

Effect of Spontaneous Open-glottis versus Valsalva Closed-glottis Pushing during Second Stage of Labour on Pelvic Floor Morbidity and Fatigue

Ola Abdel-Wahab Afifi Araby Ali¹, Fatma Mansour Abdel Azeem Barakat², Fatma Kamal Ali³

^{1,3}Assist. Professor of Obstetrics & Gynecological Nursing, Faculty of nursing, Benha University, Egypt

²Lecturer of Maternity and newborn health nursing, Faculty of nursing, Helwan University, Egypt

Abstract

Background: Maternal pushing techniques during the second stage of labor may affect women's pelvic floor function. **The aim** of this research was to evaluate the effect of spontaneous open-glottis versus Valsalva closed-glottis pushing during second stage of labour on pelvic floor morbidity and fatigue. **Design:** A quasi-experimental design (Comparative study) (two groups "control/study" Post-test only). **Setting:** The research was conducted in obstetrics and gynecological emergency department (labour unit) at Benha University hospitals in Qaliubya governorate, Egypt. **Sample:** A purposive sample of 180 primipara women who admitted to the previous setting for a period of six months, Valsalva pushing technique group (n=90) and Spontaneous pushing technique group (n=90). **Data collection tools:** Four tools were used to collect data: A structured interviewing questionnaire (Personal characteristics of studied women and Current labor and delivery outcomes sheet), Pelvic Floor Morbidity Questionnaires (Fecal Incontinence Severity Index, Pelvic Floor Distress Inventory Questionnaire- Short Form 20 (PFDI-20) and Pelvic Floor Impact Questionnaire-short form 7 (PFIQ-7)), Modified Fatigue Impact Scale (MFIS) and Women's Satisfaction Questionnaire. **Results:** There was a statistically significant difference between both spontaneous open-glottis pushing and Valsalva closed-glottis pushing groups regarding the current labor and delivery outcomes. Moreover, there was a highly statistically significant differences between spontaneous open-glottis pushing and Valsalva closed-glottis pushing groups in relation to duration of second stage of labor, the total mean scores of pelvic floor morbidity questionnaires, postpartum fatigue impact and women's satisfaction; in favor of spontaneous pushing group. **Conclusion:** Spontaneous open-glottis pushing during the second stage of labor had positive desirable effect on current labor and delivery outcomes, pelvic floor morbidity, postpartum fatigue impact and women's satisfaction. **Recommendation:** Researchers recommended that until further research is forthcoming, women should be encouraged to follow their own instinctive urge to push (spontaneous pushing).

Keywords: Pushing techniques, Second stage of labor, Spontaneous open-glottis pushing Valsalva closed-glottis pushing, Pelvic floor morbidity, Fatigue

Introduction:

Labor as a physiological process occurs when the fetus, membrane, and placenta are released from the uterus once fetus has entirely grown and able to survive outside the uterus on its own. There are four stages to the delivered after the fetus is completely expelled (*Hutchison and Mahdy, 2019*). Labor process: the first is when true contractions begin and comes to an end with full cervical dilation; the second starts when completely cervical dilation occurs. and ends

with the complete ejection of the fetus; and the third is when the placenta is Lastly, the fourth stage of labor is the six-hour period that begins after the placenta is expelled and ends when all organ systems have fully recovered physiologically (*Chuhan and Tadi, 2020*).

Fetuses are delivered at the end of the second stage of labor, which began with full cervical dilation to 10 centimeters. A shorter trial may be all that is wanted for the second stage in women who have given birth vaginally before and whose bodies have

become accustomed delivering a fetus, while a longer period may be essential for a nulliparous woman. For nulliparous women and multiparous women, the second stage of labor usually lasts less than three hours and less than two hours, respectively. As a result, the second stage of labor is deemed prolonged when it lasts longer than these standards (*Hutchison and Mahdy, 2019*).

Moreover, the urge to void during a contraction when the head presses the rectum, the full dilation of the cervix as shown by a vaginal examination, the start of bearing down effort, the crowning of the head, anal dilation during uterine contractions, and more regular, stronger, and longer-lasting uterine contractions are the characteristics of the transition from the first to the second stage of labor. (*Soliman et al., 2022*). Usually, women may have grunting voice when pushing and feel a stronger need to push like having a bowel movement (*Avery, 2020*). In the second stage of labor, pushing or bearing down on the Oxygenation for both the mother and the fetus (*Araujo et al., 2021*).

The term "directed pushing," or "Valsalva pushing," describes a vigorous, repetitive pushing attempt that lasts for ten seconds while the breath is held (by closed glottis). Caretakers should look for a fully dilated cervix during directed pushing, and laboring women should be told and urged to push with each contraction. When a woman is in the early stages of pelvis and is unable to push because the fetal head has migrated into the cavity of the pelvis and is not low enough to press on the pelvic floor and extend the perineum, woman ought to get directed pushing (*Soliman et al., 2022*).

Female pelvic floor muscle constitutes a diaphragm that encompasses the full pelvic cavity, pelvic floor muscle consisted mainly of the fibers of the coccygeus and the levator any muscles that provide endorse for the urethra, the rectum and restrict the urethral,

uterus is an essential and valuable way for mothers to facilitate the labor process. However, pushing can cause fatigue and reduce the ability of the woman to engage between those physical or mental task, so women should take breaks between contractions (*Kojima and Asazawa, 2020*). During the second stage (pushing stage) of labor, pushing procedure is achieved by inspiring the women to breathe deeply at the starting of contraction then retain the breath and bear down throughout the contraction which broadly categorized as directed (Valsalva) pushing and spontaneous pushing (*Issac et al., 2023*).

Rather than starting at the start of the contraction, spontaneous pushing occurs when the woman moves naturally in accordance with her inexorable urge to push down gradually. Three to five pushing typically take place with an open glottis, beginning at the contraction's peak. Thus, spontaneous pushing enhances

vaginal, anal openings and internal genital organs (*Dumoulin et al., 2019*). Additionally, pelvic floor muscles support arousal and orgasm during sexual activities as well as urine and feces continence (*Grimes and Stratton, 2020*).

Anal and urine incontinence, as well as pelvic organ prolapse, are examples of pelvic floor disorders that constitute pelvic morbidity. Pelvic organ prolapse means descending or drooping of pelvic organs into the vagina due to ligament or muscular weakness (*Aboseif and Liu, 2020*). In addition, Urinary incontinence is a disorder brought on by a problem with muscles or nerves that help bladder to hold or release urine, the involuntary loss of urine associated with stress urinary incontinence when coughing or sneezing or have sudden urge to go but can't get to the bathroom in time (*Rajavuori et al., 2022*). Also, fecal incontinence is one of pelvic floor morbidity symptoms that mean the involuntary gas or

stool loss, as well as loss of solid or liquid stool after normal vaginal delivery due to weakness to pelvic floor muscles (*Schei et al., 2019*) (*Tuuli et al., 2023*).

The physical strain and exertion of giving birth can have a severe impact on a woman's body. It is not surprising that the majority of the women of feel fatigued and exhausted during the postpartum period given the stress of caring for a newborn and the lack of sleep. In fact, a study found that almost 90% of women who gave birth naturally reported feeling worn out after giving birth. 1 Furthermore, a small percentage of women (up to 11%) continue to feel fatigued maybe just three months after giving birth. (*Henderson et al., 2019*).

The maternity health nurses play an important role in preventing pelvic floor morbidity that may occur during labor. Maternity nurses should describe the technique and timing of pushing, in spontaneous pushing (open glottis "at late pelvic stage"), in order to use the contraction of abdominal muscles to aid in the fetus's descent through the birth canal, women should inhale deeply, then exhale while drawing in their stomach. Directed pushing group (closed glottis "at early pelvic stage") was explained as follows: "the nurse instructs the women that women should inhale deeply, then push as hard and as long as women can down to the perineum while holding the breath they just inhaled in their lungs. (*Barca et al., 2021*).

Significance of the research:

Pelvic floor morbidity is common condition which actually reduces the quality of living for women. The type of pushing executed during delivery may also have an influence on the development of pelvic floor morbidity. Vaginal birth is strongly linked to the of pelvic floor morbidity later in life. (*Barasinski et al., 2023*).

In the world, hundreds of millions of women suffer from pelvic floor disorders. Globally, 11% to 35.5% of women experience pelvic floor morbidity, according to numerous studies. Overactive bladder (7.6% - 13% estimated prevalence), stress urinary incontinence (1.7% - 35.5% estimated prevalence), pelvic organ prolapses (2.9% - 20% estimated prevalence), and anal incontinence (0.2 - 13% estimated prevalence) are the most common pelvic floor morbidities (*Dheresa et al., 2018*). Twenty percent of American women undertaking gynecologic services have a life expectancy of requiring pelvic floor surgical intervention, and twenty percent of them have at least one pelvic floor disorder (*Tuuli et al., 2023*).

There is little information available regarding pelvic floor disorders in Egypt as well as other Middle Eastern nations; but even so, a recent survey conducted in Egypt found that the prevalence of overactive bladder and strain urinary incontinence was 39.0% and 22.2%, respectively. There are currently no published studies on the frequency of pelvic floor disorders in Egypt's healthcare settings (*Saudi and Tosson, 2022*). This study has not been conducted before in Benha University Hospitals, so this study will be carried out by the researchers to examine the effectiveness of spontaneous versus directed pushing during second stage of labor on pelvic floor morbidity among primiparous women.

Aim of the study:

The current research aimed to compare the effect of spontaneous open-glottis versus Valsalva closed-glottis pushing during second stage of labour on pelvic floor morbidity and fatigue.

Study hypotheses:

H1: Primipara women who will apply spontaneous open-glottis pushing will exhibit less pelvic floor morbidity than women who will undergo Valsalva closed-glottis pushing.

H2: Primipara women who will apply spontaneous open-glottis pushing will have positive labor and delivery outcomes (normal amniotic fluid characteristics, lesser need to episiotomy, better perineal condition, lesser instrumental intervention, shorter duration of 2nd stage) than women who will undergo Valsalva closed-glottis pushing.

H3: Primipara women who will apply spontaneous open-glottis pushing will exhibit less fatigue than women who will undergo Valsalva closed-glottis pushing.

H4: Primipara women who will apply spontaneous open-glottis pushing will become more satisfied than women who will undergo Valsalva closed-glottis pushing.

Subjects and methods

Study design:

A quasi-experimental design (Comparative study) (two groups "control/study" Post-test only) was used to achieve the research's aim.

Study setting:

The study was carried out at Benha University Hospitals' obstetrics and gynecological emergency department (labor unit). This specific location was picked because it is the primary hospital serving a large geographic area of Benha City and the Qaliubya Governorate, Egypt, and offers care for women from a variety of social environments.

Sampling:

Sample type and criteria: A purposive sample of primipara women were chosen based on the inclusion criteria stated: Primipara with singleton and alive fetus and presented by vertex, no contraindication for normal vaginal delivery, primipara with full term baby (37th to 42nd week) and have a planned vaginal delivery, not receiving epidural analgesia, free from obstetric or

medical complications during pregnancy, free from any psychological disease, complete cervical dilatation with the fetal head descending to +2 station (on a -3/+3 scale), and the subjects should remain conscious and receptive the entire study.

Sample size and technique: All primipara admitted to previous setting for six months (which were 180 primipara women). The control group, "Valsalva pushing technique," included 90 primipara women who were admitted to the labor unit during the first half (three-month duration). The study group, "Spontaneous pushing technique," included 90 primipara women who were admitted during the second half (three-month duration). This approach was taken to prevent bias in the data collection process.

Tools for collecting data:

The following four tools was used to gather data:

Tool I: A structured Interviewing Questionnaire: It was written in simple Arabic by the researchers after reading and reviewing relevant literature (*Hassan et al., 2021; Mohamed et al., 2022*). It was divided into two parts:

Part (1): Personal characteristics of studied women (4 item) such as (age, residence, level of education and occupation).

Part (2): Current labor outcomes sheet (4 item) such as (amniotic fluid characteristics, episiotomy, perineal condition, method of vaginal delivery and length of the second stage of labor).

Tool II: Pelvic Floor Morbidity Questionnaires: It consisted of 3 parts:

Part (1): Fecal Incontinence Severity Index: It was adapted from *Rockwood et al., (1999)* and used in evaluating the impact of incontinence leaks on life quality. It explains

the range of severity for various forms of bowel content incontinence. **over last 3 months** after delivery. It consisted of 5 items such as (incontinent to gas, incontinent for mucus, incontinent for liquid stool, incontinent for solid stool, wearing wear a pad or a protective garment.).

Scoring system:

The response scale listed below was applied to every item: 0= not at all, 1= a little, 2= moderately, 3= a great deal. The overall score was between 0 and 15. Higher scores signify a more severe case of fecal incontinence. The score of each item was summited and **the total scoring was categorized as following:**

- "No" impact = 0
- "Mild" impact = 1-5
- "Moderate" impact = 6-10
- "Severe" impact = 11-15

Part (2): Pelvic Floor Distress Inventory Questionnaire- Short Form 20 (PFDI-20): It was adopted from *Barber et al., (2005)*. It was used to determine if and to what extent women were bothered by specific symptoms related to their bladder, bowel, or pelvis **over the last 3 months** after delivery. It consisted of 20 questions such as (feel as though their bladder is not emptying completely; push on the vagina or the area surrounding the rectum to have a complete bowel movement; push up in the vaginal area with their fingers to start or finish urinating; experience pressure, heaviness.....etc)

Scoring System:

The following response scale is used for all items: 0= never, 1= somewhat, 2= moderately, 3= quite a bit. The total score had a range of 0 to 60; higher scores denoted greater pelvic floor distress. The score of each item was summited and **the total scoring will be categorized as following:**

- No distress = 0
- Mild distress = 1-20

- Moderate distress = 21- 40
- Severe distress = 41-60

Part (3): Pelvic Floor Impact Questionnaire-short form 7 (PFIQ-7):

It was adopted from *Barber et al., (2005)* to investigate how bladder, bowel, and vaginal manifestations affected women's relationships, activities, and emotions **over the last 3 months** after delivery, it consisted of 7 questions for each section such as (The capacity to perform domestic tasks, engage in physical exercise, engage in recreational pursuits...etc). It was divided into 3 sections as following:

- Urinary Impact Questionnaire (UIQ-7).
- Colorectal-Anal Impact Questionnaire (CRAIQ-7).
- Pelvic Organ Prolapse Impact Questionnaire (POPIQ-7).

Scoring system:

The response scale that follows is used for all items: 0 = not at all, 1= somewhat, 2= moderately, 3= quite a bit. Total score of each section was ranged from 0 to 21. The score from three sections together was summited to be ranged from 0 to 63, higher scores symbolise a greater influence on activities, relationships and feelings. The score of each item was summited and **the total scoring will be categorized as following:**

- "No" impact = 0
- "Mild" impact= 1 - 21
- "Moderate" impact = 22 - 42
- "Severe" impact = 43 – 63

Tool III: Modified Fatigue Impact Scale (MFIS):

It was adopted from *Fisk et al., (1994)* and utilized to assess the impact of fatigue on women's activities **2 hours then 24 hours and 1 month** after delivery. It consisted of 21 items divided into 3 subscales as following:

- Physical subscale 9 items such as: (clumsiness, lack of coordination, and

difficulty sustaining physical effort for prolonged periods...etc).

- Psychosocial subscale 2 items such as: (reduced desire to engage in social interactions and restricted capacity to perform tasks outside of the home).
- Cognitive subscale 10 items such as: (less attentive, have trouble focusing for extended periods of time, struggle with clear thinking, forget things...etc).

Scoring System:

The following response scale is utilized for each item: 0 = never, 1= rarely, 2= sometimes, 3= often, 4= always. The overall score varied from 0 to 84; higher numbers denote a greater degree of fatigue's impact on a woman's activities. The score of each item was summited and *the total scoring will be categorized as following:*

- "No" impact = 0
- "Mild" impact = 1-28
- "Moderate" impact = 29-56
- "Severe" impact = 57-84

Tool IV: Women's Satisfaction Questionnaire: This tool was adapted from *Yurachai, (2006) and Hassan et al., (2021)* and utilized to gauge how satisfied women were with the pushing methods adopted during childbirth. It included 6 statements as following: (My care can be adequately and suitably managed, as experience has demonstrated, My caregiver was a kind and sympathetic individual ...etc).

Scoring System:

Each statement drew on the scale of subsequent responses: 0 = disagree, 1= to somewhat, 2= agree. Total score was ranged from 0 to 12, greater scores suggest a better women's satisfaction. The score of each statement was summited and *the following categories applied to the overall score:*

- Satisfied = 8-12
- Unsatisfied = 0-7

Tools validity:

A panel of three jury experts at Benha University who specialize in obstetrics and gynecological nursing will review the data collection tools to assess the validity of the questionnaires and make sure the tools are clear, pertinent, comprehensive, and applicable. Some sentences had to be formulated with only minimal modifications. The tools were regarded as valid by the experts.

Tools reliability:

The Cronbach's Alpha coefficient test was used to determine the reliability of the tools, and the results showed that each tool's internal consistency was as follows:

Tool	Cronbach's alpha value
Tool II: Pelvic Floor Morbidity Questionnaires.	($\alpha=0.77$).
○ Part (1): Fecal Incontinence Severity Index	
○ Part (2): Pelvic Floor Distress Inventory Questionnaire- Short Form 20 (PFDI-20)	($\alpha=0.82$).
○ Part (3): Pelvic Floor Impact Questionnaire-short form 7 (PFIQ-7)	($\alpha=0.79$).
Tool III: Modified Fatigue Impact Scale (MFIS).	($\alpha=0.85$).
Tool IV: Women's Satisfaction Questionnaire.	($\alpha=0.90$).

Ethical consideration:

Before the research was conducted, the following ethical considerations must be taken: For the purpose of carrying out this research, the scientific research ethical committee of the Benha University faculty of nursing provided approval. For the purpose of conducting the research, the formal consent from the chosen study settings was obtained. To win over the confidence and trust of the women, the researchers first explained the purpose and importance of the study before using the tools. Women in the study gave their

oral consent, and the researcher kept their information confidential. There were no risks to women's health, safety, or psychological well-being associated to the research. After statistical analysis, all data collection tools were destroyed to protect the privacy of the participating women. The study tools made sure that human rights were respected and that no morally repugnant statements were made. The women were free to withdraw the study at any moment.

Pilot Study:

The pilot study was carried out for 10% of the entire six-month period, or roughly (three weeks), in order to test the objectivity, clarity, feasibility, and applicability of the tools and to identify any potential barriers and obstacles or issues that might arise for the researcher and impede the collection of data. It also aimed to identify any issues unique to the statements, such as question sequencing and clarity. Estimating the amount of time required for data collection was also helpful. To prevent sample contamination, minor adjustments were made in accordance with the pilot results and the pilot sample was excluded from the study.

Field work:

The research was carried out from the beginning of January, 2023 and completed at the end of June 2023 covering six months. The researcher visited the previously mentioned setting three times per week from 8.00 a.m. to 3.00 p.m. in obstetrics and gynecological department (labour unit) at Benha University Hospitals until the predefined duration was finished. The researcher described the purpose of the study and the elements of the tools and filled out the questionnaires for women. The preparatory, interviewing, and assessment phases, as well as the implementation and evaluation phases, were all used to achieve the study's aim.

Preparatory phase:

The preparatory phase of the study involved a review of pertinent local and international literature pertaining to the research problem by the researchers. This guided the researchers in preparing the necessary data collection tools and helped them identify the extent and gravity of the issue. Three experts in the field of obstetrics and gynecological nursing at the Benha University faculty were given the tools with the intention of testing their appropriateness, comprehensiveness, clarity, importance, and applicability. The jury's judgements were accomplished.

Interviewing and assessment phase:

The researchers welcomed the women at the start of the interview. Then, the researchers introduced themselves and explained the aim of the study to the women. After giving the women all the information they needed to participate in the study, their oral consent was obtained. According to the data obtained from the admissions records of women's history cards, interviews, and physical examinations, the researcher verified that the women who were in labor met the inclusion criteria. During 1st stage of labor, the researcher collected the personal characteristics data of studied women by using the following tools (**Tool I:** A structured interviewing questionnaire "part (1)"). The duration of each women's interview was typically be between three and five minutes.

Implantation phase:

- The researchers randomly assigned the parturient women to the study and control groups.
- When the cervix is still not fully dilated, the researchers instructed and encouraged the woman to move and change her positions during contractions because changing position is usually more comfortable than staying still.

- The researcher continuously assessed uterine contraction, as well as fetal heart sound and mother vital signs.
- The researchers interpreted the pushing technique as allowing women to push in accordance with their innate instincts, which encouraged them to push hard and for the full duration of each contraction while holding their breath and deciding whether to make noise or stay silent.
- When the woman was awake and responsive during the study, the pushing technique was performed under ideal obstetric conditions, which included the occurrence of strong uterine contractions, the completion of fetal head rotation, full dilation of the cervix, and the fetal head's descent to +1 station (on a -3/+3 scale). (*Hassan et al., 2021; Başar and Hürata, 2018; Koyuncu and Demirci, 2016*).

For control group:

Despite being monitored during delivery, these women received no special treatment beyond what was provided by standard hospital procedures. The parturient women were instructed for directed pushing by taking a deep breath and hold it (Valsalva maneuver which is routinely applied in the hospital) and, with each uterine contraction, replicate the same technique. During second stage of labor (in early pelvic stage) up until birth. The obstetricians will use vaginal examination (PV) to assess the progression of labor. Regardless of whether they felt the need to push or not, the researcher advises and encourages laboring women to push at the start of each uterine contraction once the cervix has fully dilated. By placing her palm at the uterus's funds above the woman's abdomen, the researcher can identify the woman's uterine contractions. Valsalva pushing was done in the following ways when a contraction started: Two regular breaths when contractions start.

- Holding on to the bedside rails with both hands while taking deep breaths.
- Using the diaphragm and abdominal muscles to squeeze breath.
- Pushing for 10 to 15 seconds, as hard and long as possible.
- Using a closed glottis to hold person's breath while exerting strong pressure.
- Exhaling, taking a deep breath, and holding it.
- Pushing hard for a further ten to fifteen seconds.
- Once contractions lessen, stop pushing.
- Calming down and waiting for the subsequent contraction.

For study group:

The parturient woman was instructed for *spontaneous pushing* during second stage of labor (in late pelvic stage) when women felt the need to do and push spontaneously. Women didn't start pushing until they feel obliged to. In the first stage, the researcher gave them the instructions on how to relax during uterine contractions by breathing deeply and slowly inhaling and exhaling until the contraction stopped (a breathing exercise). In the second stage, the researcher gave them instructions on how to push on their own initiative, only pushing during a contraction and breathing out for five to six seconds when they felt the need to (opening their glottis). They were not given specific instructions regarding when or how long to push. The laboring woman was taken to the delivery room to successfully complete the birthing process when the crown was visible at 2-3 cm. The spontaneous pushing could be summarized in the following steps:

- Continue breathing normally and regularly up until the point at which contractions begin to feel like pushing.
- Breathing and pulling or retraction in the core and abdominal muscles.
- A slow, relatively stable push.

- When pushing, exhaling smoothly and pursed lips.
- Pushing for five to six seconds while exhaling.
- Inhaling and pushing for five to six smooth, regular breaths, and then exhaling.
- Taking regular breaths when the contractions stop.

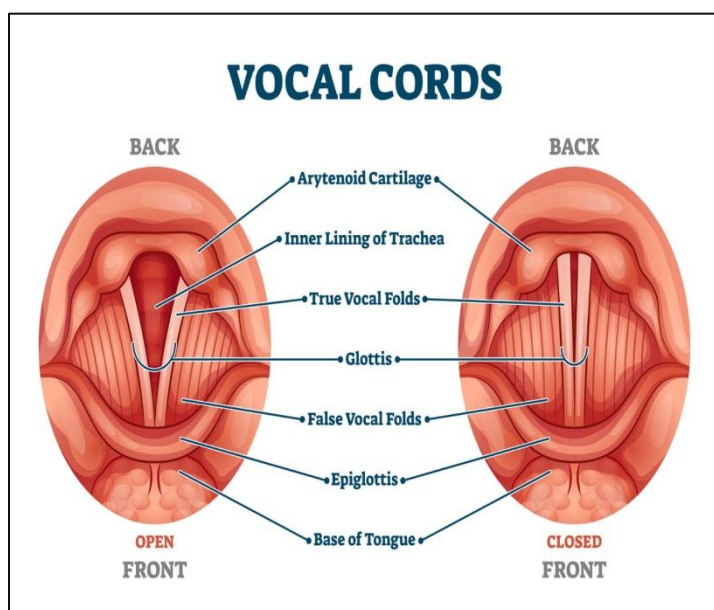


Figure (1): Vocal cords during open glottis and closed glottis. (Koyucu and Demirci, 2017)

Evaluation phase:

For both group, after the completion of data collection and implementation of two types of pushing techniques (spontaneous and directed pushing) a comparison between the two groups was done to evaluate the effect of pushing techniques using the research tools as following: **Tool I** "part 2": Current labor and delivery outcomes to assess amniotic fluid characteristics, need to episiotomy, perineal laceration, instrumental intervention, duration of 2nd stage. **Tool II**: Pelvic floor morbidity questionnaires, which include three parts; Fecal incontinence severity index, Pelvic floor distress inventory questionnaire and Pelvic floor impact questionnaire to assess incontinence leakage on quality of life, assess

if women have certain bowel; bladder or pelvic symptoms and assess women's activities; relationships and feelings; respectively *over last 3 months after delivery*.

Tool III: Modified fatigue impact scale to evaluate the effect of fatigue on women's activities *2 hours then 24 hours and 1 month* after delivery. **Tool IV**: Women's Satisfaction Questionnaire was used on the discharge time to gauge how satisfied women were with the pushing methods adopted during childbirth. The researcher followed the women during postnatal visits in obstetric outpatient clinics or via telephone and social media in case of late.

Statistical analysis:

Before being input digitally, data were checked. The gathered data will be coded, computerized, arranged, and analyzed using the proper statistical and tests. Version 22.0 of the Statistical Package for Social Sciences (SPSS) was utilized. Standard deviations, means, and frequencies and percentages were all included in descriptive statistics. The study hypotheses were tested using inferential statistics, specifically the independent t test and the Chi-square test. When a p-value was greater than 0.05, it meant there was no statistically significant difference; when it was less than 0.05, there was a statistically significant difference; and when it was greater than 0.001, there was a highly significant difference. This pattern was observed in all of the statistical tests that were conducted.

Results:

Table (1): Clarifies that (63.3% & 56.7%) of both spontaneous pushing and Valsalva pushing groups were in the same age group, respectively. (25-< 30 years) with a mean age of 26.27±4.32 and 27.64±3.93 years old respectively. As well as, (55.6%) of spontaneous pushing group & (62.2%) of Valsalva pushing group lived in the urban area. Pertaining to educational level, it was indicated that (73.3% & 65.6%) of both spontaneous pushing and Valsalva pushing groups respectively

had secondary education. According to occupation, (55.6% & 52.2%) of both groups were housewife. Therefore, Groups homogeneity was reflected by the lack of a statistically significant difference ($p \sim 0.05$) in personal characteristics between the spontaneous pushing and Valsalva pushing groups.

Table (2): demonstrates that there was statistically significant difference between both spontaneous pushing and Valsalva pushing groups regarding the studied current labor and delivery outcomes (amniotic fluid characteristics, episiotomy, perineal condition and mode of vaginal birth) ($p \leq 0.05$); it was showed that the amniotic fluid was clear for more women in the spontaneous pushing group than the Valsalva pushing group. Also, the number of women who did not need an episiotomy in the spontaneous pushing group was greater than the Valsalva pushing group, and perineal laceration occurred in a minority (13.3%) of women in the spontaneous pushing group compared to more than a quarter (28.9%) of the women in the Valsalva pushing group. Concerning mode of vaginal birth, (82.2%) of women in the spontaneous pushing group had spontaneous vaginal birth without need to any extra intervention compared to (62.2%) of women in the Valsalva pushing group. Furthermore, there was highly statistically significant difference between both spontaneous pushing and Valsalva pushing groups regarding duration of 2nd stage of labour ($p \leq 0.001$); where the mean duration of 2nd stage was shorter in spontaneous pushing group (28.88±6.80 minutes) compared to (35.24±8.33 minutes) in Valsalva pushing group.

Table (3): reveals that, the total mean scores of pelvic floor morbidity questionnaires was higher in Valsalva pushing group compared to spontaneous pushing group; 20.97±6.44 versus 16.28±5.09 respectively with highly statistically significant difference between two groups ($p \leq 0.001$).

Table (4): Shows that there was a highly statistical significant difference in the total mean score of

fatigue impact and its subscales (physical impact, psychosocial impact and cognitive impact) between the two Valsalva pushing and spontaneous pushing groups at 2 hours then, 24 hours and 1 month postpartum ($P \leq 0.001$). The total mean scores of fatigue impact in Valsalva pushing group was more than spontaneous pushing group at 2 hours postpartum then 24 postpartum hours and 1 month postpartum as following: 53.75±11.33 versus 40.12±7.58, 49.85±9.18 versus 37.87±7.14 and 26.32±3.25 versus 16.75±3.989 respectively.

Figure (1): Illustrates that (58.9%) and (40.0%) of both Valsalva pushing and **spontaneous** pushing groups respectively had severe fatigue impact at 2 hours postpartum. Meanwhile, 24 hours and 1 month postpartum, (44.4%) and (7.8%) versus (30.0%) and (2.2%) of both Valsalva pushing and spontaneous pushing groups respectively had severe fatigue impact.

Table (5): clarifies that, there was a highly statistically significant difference between two Valsalva pushing and spontaneous pushing groups regarding all statements of women's satisfaction about the pushing technique used during delivery ($p \leq 0.001$). It was revealed that; all women (100%) in spontaneous pushing group agreed that their needs have been met while taking into account their time versus more than three-quarters (75.6%) of women in Valsalva pushing group. Also, the majority of women (83.3%) in spontaneous pushing group agreed to desire the same kind of care if they were to become pregnant again versus less than half (45.6%) of women in Valsalva pushing group. Additionally, larger number and higher percentage women in spontaneous pushing group agreed on other satisfaction items than women in Valsalva pushing group.

Figure (2): Illustrates that (94.4%) of women in spontaneous pushing group were satisfied with pushing technique used during delivery versus (51.1%) of women in Valsalva pushing groups.

Table (1): Distribution of the studied sample in both groups according to their personal characteristics (n=180).

Personnel characteristics	Valsalva pushing group n=90		Spontaneous pushing group n=90		X ²	P value
	No	%	No	%		
Age:						
< 25	26	28.9	22	24.5	8.33	0.659
25-< 30	51	56.7	57	63.3		
30 - 35	13	14.4	11	12.2		
Mean ± SD =	27.64±3.93		26.27±4.32		independent t test= 0.613	0.541
Residence:						
Rural	34	37.8	40	44.4	8.26	0.363
Urban	56	62.2	50	55.6		
Educational level:						
Not read and write	5	5.6	6	6.7	1.95	0.583
Primary education	14	15.5	10	11.1		
Secondary education	59	65.6	66	73.3		
University education	12	13.3	8	8.9		
Occupation:						
Housewife	47	52.2	50	55.6	0.201	0.654
Employee	43	47.8	40	44.4		

Table (2): Distribution of the studied sample in both groups according to their current labor and delivery outcomes (n=180).

Personnel characteristics	Valsalva pushing group n=90		Spontaneous pushing group n=90		X2	P value
	No	%	No	%		
Amniotic fluid characteristics:						
Clear	79	87.8	88	97.8	6.92	0.031*
Bloody	8	8.9	1	1.1		
Meconium stained	3	3.3	1	1.1		
Episiotomy:						
Done	40	44.4	26	28.9	4.68	0.030*
Not done	50	55.6	64	71.1		
Perineal condition:						
Intact Perineum	64	71.1	78	86.7	6.53	0.008*
Laceration	26	28.9	12	13.3		
Method of vaginal delivery:						
Spontaneous vaginal birth	56	62.2	74	82.2	9.08	0.028*
Fundal pressure-assisted vaginal birth	14	15.6	6	6.7		
Vacuum-assisted vaginal birth	9	10.0	5	5.6		
Forceps-assisted vaginal birth	11	12.2	5	5.6		
Length of the second stage of labor:						
Mean \pm SD =	35.24 \pm 8.33		28.88 \pm 6.80		independent t test= 5.61	0.000**

*A Statistical significant $p \leq 0.05$ **A Highly Statistical significant $p \leq 0.001$

Table (3): Mean score of total pelvic floor morbidity questionnaires of the studied sample in both groups over last 3 months after delivery (n=180).

Pelvic Floor Morbidity Questionnaires	No. of items	Possible score	Valsalva pushing group n=90	Spontaneous pushing group n=90	Independent t-test	P value
			Mean \pm SD	Mean \pm SD		
1. Fecal Incontinence Severity Index	5	0/15	0.53 \pm 0.75	0.31 \pm 0.61	2.17	0.031*
2. Pelvic Floor Distress Inventory	20	0/60	12.37 \pm 5.07	10.13 \pm 4.67	3.07	0.002*
3. Pelvic Floor Impact						
▪ Urinary Impact	7	0/21	3.90 \pm 2.25	2.97 \pm 1.78	3.07	0.002*
▪ Colorectal-Anal Impact	7	0/21	2.77 \pm 2.50	1.92 \pm 1.83	2.58	0.011*
▪ Pelvic Organ Prolapse Impact	7	0/21	1.41 \pm 1.40	0.96 \pm 1.14	2.38	0.018*
Total Mean \pm SD	46	0/138	20.97\pm6.44	16.28\pm5.09	5.41	0.000**

*A Statistical significant $p \leq 0.05$ **A Highly Statistical significant $p \leq 0.001$

Table (4): Mean scores of fatigue impact of the studied sample in both groups (n=180).

Fatigue impact subscales	Possible score	Valsalva pushing group n=90	Spontaneous pushing group n=90	Independent t-test	P value
		Mean \pm SD	Mean \pm SD		
Physical impact					
2 hours postpartum	0/36	22.06 \pm 8.10	15.0 \pm 5.34	6.89	0.000**
24 hours postpartum		18.96 \pm 5.71	13.5 \pm 4.50	7.11	0.000**
1 month postpartum		10.86 \pm 2.13	7.79 \pm 2.61	8.64	0.000**
Psychosocial impact					
2 hours postpartum	0/8	4.83 \pm 1.93	3.33 \pm 0.99	6.54	0.000**
24 hours postpartum		4.67 \pm 1.92	3.16 \pm 1.05	6.53	0.000**
1 month postpartum		2.17 \pm 1.26	0.82 \pm 0.71	8.78	0.000**
Cognitive impact					
2 hours postpartum	0/40	26.87 \pm 7.24	21.79 \pm 5.09	5.43	0.000**
24 hours postpartum		26.23 \pm 7.15	21.22 \pm 5.13	5.39	0.000**
1 month postpartum		13.30 \pm 2.14	8.14 \pm 2.40	15.19	0.000**
Total Mean \pm SD					
2 hours postpartum	0/84	53.75 \pm 11.33	40.12 \pm 7.58	9.48	0.000**
24 hours postpartum		49.85 \pm 9.18	37.87 \pm 7.14	9.76	0.000**
1 month postpartum		26.32 \pm 3.25	16.75 \pm 3.989	17.61	0.000**

**A Highly Statistical significant $p \leq 0.001$

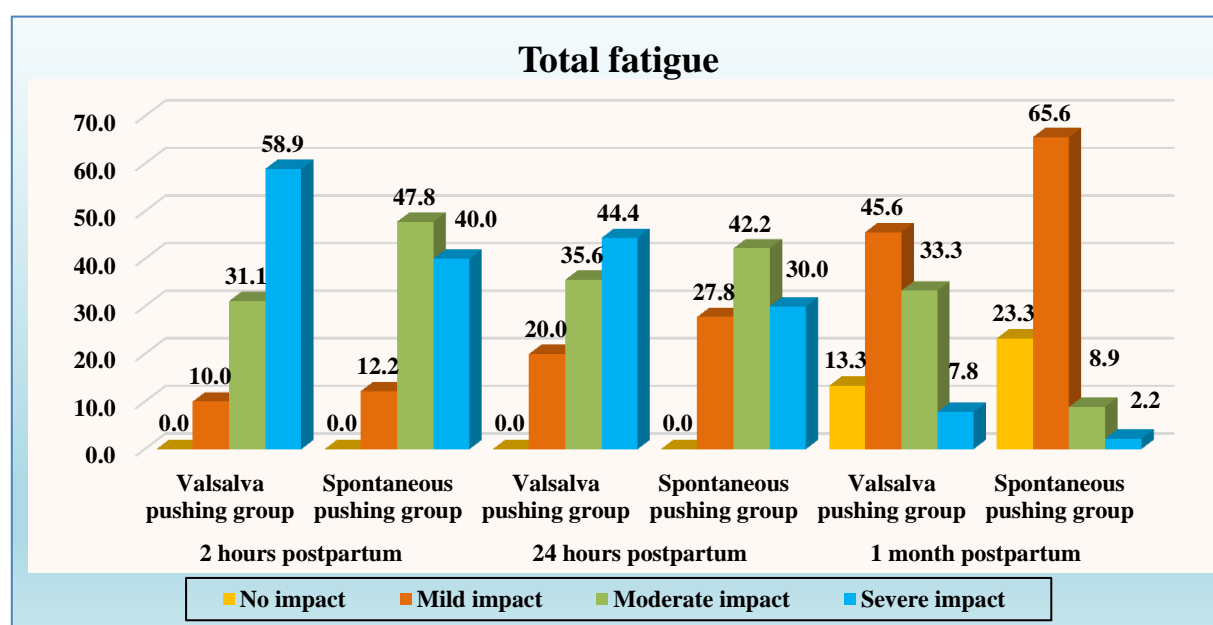


Figure (1): Distribution of studied women in both Valsalva pushing and spontaneous pushing groups regarding their total fatigue impact at 2 hours then, 24 hours and 1 month postpartum (n=180).

Table (5): Distribution of the studied women's satisfaction in both groups regarding the pushing technique used during delivery (n=180).

Statements	Valsalva pushing group n=90		Spontaneous pushing group n=90		X2	P value
	No.	%	No.	%		
My care can be adequately and suitably managed, as experience has demonstrated.						
Agree	31	34.5	56	62.2	13.93	0.001**
To somewhat	37	41.1	22	24.5		
Disagree	22	24.4	12	13.3		
My caregiver was a kind and sympathetic individual.						
Agree	52	57.8	74	82.2	13.53	0.001**
To somewhat	36	40.0	16	17.8		
Disagree	2	2.2	0	0.0		
Problems that have come up have been resolved in an efficient manner.						
Agree	44	48.9	66	73.3	13.60	0.001**
To somewhat	30	33.3	20	22.2		
Disagree	16	17.8	4	4.4		
My needs have been met while taking into account my time.						
Agree	68	75.6	90	100.0	25.06	0.000**
To somewhat	12	13.3	0	0.0		
Disagree	10	11.1	0	0.0		
Overall, my care has been appropriately organized.						
Agree	37	41.1	62	68.9	14.19	0.001**
To somewhat	31	34.4	15	16.7		
Disagree	22	24.4	13	14.4		
If I were to become pregnant again, I would desire the same kind of care.						
Agree	41	45.6	75	83.3	28.33	0.000**
To somewhat	28	31.1	10	11.1		
Disagree	21	23.3	5	5.6		

**A Highly Statistical significant $p \leq 0.001$

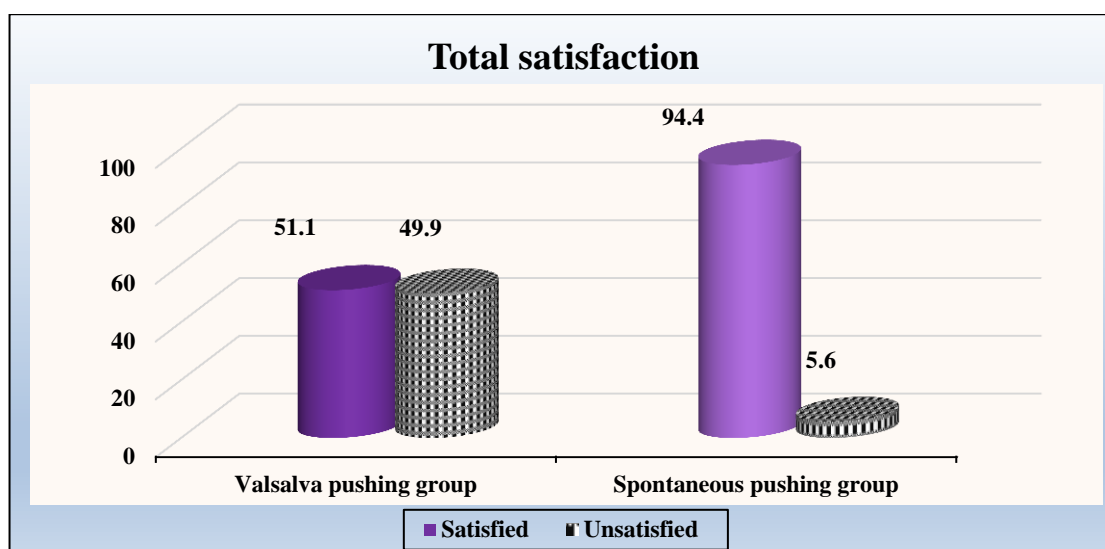


Figure (2): Distribution of studied women in both Valsalva pushing and spontaneous pushing groups regarding their total satisfaction about the pushing technique used during delivery (n=180).

Discussion

Pelvic floor disorders are significantly more likely to occur after childbirth. Significant structural alterations in the pelvic floor are linked to the second stage of labor, which is the period between full cervical dilation and delivery. Some of these changes can lead to overt and covert injuries. Decisions made about how to handle the second stage may have a significant impact on the pelvic floor. However, it's unclear how much pushing timing—a second-stage management decision that's widely accepted—affects the risk of pelvic floor disorders. The two most common approaches to second stage management are the Valsalva (immediate or directed) pushing at complete cervical dilation and spontaneous (delayed) to allow for spontaneous descent (*Khalife, 2023*).

Worldwide, women and individuals seeking gynecologic care frequently experience pelvic floor disorders, such as pelvic organ prolapse and urinary and anal incontinence. Twenty percent of American women undergoing gynecologic care have a lifetime risk of pelvic floor surgery, and twenty percent already have at least one pelvic floor disorder. Pelvic floor morbidities can have a multifactorial etiology and develop through a complex process (*Gregory, 2022*).

The aim of the present research was to compare the effect of spontaneous open-glottis versus Valsalva closed-glottis pushing during second stage of labour on pelvic floor morbidity and fatigue. The study's previously stated hypotheses were supported by the results listed below.

Concerning **personal characteristics**, the results of current research clarified that (less than two-thirds & more than half) of both spontaneous pushing and Valsalva pushing groups respectively were in the same age group (25-< 30 years) with a mean age of 26.27±4.32 and 27.64±3.93 years old respectively. As well as, (more than half) of spontaneous pushing

group & (less than two-thirds) of Valsalva pushing group lived in the urban area. Pertaining to educational level, it was indicated that (more than three-quarters & less than two-thirds) of both spontaneous pushing and Valsalva pushing groups respectively had secondary education. According to occupation, (more than half) of both groups were housewife. Therefore, there was no statistically significant difference between both spontaneous pushing and Valsalva pushing groups regarding personal characteristics ($p > 0.05$) that reflected group homogeneity.

In line with these results, according to (*Mohamed et al., 2022*), there was no statistically significant difference between the study and control groups' examined women with respect to personal characteristics (age, education level, occupation, and place of residence) ($p > 0.05$). The study and control groups had means of 25.65±5.74 and 25.98±6.32, respectively, while half of the women belonged to the 24–29 age group. Furthermore, the majority of women in both the study and control groups were employed, lived in cities, and had completed their secondary education, all of which contributed to the group's homogeneity. This similarity in the characteristics of the two samples could be due to the fact that the two studies were conducted in the same hospital despite the difference in time. As per the findings of (*Hassan et al., 2021*), there was no significant difference found in age, occupation, education, or place of residence between the two groups. In the same harmony, (*Mohamed et al., 2022b*) discovered that there was no statistically significant difference between the two groups with respect to participant age, educational attainment, occupation status, place of residence, and family income ($P > 0.05$).

In relation to **current labor and delivery outcomes**, our research findings demonstrated that there was statistically significant difference between both spontaneous pushing and Valsalva pushing

groups regarding the studied current labor and delivery outcomes (amniotic fluid characteristics, episiotomy, perineal condition and mode of vaginal birth) ($p \leq 0.05$); it was showed that the amniotic fluid was clear for more women in the spontaneous pushing group than the Valsalva pushing group. Also, the number of women who did not need an episiotomy in the spontaneous pushing group was greater than the Valsalva pushing group, and perineal laceration occurred in a minority of women in the spontaneous pushing group compared to more than a quarter of the women in the Valsalva pushing group. Concerning mode of vaginal birth, of women in the spontaneous pushing group had spontaneous vaginal birth without need to any extra intervention compared to of women in the Valsalva pushing group. Furthermore, there was highly statistically significant difference between both spontaneous pushing and Valsalva pushing groups regarding duration of 2nd stage of labour ($p \leq 0.001$); where the mean duration of 2nd stage was shorter in spontaneous pushing group (28.88 ± 6.80 minutes) compared to (35.24 ± 8.33 minutes) in Valsalva pushing group. This outcome could be explained by the fact that the women who underwent Valsalva pushing were informed to push at full cervical dilation, or the "early phase of the second stage." This led to a decrease in the women's capacity to push during the active phase of the second stage, which lengthened the second stage of labor compared to spontaneous pushing.

Our findings of research matched with (*Barasinski and Vendittelli, 2016*) who found that there was no perineal lesion (no episiotomy or second-, third-, or fourth-degree lacerations) during delivery utilizing spontaneous pushing. Furthermore, (*Martin, 2019*) agreed with us and illustrated that four key consequences of purple or Valsalva pushing were identified by a review of sixteen articles published. In comparison to spontaneous pushing, these include an increase in perineal trauma, maternal distress, and fetal

distress. In a similar vein, (*Mohamed et al., 2022a*) found that directed pushing technique was linked to a longer second stage of labor and a higher risk of unfavorable outcomes, whereas spontaneous pushing technique improved maternal and neonatal outcomes during the second stage of labor. Additionally, according to (*Mohamed et al., 2022b*), there was a significant difference between the two groups regarding the duration of the current labor stages ($P < 0.05$), with the open glottis (spontaneous) (54.0%) group reporting a shorter duration of the second stage of labor (5–10 min) than the closed glottis pushing group (2.0%). The findings of this study support the observations made by *Başar and Hürata (2018)*, who found that the second stage of labor lasted between 10 and 20 minutes.

In the same context, (*Allen, 2023*) gave a description of the physiological changes that take place in the body during Valsalva pushing, which could help to clarify why some women may react negatively to directed, forceful pushing. The woman experiences an increase in blood pressure and intrathoracic pressure during Valsalva pushing, which involves taking a deep breath and holding it. When pushing is done firmly, the intrathoracic pressure increases above the pressure of the blood vessels that revert back blood to the heart. This causes the woman's blood pressure to drop, which in turn lowers her cardiac output and return. Consequently, the placenta receives a diminished blood supply, which means that the fetus receives less oxygen.

Furthermore, (*Hassan et al., 2021*) demonstrated that the duration of the second stage of labor varied statistically significantly between the two groups, with the spontaneous pushing group experiencing a shorter duration. Besides that, compared to 36 (72%) of the women in the spontaneous pushing group, 16 (32%) of the women in the Valsalva pushing group had intact perineum. Unlike the women in the Valsalva pushing group, which had 78

percent clear amniotic fluid, all the women in the spontaneous pushing group had clear fluid. The study's findings about amniotic fluid could be the result of the Valsalva pushing technique's impairment of placenta perfusion and circulation, which worsened the fetal condition. Moreover, women who spontaneously pushed had much lower rates of episiotomy and perineal lacerations, according to a study by *Hussein et al., (2021)*, which validated our research findings.

Conversely, however, according to *Lemos et al., (2017)*, there was no discernible variation in the length of the second stage of labor, which contrasted with the findings of the current study. Third or fourth degree perineal laceration and episiotomy did not vary significantly from one another. Also, it's also unclear to the researchers which pushing coaching techniques—directed or spontaneous—are more effective. Women ought to be supported in pushing and bearing down in accordance with their comfort and preferences until more high-quality research is accessible. What's more, (*Araujo et al., 2017*) noted that there were no discrepancies in the following outcomes for mothers and newborns: vaginal, cesarean, or instrumental delivery; episiotomy; perineal lacerations; and length of the second stage of labor. Maternal tiredness, pain, and satisfaction didn't really change.

Pertaining to **pelvic floor morbidity**, the current study's findings indicated that the overall mean scores of pelvic floor morbidity questionnaires (fecal incontinence severity index, pelvic floor distress inventory and pelvic floor impact "urinary, colorectal-anal and pelvic organ prolapse impacts") higher in Valsalva pushing group compared to spontaneous pushing group; 20.97 ± 6.44 versus 16.28 ± 5.09 respectively with a difference between the two groups that is extremely statistically significant ($p \leq .001$). This may be explained by the fact that the pelvic floor muscles are under extreme strain during childbirth, particularly when pushing occurs

actively or directed (Valsalva maneuver) during the second stage of labor. When using vacuum or forceps to deliver an infant, this risk increases.

The present research results were supported by (*Barasinski and Vendittelli, 2016*) who noticed that during the postpartum visit, the pelvic floor, urine function, and pelvic organ prolapse were all adversely affected by labor (between 6 and 8 days after childbirth). Directed (Valsalva) pushing may also cause a fetus to become deoxygenated, harm pelvic, perineal, and urinary structures, and undermine a woman's self-confidence (*Roberts and Hanson, 2017*). Yet, it may also shorten the duration of second stage labor.

In contradiction with the results of the current study, (*Tuuli et al., 2023*) stated that immediate pushing, as opposed to delayed pushing, did not increase pelvic organ prolapse measures, perineal lacerations, or patient-reported pelvic floor symptoms at 6 weeks or 6 months postpartum among nulliparous patients in the second stage with neuraxial analgesia; the only exception being a change in the FISI (Fecal Incontinence Severity Index) score at 6 months, which was higher in the immediate pushing group at 6 months, but less than the minimum important difference.. Further to that, the findings of this study were in controversy with those of (*Barasinski et al., 2023*) who discovered that there was no difference in stage II pelvic organ prolapse between the two groups. In the same way, there was no difference in the incidence of UI between the groups with open and closed glottis. In summary, pelvic organ prolapses occurred two months after delivery irrespective of the type of directed pushing technique used during delivery. It is possible that open-glottis pushing protects multiparous and secundiparous women from UI.

Even though postpartum fatigue is common, it is unfortunately understudied and often overlooked. Although the term "postpartum fatigue" (PPF) has been used

rather loosely, it usually refers to a diminished ability to engage in physical and mental activities following childbearing, a prolonged lack of energy, and difficulties paying attention and concentrating that are not readily remedied by rest or sleep (*Henderson, 2019*). Typically, postpartum fatigue tends to be most intense during the first few weeks after delivery and gradually improves as the mother's body heals and adjusts to the demands of caring for a newborn. However, it's important to note that some women may experience ongoing fatigue or exhaustion for several months after giving birth (*Easthope, 2023*).

Regarding **fatigue impact**, the finding of present research showed that there was highly statistical significant difference in the total mean score of fatigue impact and its subscales (physical impact, psychosocial impact and cognitive impact) between the two Valsalva pushing and spontaneous pushing groups at 2 hours, 24 hours and 1 month postpartum ($P \leq 0.001$). The total mean scores of fatigue impact in Valsalva pushing group was more than spontaneous pushing group at 2 postpartum then 24 postpartum hours and 1 month postpartum as following: 53.75 ± 11.33 versus 40.12 ± 7.58 , 49.85 ± 9.18 versus 37.87 ± 7.14 and 26.32 ± 3.25 versus 16.75 ± 3.989 respectively. Moreover, it was illustrated that (more than half) and (two-fifths) of both Valsalva pushing and spontaneous pushing groups respectively had severe fatigue impact at 2 hours postpartum. Meanwhile, 24 hours and 1 month postpartum, (more than two-fifths) and (minority) versus (less than one-third) and (minority) of both Valsalva pushing and spontaneous pushing groups respectively had severe fatigue impact. This finding may be compounded by the fact that the time needed for pushing was shorter for the group that used spontaneous pushing because the women's bodies dictated when to push, it was longer for the group that used Valsalva pushing because the women followed the directions of the birth attendants.

This outcome is backed by (*Mohamed et al., 2022a*) who clarified that on about modified fatigue symptoms, there was a highly statistically significant difference between the study and control groups of women in favor of spontaneous group. As well as, (*Hassan et al., 2021*) evidenced that the control group's individual VAS-fatigue items were higher than those of the study group with statistically significance difference between the two groups. A study was carried out by (*Hussien et al., 2021*) showed that, within the first hour of complete cervical dilatation, the majority of the women in the spontaneous pushing group reported much less pain ($p=0.000$), and they also felt less fatigued in the first four to six hours following delivery. Furthermore, (*Mohamed et al., 2022b*) revealed that the closed glottis pushing group had significantly higher individual VAS-fatigue items than the open glottis pushing group. From the researcher point of view, postpartum fatigue affects a significant percentage of women early in the postnatal period, but it is neither inevitable nor universal. Partners' and midwives' supportive and helpful actions may act as predictors.

As for what was mentioned about **women's satisfaction** regarding the pushing technique used during delivery, our research finding clarified that there was a highly statistically significant difference between two Valsalva pushing and spontaneous pushing groups regarding all statements of women's satisfaction about the pushing technique used during delivery ($p \leq 0.001$). It was revealed that; all women (100%) in spontaneous pushing group agreed that their needs have been met while taking into account their time versus more than three-quarters (75.6%) of women in Valsalva pushing group. Also, the majority of women (83.3%) in spontaneous pushing group agreed to desire the same kind of care If they were to become pregnant again versus less than half (45.6%) of women in Valsalva pushing group. Additionally, larger number and higher percentage women in spontaneous pushing

group agreed on other satisfaction items than women in Valsalva pushing group. Increasingly, current research results reported that and the majority of women in spontaneous pushing group were satisfied with pushing technique used during delivery versus more than half of women in spontaneous pushing groups. Moreover, present research's results were compatible with those of *Mohammed et al., (2022a)*, which indicated that fewer than 75% of the women in the study group were pleased with the pushing technique used. According to (*Mohamed et al., 2022b*), women in a same open glottis pushing group were more likely to believe that they can have adequate and appropriate and control over their P< 0.001), that people in charge of their care are thoughtful and empathetic and, and that their needs have been met with proper consideration for her time. Additionally, 75 (100%) of open glottis pushing groups confirmed that they would choose a same type of care for their next labor, while 43 (57.3%) of closed glottis pushing groups type of care. All previously mentioned finding came in similar to what was proved in a research work was carried out by (*Hassan et al., 2021*).

Conclusion:

Based on the current research's findings; it was concluded that the research hypotheses were bolstered and spontaneous open-glottis pushing during the 2nd stage of labor had desirable effect where there was statistically significant associated with less pelvic floor morbidity and better labor and delivery outcomes (clear amniotic fluid, lesser need to episiotomy, better perineal condition, lesser instrumental intervention). Moreover, there was a highly statistically significant differences between spontaneous open-glottis pushing and Valsalva closed-glottis pushing groups in relation to duration of 2nd stage of labor and postpartum fatigue impact; in favor of spontaneous pushing group. Additionally, women in spontaneous open-glottis pushing group were more satisfied compared to women

in Valsalva closed-glottis pushing group with highly statistically significant differences.

Recommendation:

Recommendations obtained from this research were as following:

- Spontaneous open-glottis pushing should be included in protocols of care in maternity hospitals due to its achieved desirable outcomes
- Researchers suggested that women should be encouraged to follow their own natural instinct to push, known as spontaneous pushing, until more research is obtainable.
- By attending birthing education classes prior to childbirth, an OB-GYN, midwife, or childbirth instructor can suggest breathing and stretching exercises to help prepare the pelvic floor for childbirth.
- In order to avoid more problems, women who exhibit symptoms of pelvic floor disorders during pregnancy ought to seek treatment. Furthermore, lifestyle changes like consistent exercise, eating a balanced diet, and managing chronic constipation well can greatly reduce the risk of pelvic floor disorders.
- Evidence-based care should be provided to women in the second stage of labor, guided by the professional judgment of midwives and taking into account each woman's unique needs, preferences, and risk factors.

Further researches:

- There are few, varied, and occasionally faulty primary studies. Therefore, more research is necessary. Supporting spontaneous pushing and empowering women to select their own pushing technique ought to be acknowledged as optimal clinical practice in the interim.
- To guarantee greater generalizability of the findings, the study should be repeated using a sizable representative probability sample.

Acknowledgements:

The participating primiparous parturient women are greatly appreciated by the researchers for their cooperation and kind participation in this research. In addition, the researchers express their gratitude to the jury committee, the hospital's director, and the nursing personnel who provided the research field in which this study was conducted.

References:

- Aboseif C and Liu P. (2020):** Pelvic Organ Prolapse. Available at: <https://europepmc.org/article/nbk/nbk563229/>. Accessed on March, 27 2023, 11 AM.
- Araujo AE, Delgado A, Maia JN, Campos SL, Ferreira CWS and Lemos, A. (2020):** Efficacy of spontaneous pushing with pursed lips breathing compared with directed pushing in maternal and neonatal outcomes: a clinical trial. Authorea Preprints.
- Avery MD. (2020): Second Stage of labor:** Pushing your baby out. *Journal of midwifery & women's health*, 56(3):439-440.10.1111/j.1542-2011.2011.00145. x.
- Barasinski C, Debost-Legrand A, Savary D, Bouchet P, Curinier and Vendittelli F. (2023):** Does the type of pushing at delivery influence pelvic floor function at 2 months postpartum? A pragmatic randomized trial—The EOLE study. *Acta Obstetrica et Gynecologica Scandinavica*, 102(1):67–75.
- Barber M, Walters MD and Bump RC. (2005):** Short forms of two condition-specific quality-of-life questionnaires for women with pelvic floor disorders (PFDI-20 and PFIQ-7). *American journal of obstetrics and gynecology*, 193(1):103-113.
- Barca JA, Bravo C, Pintado-Recarte MP, Asúnsolo Á, Cueto-Hernández I, Ruiz-Labarta J and De León-Luis JA. (2021):** Pelvic floor morbidity following vaginal delivery versus cesarean delivery: systematic review and meta-analysis. *Journal of Clinical Medicine*, 10(8):1652.
- Chauhan G and Tadi P. (2020):** Physiology, postpartum changes. Available at: <https://europepmc.org/article/NBK/nbk555904>. Accessed on April, 5 2023, 8 AM.
- Dheresa M, Worku A, Oljira L, Mengiste B, Assefa N and Berhane Y. (2018):** One in five women suffer from pelvic floor disorders in Kersa district Eastern Ethiopia: a community-based study. *BMC women's health*, 18(1):1-8.
- Dumoulin C, Pazzoto Cacciari L and Mercier J. (2019):** Keeping the pelvic floor healthy. *Climacteric*, 22(3):257-262.
- Fisk J, Ritvo P, Ross L, Haase D, and Schlech W. (1994):** Measuring the functional impact of fatigue: initial validation of the fatigue impact scale: 10.1093/clinids/18.supplement_1.s79.
- Grimes WR and Stratton M. (2020):** Pelvic floor dysfunction. Available at: <https://europepmc.org/article/nbk/nbk559246>. Accessed on February, 15 2023, 6 AM.
- Hassan HE, Gamel WMA and Genedy ASE. (2021):** Spontaneous versus directed pushing technique: maternal and neonatal outcomes: A comparative study in northern Upper Egypt. *International Journal of Studies in Nursing*, 6(1):24.
- Hutchison J and Mahdy H. (2019):** Stages of labor. Available at <https://europepmc.org/article/NBK/nbk544290>. Accessed on 14. Aug.2023 at 8 am.
- Issac A, Nayak SG, T P, Balakrishnan D, Halemani K, Mishra P, Jacob J, Stephen S. (2023):** Effectiveness of breathing exercise on the duration of labour: A systematic review and meta-analysis. *J Glob Health*; 13:04023. doi: 10.7189/jogh.13.04023. PMID: 36896808; PMCID: PMC9999308.
- Kojima N and Asazawa K. (2020):** Predictors of Mothers' Early Postpartum Fatigue: A Cross-Sectional Study. *Open Journal of Nursing*, 10(9):890-902.

- Rajavuori A, Repo JP, Häkkinen A, Palonen P, Multanen J and Aukee P. (2022):** Maternal risk factors of urinary incontinence during pregnancy and postpartum: A prospective cohort study. *Eur J Obstet Gynecol Reprod Biol* X; 13:100138. doi: 10.1016/j.eurox.2021.100138. PMID: 34825175; PMCID: PMC8605044.
- Rockwood TH, Church JM, Fleshman JW, Kane RL, Mavrantonis C, Thorson AG, Wexner SD, Bliss D and Lowry AC. (1999):** Patient and surgeon ranking of the severity of symptoms associated with fecal incontinence: the fecal incontinence severity index. *Dis Colon Rectum.*; 42(12):1525-32. doi: 10.1007/BF02236199. PMID: 10613469.
- Saudi RA and Tosson EE. (2022):** Prevalence and the degree of distress of pelvic floor disorders symptoms in women seeking primary health care at Ismailia governorate. *Egypt Urogynaecologia*, 34:291.
- Hassan HE, Gamel WMA and Genedy ASE. (2021):** Spontaneous Versus Directed Pushing Technique: Maternal and Neonatal Outcomes: A Comparative Study in Northern Upper Egypt. *International Journal of Studies in Nursing*, 6(1):24-35
- Schei B, Johannessen H, Rydning A, Sultan A and Mørkved S. (2019):** Anal incontinence after vaginal delivery or cesarean section. *Acta obstetrica et gynecologica Scandinavica*, 98(1), 51-60.
- Mohamed SSA, Elsadek ANE, Khalil EM and Helmy HK. (2022):** Effect of Open Glottis versus closed Glottis (Valsalva) in Second Stage of Labor on Maternal and Neonatal Outcomes. *Egyptian Journal of Health Care*, 13(1):1252-1266.
- Tuuli M, Gregory W, Arya L, Lowder J, Woolfolk C, Caughey A, Srinivas S, Tita A, Macones G, Cahill A and Richter H. (2023):** Effect of Second-Stage Pushing Timing on Postpartum Pelvic Floor Morbidity: A Randomized Controlled Trial. *Obstetrics and gynecology*, 141(2):245–252.
- Koyuncu RG and Demirci N. (2016):** Doğumun ikinci evresinde kullanılan ıknma tipleri: literatür gözden geçirme çalışması”, *G.O.P. Taksim E.A.H. JAREN*; 2(1):33-39 DOI: 10.5222/jaren.2016.033
- Başar F and Hürata SS (2016):** The Effect of Pushing Techniques On Duration of the Second Labor Stage, Mother and Fetus: A Randomized Controlled Trial. *International J. of Health Services Research and Policy*, 3(3): 123-134
- Khalife T. (2023):** Childbirth and Pregnancy's effect on pelvic floor health. *Mayo Clinic Health System*. Available at: <https://www.mayoclinichealthsystem.org/home-town-health/speaking-of-health/pregnancy-and-pelvic-floor-health>
- Gregory WT, Cahill AG, Woolfolk C, Lowder JL, Caughey AB, Srinivas SK, Tita ATN, Tuuli MG and Richter HE. (2022):** Impact of pushing timing on occult injury of levator ani: secondary analysis of a randomized trial. *Am J Obstet Gynecol*; 226(5): 718.e1-718.e10. doi: 10.1016/j.ajog.2022.02.020. Epub 2022 Feb 22. PMID: 35202591; PMCID: PMC9064971.
- Henderson J, Alderdice F and Redshaw M. (2019):** Factors associated with maternal postpartum fatigue: an observational study. *BMJ Open*; 9(7): e025927. doi: 10.1136/bmjopen-2018-025927. PMID: 31352411; PMCID: PMC6661702.
- Easthope A. (2023):** If You're Battling Postpartum Fatigue, This Could Be the Root Cause. Available at: <https://www.rupahealth.com/post/a-functional-medicine-approach-to-postpartum-fatigue>. Accessed on June, 15 2023, 9 AM.
- Barasinski C and Vendittelli F. (2016):** Effect of the type of maternal pushing during the second stage of labour on obstetric and neonatal outcome: a multicentre randomised trial-the EOLE study protocol. *BMJ Open*

;6(12): e012290. doi: 10.1136/bmjopen-2016-012290. PMID: 27998899; PMCID: PMC5223691.

Başar F and Hürata SS. (2018): The Effect of Pushing Techniques on Duration of the Second Labor Stage, Mother and Fetus: A Randomized Controlled Trial. *International J. of Health Services Research and Policy*; 3(3): 123-134

Hussien AA, Nour SA, Salah El-Din H and Gad AH. (2014): Effect of Directed Versus Spontaneous Pushing During the Second Stage of Labor on Birth Outcome among Primiparas. *Zagazig Nursing Journal*, 10(2):133-149

Lemos A, Amorim MM, Dornelas de Andrade A, de Souza AI, Cabral Filho JE and Correia JB. (2017): Pushing/bearing down methods for the second stage of labour. *Cochrane Database Syst Rev*; 3(3):CD009124. doi: 10.1002/14651858.CD009124.pub3. PMID: 28349526; PMCID: PMC6464699.

Allen M. (2023): Using the Valsalva technique during the second stage of labour. Available at: <https://www.britishjournalofmidwifery.com/content/clinical-practice/using-the-valsalva-technique-during-the-second-stage-of-labour/> Accessed on July, 7 2023, 6 PM.

Roberts J and Hanson L. (2017): Best Practices in Second Stage Labor Care: Maternal Bearing Down and Positioning. *Journal of Midwifery & Women's Health*, 52(3):238-245

Martin CJH. (2019): Effects of valsalva manoeuvre on maternal and fetal wellbeing. *BRITISH JOURNAL OF MIDWIFERY*. 17(5):279-285

Tuuli MG, Gregory WT, Arya LA, Lowder JL, Woolfolk C, Caughey AB, Srinivas SK, Tita ATN, Macones GA, Cahill AG and Richter HE. (2023): Effect of Second-Stage Pushing Timing on Postpartum Pelvic Floor Morbidity. *American College of Obstetricians*

and Gynecologists. *Wolters Kluwer Health*, 14(2):245-252

Mahmoud MM, Mohamed MA, Ramadan SA and Elbana HM. (2022 a): Effect of Spontaneous Pushing Technique during Second Stage of Labor on Labor Outcomes among Primiparas. *Journal of Nursing Science Benha University*, 3(2):664-679.

Mohamed SSA, Elsadek ANE, Khalil EM and Helmy HK. (2022b): Effect of Open Glottis versus closed Glottis (Valsalva) in Second Stage of Labor on Maternal and Neonatal Outcomes. *Egyptian Journal of Health Care*, 13(1):1252-1266

Barasinski C, Debost-Legrand A, Savary D, Bouchet P, Curinier S and Vendittelli F. (2023): Does the type of pushing at delivery influence pelvic floor function at 2 months postpartum? A pragmatic randomized trial—The EOLE study. *Acta Obstet Gynecol Scand*; 102:67-75. doi: 10.1111/aogs.14461

Hassan HE, Gamel WMA and Genedy ASE. (2021): Spontaneous Versus Directed Pushing Technique: Maternal and Neonatal Outcomes: A Comparative Study in Northern Upper Egypt. *International Journal of Studies in Nursing*, 6(1):24-35

Koyucu RG and Demirci N. (2017): Effects of pushing techniques during the second stage of labor: A randomized controlled trial. *Taiwanese Journal of Obstetrics & Gynecology*, 56(5):606-12.

Yurachai, M. (2006): The effect of directed versus spontaneous pushing on postpartum fatigue, perineal pain and childbirth satisfaction. Master Dissertation, Mahidol University.

Henderson J, Alderdice F, Redshaw M. (2019): Factors associated with maternal postpartum fatigue: an observational study. *BMJ Open*.;9(7): e025927. doi:10.1136/bmjopen-2018-025927