes.

1.4 Research Hypothesis:

Women with spontaneous pushing in upright position during second stage of labor will have a shorter in duration of second stage of labor, less postpartum fatigue and proper fetal wellbeing than those with Valsalva pushing.

II. Material and methods

2.1 Research design:

A quasi-experimental study was followed to fulfill the aim of this study

2.2 Setting of the study:

This study was conducted at delivery room in obstetrics and gynecological department at Benha University Hospital, where there are about three vaginal delivery tables

2.3 Sample:

2.3.1 Sample type: simple random sample

2.3.2 Sample size: sample size was detected based on the last year census report of the obstetrics and gynecology department at Benha university hospital. The total number of spontaneous vaginal delivery primipara was 980 primipara (Benha University Hospital Census, 2013) (10). Sample size was calculated utilizing the following formula (11).

N

$$n = \frac{N^2 e^2}{1 + N e^2}$$

Where:

n= sample size

N= population (980)

e= margin error (0.05)

a total 284 of primipara women were recruited in the current study. 130 primipara women were recruited in the Valsalva pushing group. Data was collected at the first half of data collection period, while 154 women of them were recruited in spontaneous pushing group, data were collected at the second half of the period of data collect.

2.3.3 Inclusion criteria:

- Women aged 18-35 years.
- spontaneous vaginal delivery
- Primigravida women
- Free from medical disorders.
- Women at the gestational period between 37-42 weeks.
- No obstetric complication during first stage of labor.

2.4 Tools of data collection:

Three tools were used in the current study to collect the necessary data.

2.4.1 Structured Interviewing Questionnaire Sheet:

It was developed by the researcher; it consisted of two parts:

Part 1: general characteristics data such as; age, educational level, residenceetc.

Part 2: obstetric history such as; gestational age, time of the first stage of labor ,time of membrane rupture ,methods of membrane rupture.

2.4.2 Fatigue Assessment and Analysis scale

Visual analogue scale–fatigue (VAS-F) used by Troy and Dalgas-Pelish (12).The (VAS-F) tool consists of an 18-item scale.(13) Items concerning fatigue and 5 items on energy)..Items 1-5 and 11-18 belong to the fatigue subscale. Items 6-10 belong to the energy subscale. With actual use, the horizontal lines should be exactly 10 cm.. Each analogue scale has bipolar end anchors related to descriptors of fatigue, with a high score indicating more of the attribute (fatigue or energy). Woman was asked to put (X) mark on the horizontal line. And finally the researcher measure the fatigue score through measuring the point at which the (x) mark was found.

2.4.3: Apgar score in 1-5 minutes after the labor: to evaluate neonatal outcome. This includes fetal heart rate, respiratory rate, muscle tone, reflex response and color (Apgar, 1953). It is done at one and five minutes after birth and may be repeated later if the score remains low.

2.4.4 Content validity:

Content validity was done by panel expertise .The developed tool was reviewed for appropriateness of items and measuring the concepts through 5 an expert jury panel in the field of maternity nursing and obstetric medicine specialty to assure content validity. The questionnaire was modified according to the panel judgment on clarity of sentences and appropriateness of content.

2.4.5 Reliability

2.5 Ethical considerations

This study was conducted under the approval of the faculty of nursing Ethics Committee, Benha University. Participants were given explanations about the purpose of the study, and they were also informed that they could withdraw from the study at any time before the completion of the study. Participants who agreed to complete in this study were asked to sign a consent form. Confidentiality of participants' information was assured and the data were accessed only by the investigators involved in the study.

2.6 Pilot Study

The pilot study was conducted on 10.0% of the total sample to test the feasibility and the applicability of the tool, find out the possible obstacles and problems that might face the researcher and interfere with data collection, detect any problems peculiar to the statements as sequence of questions and clarity and estimate the time needed for data collection. The samples of the student included in the pilot study were excluded from the main study sample.

2.7 field of work

Data were collected from the beginning of January, 2014 till the beginning of June 2014. Each participant firstly was enrolled in the study when cervical dilation reached 10 cm (second stage of labor). For spontaneous pushing group women were assessed as having full dilatation of the cervix .they were ask to commence pushing only when they felt the urge to do so and gave no specific instructions about the timing and duration of pushing. For valsalva pushing group women were trained by the nurse to use closed-glottis pushing three to four times during each contraction immediately when cervical dilation reached 10 cm and to continue pushing using this method with each contraction until birth. The nurse counted to 10 during each pushing effort to assist the woman in holding her breath for at least 10 seconds. In both groups the women were followed from the beginning of the second stage of labor to the immediate 2 hour of postpartum period, when the postpartum fatigue was recorded by each of woman utilizing visual analogue scale–fatigue (VAS-F) tool.

2.8 data analysis

Data analysis was performed using IBM SPSS statistical software version 15. The data were explored. Descriptive statistics with mean and standard deviation (SD) for continuous variables and frequency for categorical variables were analyzed. Qualitative variables were compared using chi square test (X²) as the test of significance and independent (t) test was used to compare mean score between two groups .the p-value is the degree of significant and using the correlation (r) test. A significant level value was considered when p-value ≤

0.05 and a highly significant level value was considered when $p\text{-value} \leq 0.001$, while $p\text{-value} > 0.05$ indicates non-significant results.

III. Result

Table (1): presents the general characteristics of participants under study. It was observed that, the mean age of participants under study was (25.16 ± 2.987) , in spontaneous and valsalva pushing groups were (25.24 ± 2.975) , & (25.07 ± 3.010) years) respectively. In addition, the same table manifest that, the majority of the participants were educated. Concerning residence, it was found that, 87.0% and 65.4 % of spontaneous and valsalva pushing groups were residing in rural areas. Furthermore, this tables illustrates that the majority of spontaneous and valsalva pushing groups were housewife (87.7%, 86.2%) respectively.

Table (2): displays the characteristics of the current process of labor, it was observed that there was no statistical significant difference between spontaneous and valsalva pushing groups in relation to the duration of the first stage of labor. On the other hand it was observed that there was a highly statistical significant difference between two groups regarding the duration of the second stage of labor ($p < 0.001^{**}$). more over this table also clarifies that there was a significant difference between two groups in relation to the occurrence of perineal laceration ($p < 0.05^*$).

Table (3): presents the difference of visual analogue scale–fatigue score between spontaneous upright and valsalva pushing groups, it was observed that there was a highly statistical significant difference regarding fatigue and energy subscales scores between two groups ($p < 0.001$).

Table (4): exemplifies neonatal characteristics of the studied groups, it was observed that there was no statistical significance difference between spontaneous and valsalva pushing groups regarding the gestational age, neonatal birth weight and neonatal sex. On the other hand there was a highly significance between two groups in relation to Apgar score of the neonate during both first and fifth minute. in addition there was a highly statistical significance difference regarding admission of the neonate to intensive neonatal care unit ($p < 0.001^{**}$).

Variable	Total		Spontaneous pushing group N = 154		Valsalva pushing group N= 130		P value
	Total N, % or Mean \pm SD		Total N, % or Mean \pm SD		Total N, % or Mean \pm SD		
Age	25.16 \pm 2.987		25.24 \pm 2.975		25.07 \pm 3.0106		0.476*
Educational qualification							.878
Illiterate	31	10.9	16	10.4	15	11.5	
Read and write	13	4.6	6	3.9	7	5.4	
Secondary educational	106	37.3	60	39.0	46	35.4	
University education	134	47.2	72	46.7	62	47.7	
Residence							.707
Rural	247	87.0	52	33.8	45	34.6	
Urban	37	13.0	102	66.2	85	65.4	
Occupational condition							.880
Working	97	34.2	135	87.7	112	86.2	
House wife	187	65.8	19	12.3	18	13.8	
Body weight	75.38 \pm 13.242		75.44 \pm 13.344		75.31 \pm 13.173		.080*
Length	162.30 \pm 6.285		162.27 \pm 6.297		162.34 \pm 6.295		.098*
Body mass index	28.41 \pm 4.860		28.47 \pm 4.899		28.35 \pm 4.832		.945*

Note: * P-Value indicated by independent t test Chi-square test was used for other

Variable	Spontaneous pushing group N = 154		Valsalva pushing group N = 130		P value Chi test
	No	%	No	%	
Duration of the first stage of labor in hours.					.885
8-	21	13.6	13	10.0	
10-	83	53.9	73	56.2	
12-14	50	32.5	44	33.8	
Duration of the second stage of labor in minute.					0.000**
20-	122	79.2	68	52.3	
30-	30	19.5	62	47.7	
40-50	2	1.3	0	.0	
Perineal laceration					.013*
Yes	21	13.6	32	24.6	
No	133	86.4	98	75.4	

Variable	Mean ± standard deviation		p-value independent t test
	Spontaneous pushing group N = 154	Valsalva pushing group N = 130	
Fatigue subscale	49.1364±8.31965	90.4538±7.11926	0.000**
Energy subscales	21.7273±3.91457	41.0692±3.11084	0.000**
Total fatigue-f scale	70.8636±12.11334	131.5231±10.17918	0.000**

Variable	Spontaneous pushing group N = 154		Valsalva pushing group N = 130		P value Chi square test
	No	%	No	%	
Gestational age					.859
38-	79	51.3	63	48.5	
40-	52	33.8	45	34.6	
42	23	14.9	22	16.9	
Mean ±SD	39.61±1.324		39.66±1.326		0.861
Neonatal birth weight in (grams).					
< 2500	67	43.5	60	46.2	
2500-	83	53.9	66	50.8	
3500-	4	2.6	4	3.1	
Mean ±SD	2588.96±360.022		2585.00±359.729		.849
Neonatal sex					
Male	74	48.1	61	46.9	
Female	80	51.9	69	53.1	0.000**
Apgar score at 1 minute					
Good (8-10)	132	85.7	44	33.8	
Moderate asphyxia (5-7)	18	11.7	66	50.8	
Sever asphyxia (≤4)	4	2.6	20	15.4	0.000**
Apgar score at 1 minute					
Good (8-10)	144	93.5	81	62.3	
Moderate asphyxia (5-7)	8	5.2	39	30.0	
Sever asphyxia (≤4)	2	1.3	10	7.7	0.000**
Admission to intensive care					
Yes	2	1.3	14	10.8	
No	152	98.7	116	89.2	

IV. Discussion

This study aimed to evaluate the effect of spontaneous pushing in upright position versus Valsalva maneuver pushing techniques at the second stage of labor among primipara women on labor outcomes. As regarding general characteristics of participants including age, educational qualification, occupational condition, bodyweight, height, and body mass index, the present study revealed that there was no statistical significant difference between both spontaneous and Valsalva pushing groups, these findings were in the same line with **Lam and McDonald**,⁽¹³⁾ in the study to determine the differences between use of the directed and spontaneous pushing techniques in the second stage of labor. They reported that there was no significant difference found between directed and spontaneous pushing for age, body weight, height and body mass index or education level. In addition **Jahdi et al**,⁽¹⁴⁾ in the study to compare the effect of physiological and directed pushing on the duration of the second stage of labor, mode of birth and Apgar. They represented that there was no difference among women in both physiological and directed pushing in terms of maternal age, parity, gestational age, fetal gender, educational status and employment.

Regarding duration of the second stage of labor as one of the outcomes measurements, the present study revealed that there was a highly statistical significant difference between both spontaneous and Valsalva pushing groups ($p < 0.001^{**}$). These findings may be due to that spontaneous pushing is associated with harmony coordination among different muscles including abdomen, diaphragmatic and pelvic floor muscles that subsequently improve fetal descent and short duration of the second stage of labor. These findings were agreed with **Jahdi et al**,⁽¹⁴⁾ who added that spontaneous pushing did significantly shorten the duration of second stage labor. More over **Sampselle et al**,⁽⁷⁾ in the study to describe the association between provider communication and actual maternal pushing behavior in second-stage labor and to test differences in length of second stage and total maternal pushing time by maternal pushing behavior. They added that the proportion of spontaneous pushing by the birthing woman was positively and significantly shorten the length of the second stage of labor. On the other hand, **Bloom et al**,⁽¹⁵⁾ found that mean duration of second stage was shorter significantly shorter ($P = 0.014$) in a coached pushing group (46 minutes), when of second stage compared to a control who did what comes naturally (59 minutes). In addition **Prins et al**,⁽³⁾ in the study to evaluate benefits or harms for the mother and her baby of Valsalva pushing versus spontaneous pushing in the second stage of labor. They added that the duration of the second stage of labor is shorter with Valsalva pushing but the clinical significance of this finding is uncertain. And further research seems warranted.

Perineal laceration is an important factor to consider when evaluating overall effect of spontaneous versus Valsalva pushing techniques. The present study findings represents that there was a highly statistical significant difference between both spontaneous and Valsalva pushing groups ($p < 0.001^{**}$). These findings may be related to that Valsalva pushing requires repeated, prolonged breath holding and bearing down which have an adverse effect on subsequent pelvic floor function that affect pelvic floor and perineal muscles that subsequently increases risk of perineal laceration. These findings came in the same line with

Regarding the mean fatigue scores around first 2 hours of postpartum, the present study represented that the mean fatigue and energy score were decreased among spontaneous pushing group participants, these findings may be related to that Valsalva pushing might be one of the a etiological factors of perineal trauma and of stress incontinence because of the increased downward stress resulting in potential damage to the anterior vaginal wall and to the supports of the bladder. Those are mainly associated with postpartum fatigue. Moreover during Valsalva pushing women were asked to increase frequency of pushing technique rather than the spontaneous pushing that may subsequently affect body energy among Valsalva pushing group. These findings came in the line with **Lam and McDonald**,⁽¹³⁾ who added that indicating that, the fatigue and energy mean score were different between spontaneous and Valsalva pushing group, in addition spontaneous pushing recovered from fatigue more rapidly than these in Valsalva group. Moreover **Haseebetal**,⁽¹⁶⁾ in the study to find out the effects of two different pushing techniques in the second stage of labor on postpartum maternal fatigue and Apgar score of neonates in Saudi females, they added that physiological pushing technique has a better outcome with regard to postpartum maternal fatigue and neonatal APGAR score when compared to directed pushing during these second stage of labor.

In relation to neonatal outcome, Apgar score of neonates, was the utilized measure that used to evaluate neonatal outcome, the present study revealed that, the Apgar score of neonates among spontaneous pushing group showed a higher and good Apgar score when compared with Valsalva pushing. These findings may be due to that Valsalva pushing is associated with closed glottis pushing that affects maternal hemodynamic and increases intra thoracic pressure. That subsequently decreases venous return to the heart, cardiac output, maternal arterial pressure, and blood perfusion of the placenta, which affects in oxygen supply to the fetus and illustrated in lower pH and Po₂ of the umbilical arterial blood. While during spontaneous pushing, bearing down is associated with exhalation and open glottis, air escapes and the thoracic pressure is not maintained. These findings partly agreed with **Tuuli MG et al**,⁽¹⁷⁾ who suggested a reduction in fetal brain oxygenation associated with maternal pushing efforts. Another randomized controlled trial was undertaken in 2005 by **Simpson**⁽¹⁸⁾ to determine any differences between the use of directed and spontaneous pushing techniques in the second stage of labor. Seventy three multiparous women were randomly allocated to either the control group (directed pushing N = 38) or the experimental group (spontaneous pushing N = 38). Women in the experimental group had longer second stage of labor, the difference between the PGAR score were similar at 1 and 5 min after birth. On the other hand **Lam and McDonald**,⁽¹³⁾ who reported that Apgar score means were similar at 1 minute and 5 minutes after birth. There was also no statistically significant difference between the numbers of babies admitted to the neonatal intensive care unit between spontaneous and Valsalva pushing group.

V. Conclusion

spontaneous pushing during second-stage labor is a safe and less exhausting pushing technique, it was not associated with demonstrable adverse outcome. It significantly shortens the duration of second stage labor, decreases incidence of perineal laceration. Also it has a better outcome with regard to postpartum maternal fatigue and neonatal Apgar score when compared to directed pushing during the second stage of labor.

VI. Recommendation

Based on the findings of the present study, the following recommendations were suggested: Spontaneous pushing during second-stage labor could be recommended to be included in maternal hospitals protocol.

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