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Effect of Breathing Technique (Blowing) on the Integrity of Perineum and Duration of the Second Stage of Labor among Primiparous Women

[1]Hanan Ibrahim Ibrahim, [1]Violet Nicola Ghattas and [2]Hanan Abd-Elrahman Kandeel

[1]Department of Obstetrics and Gynecologic Nursing,
Faculty of Nursing, Damanhour University, Damanhour, Egypt
[2]Department of Obstetrics and Gynecologic Nursing,
Faculty of Nursing, University of Alexandria, Alexandria, Egypt

Abstract: This study aimed to determine the effect of breathing technique (blowing) on the integrity of perineumand duration of the second stage of labor among primiparous women. A non- randomized controlled clinical trial was followed in this study. The study was carried out in El-Shatby Maternity University Hospital in Alexandria. A convenience sample of 80 parturients undergoing vaginal delivery and available at the time of data collection were recruited from the above mentioned setting. Two tools were used for collection of data, namely:"*Basic data structured interview schedule*" and "*Perineal outcome assessment sheet, duration of the 2nd stage of labor and, newborn babies' characteristics*". Results revealed a statistically significant differences between the study and control groups' in relation to intact perineum (P=0.008) and posterior laceration (P=0.012). No statistically significant differences were found between the two groups' regarding episiotomy and anterior perineal laceration. It was also noticed that the study group had shorter mean (65.95±4.206 minutes) than the control group (79.60±4.217 minute). There was a statistically significant difference between the two groups, where P=< 0.0001. It can be concluded that parturients who performed breathing technique (blowing) had significantly more intact perineum and shorter 2nd stage of labor than those who didn't perform it. *Recommendations* encompassed that the nursing curriculum should be revised and updated to include the blowing technique in the nursing management of the 2nd stage of labor. Adequately planned in-service training programs should be implemented by the responsible authorities for the maternity nurses regarding the importance of blowing technique during 2nd stage of labor to upgrade their knowledge and skills about it.

Key words: Breathing Technique (Blowing) · Perineal Integrity · Second Stage of Labor · Primiparous Women

INTRODUCTION

Labor is a normal physiological process whereby the fetus is expelled out from maternal uterus to the outside world. It is categorized into four stages. Its second stage starts from complete cervical dilation and is called the out driving stage because it is one of the crucial stages for both mother and fetus. It is also known as the emergency, acceleration and instruction-to-push stage, with the assumption that shortening its length is beneficial [1]. It is often characterized by regular frequent contractions during which women feel vaginal pressure, rectal pressure and an overwhelming urge to bear down [2]. These maternal bearing down efforts aid in fetal descent as the fetus completes the cardinal movements of labor, rotating and descending through the maternal pelvis [3].

Approximately 600,000 women die each year due to complications related to pregnancy and childbirth. The vast majority of them have been determined to occur in developing countries. Antenatal, birth and postnatal care are among the basic protective facilities to protect and improve the health of both mother and child to be delivered [4]. Prevention of perineal trauma is one of the best options for birthing women. Accordingly, both childbearing females and health practitioners place a strong emphasis on minimizing perineal trauma and decreasing potential related morbidity for mothers [5].

Corresponding Author: Hanan Ibrahim Ibrahim, Department of Obstetrics and Gynecologic Nursing, Faculty of Nursing, Damanhour University, Damanhour, Egypt.

Perineal tear is multifactorial and has numerous predisposing factors. These predisposing factors include: Primi-parity, abnormal presentations, macrosomic baby, instrumental delivery, occipito-posterior position and previous episiotomy especially media type. Smith *et al*. [6] associated the occurrence of 3rd and 4th grade perineal tears with guide pouching method, birth in an upright position and prolonged 2nd stage.

Other risk factors were also recognized, such as precipitated labor, ancient or young age, prior Perineal trauma, fundal pressure during second stage and frequent vaginal examinations [7]. More than 85% of female undergoing vaginal birth usually suffer from some degree of Perineal tear, with 6-11% of all vaginal deliveries resulting in a third or fourth degree tear. Fortunately, with subsequent births, the incidence of Perineal tear reduces from 90.4% in nulliparous females to 68.8% in multiparous females undergoing vaginal delivery [8, 9].

The incidence of perineal tears of 3rd and 4th degree varies from nation to nation, ranging from 0.1 % in China, India and Cambodia to 15 % in Philippines. This incidence also ranges from Null to 76.3% according to the type of health care facilities. A study conducted in England concluded that the prevalence of perineal tear among primiparous women was 91.4% included all degrees of perineal tears and episiotomy. The prevalence was much lower among multiparous women 68.8% [10].

The exact incidence of perineal tears in Egypt as a whole is unavailable yet, in some Egyptian areas it has been investigated by some scattered small studies. According to the latest research of the risk factors for perineal tears among low risk parturient females in Zagazig / Egypt, 27% of the subjects had spontaneous perineal tears (second degree). Perineal tears can cause problem for new mothers in the short and long term [11].

The degree of postnatal morbidity is directly related to the extent and complexity of the genital tract trauma. Short-term problems (immediately following birth) include: blood loss, need for suturing and pain [12]. After childbirth these tears also weaken the pelvic floor muscles, dyspareunia, urinary incontinence and fecal incontinence. Perineal trauma also affects women's physical, psychological and social wellbeing in the immediate postnatal period as well as in the longer term. One of the important tasks in managing labor is the protection of perineum. An important variable affecting this outcome is maternal pushing during the second stage of labor [13].

There are two main methods for handling the second stage of labor. In the first method that was first introduced in 1950 is called the Valsalva maneuver. Where females are trained simultaneously with the onset of contractions to take a deep breath, hold it and begin to push as hard as they can. This frequent and prolonged pushing in Valsalva maneuver causes nerve and structural damage on the pelvic floor which has been attributed to the increase of abdominal pressure and rapid expansion of vagina and perineum [14].

The second method is called blowing, where women are asked at the onset of pain to take 2 deep abdominal breaths, then take another deep breath and push the open mouth for 4-5 seconds while controlling exhalation. The adverse effects of this method on the mother are much less than the earlier method, the adverse consequences of this blowing technique for the mother included the breathing becomes an automatic response to pain, the mother remains in a more relaxed state and will respond more positively to the onset of pain, as well as provides a sense of well being and control. Blowing enhances oxygen gives the mother and baby more power and energy [15]. Experts suggest that one of the effective methods in reducing tissue damage is to stretch muscles slowly and steadily [16, 17].

Accordingly, blowing can be said that one of the possible ways to reduce damage to the perineum, to lower the abdominal pressure added to uterine contractions at the moment of delivery and help the baby's head out slowly and simultaneously with contractions. In Valsalva maneuver, the mother is pushing severely trying everything to make the baby come out and on the other hand, the Perineal tissues resist this pressure because of connective tissues, therefore, the risk of trauma to the perineum can increase [18].

Thus, a technique should be used to reduce the pressure on the perineum. Breathing technique of blowing is an effective method to reduce pressure exerted on the perineum as well as for reducing the urge to push in the mother and slow expansion of the perineum tissues can reduce its damage during childbirth. However the evidence regarding the blowing to reduce perineal trauma during the second stage of labor remains contradictory. Brancato *et al*. and Roberts *et al*. [19, 20] found that spontaneous pushing leads to greater release of oxytocin, effective uterine contractions, better rotation and descent of the fetal head in the maternal pelvis, rapid progress of labor and, as a result, increase in spontaneous vaginal delivery. Each of these factors can lead to improved maternal and fetal outcomes.

In a study conducted by Lemos *et al*. [14] the effects of immediate versus delayed pushing during the second stage of labor on fetal outcomes was investigated. Among the immediate pushing group (immediately after

complete cervical dilatation), there were fewer instances of fetal oxygen saturation, reduced fetal heart rate and more perineal laceration. Some other researchers support and recommend the use of blowing technique [15, 16] and other researchers reported no benefits for its use [12, 17].

These contradictory results necessitate additional studies to fill the gap in this respect. Therefore this study aimed to determine the effect of Breathing Technique (Blowing) on the Integrity of Perineum and Duration of the Second Stage of labor among primiparous women.

Aim of the Study: This study aimed to determine the effect of breathing technique (blowing) on the integrity of perineum and duration of the second stage of labor among primiparous.

Operational Definition: Perineal integrity in this study refers to the perineal condition after expulsion of the fetus (intact perineum, episiotomy & tears).

Research Hypotheses:

- Parturients who perform breathing technique (blowing) have more intact perineum during the 2nd stage of labor than those who don't perform it.
- Parturients who perform breathing technique (blowing) will experience shorter duration of the 2nd stage of labor than those who don't perform it.

MATERIALS AND METHOD

Research Design: A non- randomized controlled clinical trial was utilized to fulfill this study.

Setting: The study was conducted at labor room in El-Shatby Maternity University Hospital in Alexandria.

Subjects and Inclusion Criteria: A convenience sample of 80 parturients undergoing vaginal delivery were recruited for the study according to the following inclusion criteria: age 20-35years; primiparous; full-term (37- 42 weeks); normal course of pregnancy; having normal BMI (18.5-<25); didn't practice regular exercise and perineal massage during pregnancy; having singleton fetus with vertex presentation; without contraindications for normal labor; in the active phase of labor; having perineal length larger than 3 cm and accepted to participate in the study.

Subjects who fulfilled these inclusion criteria were assigned to either one of following two groups*: study group (blowing),* which encompassed 40 parturients who performed breathing technique (blowing). *Control group (Valsalva maneuver),* which comprised 40 parturients who followed the routine hospital care.

Tools: Two tools were utilized to collect the necessary data.

Tool One: Basic Data Structured Interview Schedule: Which was almost developed by the researchers and included three parts:

Part 1: Socio-demographic data such as age, level of education, occupation and current residence.

Part II: Current pregnancy profile such as weeks of gestation.

Part III: Clinical data such as onset of labor, BMI, use of oxytocics, length of perineum, hemoglobin, hematocrit and Brink scale.

Brink Scale: Was adopted and used by the researchers to measure the strength of the pelvic floor muscles [21, 22].

It evaluates 3 pelvic floor muscles contraction variables:

- Vaginal pressure or muscle force.
- Elevation or vertical displacement of the examiner's fingers.
- Duration of contraction.

Each muscle contraction variable was ranged from 1- 4-points ordinal scale for a total score ranged from 3-12 points. Rating was summed to obtain total score with a possible range of 3-12. The lowest score was 3-6; the moderate score was 7-9 and the highest score was 10-12 on ordinal scale.

Tool Two: Perineal Outcome Assessment Sheet, Duration of the 2nd Stage of Labor And, Newborn Babies' Characteristics: Which included three parts:

Part 1: Perineal outcome assessment sheet, which incorporated perineal condition after labor (e.g. intact, episiotomy, or tears, as well as degree and site of tears).

Part II: Duration of the 2nd stage of labor.

Part III: Newborn babies' characteristics such as birth weight, as well as head and chest circumferences.

Method

Tools Validity: The tools were either developed or adopted after reviewing recent and relevant literature. Tool one and two were tested for content validity by a jury of five experts in the field and then the necessary modifications were done.

Tools Reliability: Reliability of Brink scale was adopted as it has standardized validity and reliability. Tool two was evaluated by using Cronbach's Alpha coefficient test. It consisted of relatively homogeneous items as indicated by the high reliability, where its internal consistency was 0.81.

Pilot Study: A pilot study was carried out on 8 parturients who were excluded from the selected subjects. It was performed to detect the applicability, assure clarity of the tools and estimate the needed time to collect data. After pilot study, the tools were revised, reconstructed and made ready for use.

Ethical Consideration: An approval of the research was obtained from the Faculty of nursing, Damanhour University, of which an official letter was directed to the responsible authority of El-Shatby Maternity University Hospital to get his approval to collect data after explaining the aim of the study. An oral consent was taken from each parturient after clarifying the study aim and interventions. Parturients' privacy and right to withdraw at any time were kept and confidentiality of their data was assured.

Filed Work: Data collection was done over a period of six months from the beginning of October 2016 till the end of March 2017. For both groups, data of tool one was collected through an interview schedule, which was conducted individually and in total privacy. To do this, each parturient was interviewed for 10-15 minutes during the first stage of labor, during which anthropometric measurements (height and weight) were carried out to calculate BMI and Brink scale was used to measure the strength of the pelvic floor muscles.

Vaginal examination was performed by the researchers to determine the degree of pelvic floor muscles contraction according to Brink scale, which was used for pre-assessment. Trans-vaginal digital palpation was done for each parturient in the dorsal lithotomy position while performing voluntary pelvic floor muscles contraction. The researcher inserted 1 or 2 lubricated gloved fingers (with the palm facing down) into the parturient's vagina with 4-6 cm cervical dilatation. The researcher instructed the parturient that during a count from 1-3 she should squeeze the pelvic muscles as strong as she can (the ones that she use to stop urine stream) and hold the contraction for as long as possible as well as avoid contracting abdomen, buttock or thigh muscles.

The researcher taught the parturient how to locate her pelvic floor muscles by several ways. One way was that of the aforementioned pre-assessment; while another way was imagining stopping herself from passing gasses or pulling her vagina, urethra and rectum upside.

After vaginal examination, parturients were randomly assigned to either a study or a control group, who used either breathing technique (blowing) or Valsalva maneuver respectively.

The breathing techniques (blowing & Valsalva maneuver) were explained for both groups. *The study group* was asked to start pushing with blowing after full dilatation of the cervix and feeling the baby's head at 1+ from the ischial spines (crowning). They were also asked to take two deep abdominal breaths, during the onset of uterine contraction, then take another deep breath and push for 4-5 seconds with open glottis and controlled exhalation. The study group was asked to repeat this process with each uterine contraction. As a result, the fetal head emerges due to uterine contractions, but not due to an increased abdominal pressure caused by excessive pushing. On the other hand, *the control group* carried out pushing according to hospital routine; they were taking a deep breath at the onset of a contraction, holding it and pushing for 8-10 seconds against a closed glottis.

Deliveries were conducted by the researchers, where one researcher assisted parturients to do both breathing & pushing techniques, while the other one checked the perineal status and recorded its findings (intact, episiotomy, presence of tear as well as its site and degree). After delivery of the fetus, duration of the 2nd stage of labor and newborns' measurements (birth weight, head & chest circumferences) were assessed.

Statistical Analysis: Statistical analysis was done by the researchers with the help of statistical specialist as follows: the collected data were categorized, coded, computerized, tabulated and analyzed using Statistical

Package for Social Sciences (SPSS) version 23 program. Statistical measures were used such as simple frequency tables to describe and summarize categorical variables. Cross tabulation was also used to explore relationships between variables. A descriptive and analytical statistics were used such as percentages, mean and SD. Chi-square-test and Fisher Exact-test were also used to find out the difference in the results at 0.05 level of significance.

RESULTS

According to Table (1) almost two-fifths (40% & 37.5%) of study and control groups respectively were 30-35 years old**.** In addition, 40% of the former were 25 to less than 30 years old, compared to 27.5% of the latter. On the other hand, 35% of control group were 20 to less than 25 years old, compared to 20% of study group.

The table shows that 52.5% of study group had secondary level of education or its equivalent, compared to 30% of control group. However, 35 & 30% of the latter were illiterate and had basic level respectively, compared to 20 & 15% of the former. As much as that 70% of control group were housewives, compared to 50% of study group. In contrast, 50% of the latter were working, compared to 30% of the former.

Approximately one- half (52.5%) of study and control groups were urban *residents*, while 47% of both groups were rural residents. However, no statistically significant differences were found between the two groups' socio-demographic characteristics.

Table (2) presents the distribution of the parturients according to their mean obstetric and clinical data. It was elucidated that the mean was 22.869±1.822 & 22.215±1.792 among study and control groups respectively for *BMI*; 38.50±1.198 & 38.12±1.539 for *weeks of gestation*; 3.745±0.221& 3.785±0.207 for *length of perineum;* 11.812±4.974 & 11.088±0.898 for *hemoglobin*; 41.747±3.775 & 42.250±3.238 for *hematocrit* and 10.50±0.784 & 10.40±0.982 for *brink scale score*. However, the relationship between the two groups' mean of obstetric and clinical data was not statistically significant.

Table 1: Number and percent distribution of the parturients according to their socio-demographic characteristics

	G1 (40) (Study group)		G 2 (40) (Control group)		
Socio-demographic characteristics	N	%	N	%	F / x^2(P)
Age (years):					
20-	8	20.00	14	35.00	2.595 (0.273)
25-	16	40.00	11	27.50	
30-35	16	40.00	15	37.50	
level of Education:					
- Illiterate /Read & Write	8	20.00	14	35.00	7.38 (0.061)
- Primary & Preparatory	6	15.00	12	30.00	
- Secondary or its equivalent	21	52.50	12	30.00	
- University or higher	5	12.50	2	5.00	
Occupation:					
- Housewife	20	50.00	28	70.00	3.33 (0.068)
- Working	20	50.00	12	30.00	
Current Residence:					
- Rural	19	47.50	19	47.50	0.000 (1.000)
- Urban	21	52.50	21	52.50	

x^2 (P): Chi-Square Test & P for x^2 Test F (P): Fisher Exact test & P for F Test
(P) For t test *: Significant at P ≤0.05

Table 2: Distribution of the parturients according to their mean obstetric and clinical data

	G1 (40) (Study group)	G 2 (40) (Control group)	
Obstetric and clinical data	Mean & SD	Mean & SD	t test (P)
BMI	22.869±1.822	22.215±1.792	1.619 (0.110)
Weeks of Gestation	38.50±1.198	38.12±1.539	1.232 (0.222)
Length of perineum	3.745±0.221	3.785±0.207	0.836 (0.406)
Hemoglobin(g/dl)	11.812±4.974	11.088±0.898	0.906 (0.368)
Hematocrit (%)	41.747±3.775	42.250±3.238	0.640 (0.524)
Brink scale score	10.50±0.784	10.40±0.982	0.503 (0.616)

(P) For t test
*: Significant at P ≤0.05

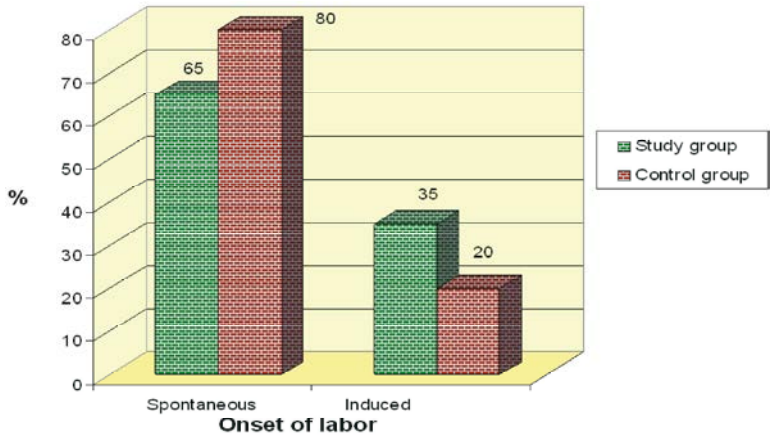

Fig. 1: Percent distribution of the parturients according to their onset of labor

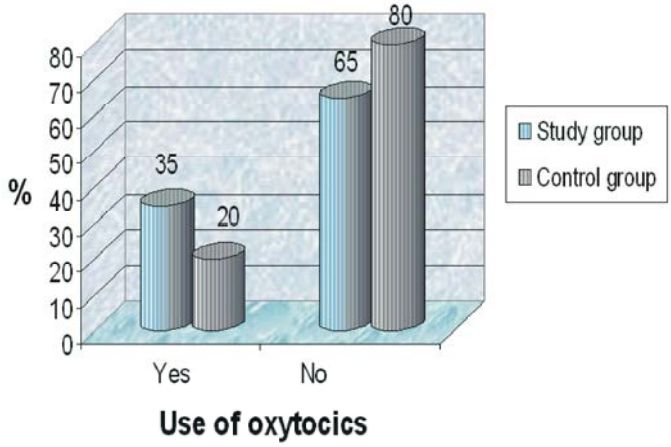

Fig. 2: Percent distribution of the parturients according to their use of oxytocics

Fig. (1) illustrates the percent distribution of the parturients according to their onset of labor. It was found that 80% of control group had spontaneous onset, compared to 65% of study group. On the other hand, 35% of the latter had induced onset, compared to 20% of the former. However, no statistically significant difference was found between the two groups.

Fig. (2) brings to light the percent distribution of study subjects according to their use of oxytocics. It was observed that oxytocics were not used for 80% of control group, compared to 65% of study group. On the contrary, they were used for 35% of the latter, compared to 20% of the former. However, the relationship between the two groups was not statistically significant.

Table (3) manifests the distribution of the parturients according to their perineal status. *Intact perineum* was found among 45% of study group, compared to 17.5% of control group. *Posterior laceration* was observed among 40% of the latter who had perineal laceration, compared to 15% of the similar former. Meanwhile, *1st degree of posterior perineal laceration* was noted among 66.67% of study group, compared to 37.5 % of the control group. On the other hand, 2nd degree was found among 65.25% of the latter, compared to 33.33 % of the former.

On the other hand, *anterior perineal laceration* was not observed among the majority of study and control groups (85 % & 80 %) respectively. *Episiotomy* was also not performed for a sizeable proportion of the two groups (75% & 77.5%) respectively. However, no statistically significant differences were found between the two groups' perineal status, except for intact perineum (P=0.008) and posterior laceration (P=0.012).

Figure (3) illustrates the percent distribution of the parturients according to their mean duration of the 2nd stage of labor. It was noticed that the study group had shorter mean (65.95±4.206 minutes) than the control group (79.60±4.217 minute). The relationship between the two groups was highly statistically significant, where P=< 0.0001.

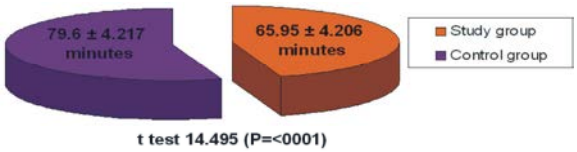

Fig. 3: Distribution of the parturients according to their mean duration of the second stage of labor

Table 3: Number and percent distribution of the parturients according to their perineal status

	G1 (40) (Study group)		G 2 (40) (Control group)		
Perineal status	N	%	N	%	F / x^2(P)
Intact perineum:					
- Yes	18	45.00	7	17.50	7.04 (0.008)*
- No	22	55.00	33	82.50	
Posterior laceration:					
- Yes	6	15.00	16	40.00	6.27 (0.012)*
- No	34	85.00	24	60.00	
Degree of posterior laceration:	(n=6)		(n=16)		
1	4	66.67	6	37.50	1.65 (0.438)
2	2	33.33	9	56.25	
3	0	00.00	1	06.25	
Anterior laceration:					
- Yes	6	15.00	8	20.00	0.346 (0.556)
- No	34	85.00	32	80.00	
Episiotomy:					
- Yes	10	25.00	9	22.50	0.690 (0.793)
- No	30	75.00	31	77.50	
Mean & SD of episiotomy length (cm):	(n=10)		(n=9)		t test (P)
	3.400±0.316		3.444±0.391		0.271 (0.790)
Mean & SD of episiotomy depth (mm):	(n=10)		(n=9)		t test (P)
	16.250±0.825		16.833±0.433		1.895 (0.075)

x^2 (P): Chi-Square Test & P for x^2 Test F (P): Fisher Exact test & P for F Test

(P) For t test *: Significant at P ≤0.05

Table 4: Mean distribution of the parturients according to their newborn measurement

	G1 (40) (Study group)	G 2 (40) (Control group)	
Newborn measurements	Mean & SD	Mean & SD	t test (P)
Weight:	3.278±0.289	3.188±0.247	1.498 (0.138)
Head circumference:	34.37±1.779	33.92±2.030	1.054 (0.295)
Chest circumference:	31.78±1.790	31.53±1.881	0.609 (0.544)

(P) For t test

*: Significant at P≤0.05

Table (4) sheds light upon mean distribution of the parturients according to their newborn measurement. The mean was 3.278±0.289 & 3.188±0.247 among study and control groups respectively for *newborn weight*; 34.37±1.779 & 33.92±2.030 for *newborn head circumference* and 31.78±1.790 & 31.53±1.881 for *newborn chest circumference*. However, the relationship between the two groups' mean newborn measurements was not statistically significant.

DISCUSSION

Labor is an important life event. Technological advances and obstetric developments have made delivery safer for both the mother and the baby. Favourable delivery experiences for the mother and family-centered approaches to labor have gained popularity. In addition to providing a safe delivery for both the baby and the mother, the current focus of

care during labour also aims to achieve a favourable and satisfactory delivery experience [23].

Vaginal births are often associated with some form of trauma to the genital tract and tears that can cause serious problems such as urinary incontinence, anal incontinence, pelvic organ prolapse, sensory and emptying abnormalities of the lower urinary tract, defecatory dysfunction, sexual dysfunction and several syndromes, which decreases the quality of life [24, 25]. One of the factors affecting perineal injuries during childbirth is the way the mother pushes in the second stage of labor. Different methods for handling the second stage of labor are obvious in the nursing and medical literature. One of which is the blowing pushing technique (open glottis pushing while breathing out) while the other one is Valsalva maneuver (closed glottis pushing while holding the breath) [23, 26].

The using of blowing technique is widely advocated by midwives to reduce perineal trauma and improve comfort during second stage of labor since the breathing becomes an automatic response to pain and the mother remains in a more relaxed state and will respond more positively to the onset of pain and provides a sense of well being and control. Blowing increased oxygen provides more strength and energy for both the mother and baby [1, 14, 15, 27]. Additionally, the woman responds purely to the urges of her body, i e in response to Fergu's bearing down reflex. This reflex occurs as the presenting part descends below the ischial spines stretching the nerves and muscles, stimulating the stretch receptors in the posterior vaginal wall causing an increase in the release of oxytocin [1, 26, 28, 29].

The present study revealed that study group who performed breathing technique (blowing) had significantly more intact perineum than control group who performed routine hospital. There was a significant relation between two groups regarding the frequency of different types of posterior rupture (Grade 1, 2, 3).This result is congruent with Albers *et al.* [30] who suggested that the possibility of perineal lacerations requiring suturing are higher in Valsalva pushing. A study by Mohamed et al. [31] found that perineal lacerations were significantly less in the spontaneous pushing group than the Valsalva pushing group. Regarding the study done by Ahmadi *et al.* [32] which investigated the effect of breathing technique of Blowing on the extent of damage to the perineum at the moment of delivery, the results indicated that women with spontaneous pushing enjoyed more intact perineum, less tearing (Grade 1, 2, 3). However, they are in contradiction with the studies done by Bloom *et al.* [33], Asali *et al*. [34] and Yildirim *et al.* [35]. The study of Prins *et al*. [29] that assessed 425 women found no difference in perineal recovery. Some results in the literature are contradicting to the present study results and support that pushing techniques do not affect perineal trauma rates [14, 36.37].

In the present study, there was no significant difference between both study and control group in the frequency of anterior rupture and episiotomy. It can be attributed to the fact that the participants had been matched in both groups with regard to the factors affecting incidence of episiotomy or its indications. This result is constant with study of Ahmadi [32]. These findings are incongruent with the results of Asali *et al.* [34]. who reported that the incidence of episiotomy in the group who had spontaneous strain was lesser than those who performed the Valsalva maneuver in the second phase of delivery. In addition, there was no difference between the two groups in terms of episiotomy rates and perineal laceration in the study by Yildirim *et al*. [35].

Such dissimilarities among the present study results and those of the above mentioned ones could be attributed to using of the blowing technique. In the studies by Yildirim *et al*. [35] and Asali *et al*. [34] regardless of the pushing type, both groups continued pushing until the last minute when the baby's head emerged. However, in the present study, women started blowing strongly only at the very moment the head started emerging and made the baby's head come out smoothly by uterine contractions. This can have a significant impact on reducing tear. Mean while. Frequent and prolonged pushing in Valsalva maneuver causes nerve and structure damage to pelvic floor muscles. Moreover, the damage is due to increased abdominal pressure and rapid dilatation of the vagina. It is postulated that closed glottis pushing has maternal hemodynamic effects and increases intrathoracic pressure. This produces a drop in venous return to the heart, a drop in cardiac output, drop in maternal arterial pressure, drop in blood perfusion of the placenta, drop in oxygen supply to the fetus illustrated in lower pH and Po2 of the umbilical arterial blood [29, 38, 39].When bearing down by exhalation and open glottis, air escapes and the thoracic pressure is not maintained. Furthermore the Valsalva pushing style is associated with more directive communication style of the midwife or obstetrician, which could affect the woman’s feelings of satisfaction and accomplishment about her delivery [40, 41].

The results of the present study showed no significant difference between study and control group regarding fetal outcomes (baby birth weight, head and chest circumference). The British Royal College of Obstetricians and Gynaecologists (2007) stated in its clinical guideline on intrapartum care, that there is no high level evidence that either directed pushing or spontaneous pushing affects outcomes [42]. This can be attributed to impossible comparing the neonatal outcomes, because all studies used different parameters to measure the condition of the neonate.

The mean duration of the second stage of labor was found to be significantly shorter among the study group than the control group. This finding may be attributed to the fact that if a woman was assessed as progressing slowly in second stage then directed pushing may be encouraged as a means accelerating progress. It is also possible that the maternal physiological effects of Valsalva, used more extensively in directed pushing, may contribute to the finding of increased duration of second stage noted in this study. The use of Valsalva results in an increase in intra thoracic pressure leading to a reduction in venous return and subsequent cardiac output [43].

Studies comparing directed to spontaneous pushing have reported increased levels of maternal fatigue in women using directed pushing [43, 44] Although elevated serum lactate levels may contribute to overall maternal fatigue, the reduced uterine perfusion associated with the Valsalva maneuver may also result in raised lactic acid levels within the myometrium contributing to inefficient uterine contractions and a longer second stage [45].

Other studies showed that spontaneous pushing shortened the second stage of labor [33, 35, 46]. Bloom *et al*. [33] conducted a study on 320 women and found that the duration of second stage of labor was approximately 13 minutes shorter in the spontaneous pushing group. Yildirim and Beji [35] conducted a randomized study about the effects of pushing techniques in birth on mother and fetus, in Istanbul, Turkey. They found that the mean duration of the second stage of labor in the directed pushing group was significantly longer (50.1±26.3) than that in the spontaneous pushing group (40.8±19.1).

Moreover, the study of Lai *et al.* [47] in Taiwan revealed that the mean duration of the second stage of labor in the spontaneous pushing group (70.31±37.17) was highly significantly shorter than those in the directed pushing group (129.06±75.69). Furthermore, the studies of Chang *et al.* [48] in Taiwan and Jahdi *et al.* [46] in Tehran, Iran and Salehian [49] revealed that women in the spontaneous pushing group had significantly shorter second stages of labor than those in the directed pushing group. According to a study by Mohamed *et al.* [31] the duration of the second stage of labor was significantly shorter in the spontaneous pushing group than the Valsalva pushing group. The results are parallel to the present study results.

In contrast, the current finding disagrees with that of Simpson [50] who found a significant increase in the length of the second stage of labor among the spontaneous pushing group. The study of Kelly [51] investigated the effect of delayed versus immediate pushing in second stage of labor. He found a significant longer duration of the second stage of labor in spontaneous as compared to the experimental group.

The current finding is also dissimilar to that of Gillesby *et al*. [52] who reported that spontaneous pushing group had longer second stage of labor (59 minutes) than the directed pushing group). Moreover, the study of Lam and McDonald [53] in Hong Kong, China revealed that although women in the spontaneous pushing group had longer mean of the second stage of labor (38.1±26.8) than the directed pushing group (31.9±19.1), no significant difference was found between the two groups Furthermore, the finding of the present study is contradicted to that of Prins *et al*. [29] in their meta-analysis of randomized trials, which investigated the effect of spontaneous versus Valsalva pushing on mother and fetus during the second stage of labor. The study of Ismail in Egypt [39] revealed that the mean duration of the second stage of labor was found to be significantly shorter among the directed pushing group than the spontaneous pushing group. The mean difference was 18.15±1. 433. Moreover, Vaziri *et al*. [43] found that the mean duration of the second stage in the intervention group (pushed spontaneous) was significantly higher than that in the Valsalva puching group (76.32±8.26 minutes versus 64.56±15.24 minutes.

Lowdermilk and Perry, [54] stated that the duration of the second stage is influenced by the effectiveness of the primary powers of labor and maternal position as well as the positions of the fetus such as occipito-posterior position. Therefore, increased duration of the second stage of labor among the spontaneous pushing group may not necessarily be attributed to the effect of this technique.

CONCLUSION

Based on the findings of this study, the hypothesis is accepted. It can be concluded that parturients who performed breathing technique (blowing) had significantly more intact perineum and shorter duration of the 2nd stage of labor than those who didn't perform it.

Recommendations: In the light of the results of this study, the following recommendations are suggested:

- The nursing curriculum should be revised and updated to include the blowing technique in the nursing management of the 2nd stage of labor.
- Adequately planned in-service training programs should be implemented by the responsible authorities for the maternity nurses regarding the importance of blowing technique during 2nd stage of labor to upgrade their knowledge and skills about it.
- All low-risk parturients should be informed about the benefits of the blowing technique and encouraged to use it during the 2nd stage of labor.
- Further studies are also needed to assess parturients' satisfaction regarding the use of the blowing technique.

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