Effect of Spontaneous versus Directed Pushing during Second Stage of Labor on Pelvic Floor Morbidity among Primiparous Women

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Abstract

Background: The second stage of labor is critical for maternal and fetal outcomes and is influenced by various factors, including the pushing techniques used by the nurses or obstetricians. **Aim:** To evaluate effect of spontaneous versus directed pushing during the second stage of labor on pelvic floor morbidity among primiparous women. **Design:** A quasi-experimental design ("two groups post-test only") was used to fulfill this study. **Setting:** The study was conducted in the labor unit in the obstetrics and gynecological department at Banha University Hospitals. **Sample:** A purposive sample of 140 primiparous was divided into a directed pushing group (70) and a spontaneous pushing group (70). **Tools:** Two tools were used for data collection: A structured interviewing questionnaire sheet (general characteristics, and current labor history) and pelvic floor morbidity questionnaires (fecal incontinence severity index, pelvic floor distress inventory questionnaire, and pelvic floor impact questionnaire. **Results:** There was a statistically significant difference between spontaneous and directed pushing groups regarding the current labor history (amniotic fluid characteristics, episiotomy, perineal condition, mode of vaginal birth, and duration of 2nd stage of labor). Also, there was a high statistically significant difference regarding the total mean scores of pelvic floor morbidity questionnaires (spontaneous pushing group had more favorable outcomes regarding current labor history and total mean scores of pelvic floor morbidity than directed pushing group). **Conclusion:** Spontaneous pushing during 2nd stage of labor had favorable outcomes related to pelvic floor morbidity and better labor outcomes than direct pushing. **Recommendation:** Establishing policy in healthcare settings that support spontaneous pushing to allow primiparous women to respond to the body's natural urges to facilitate better labor outcomes.

Keywords: Directed pushing, Spontaneous pushing Second stage of labor, Pelvic floor morbidity.

Introduction

Normal labor or normal delivery vaginal (NVD) is defined as a series of genital organ-related processes that expel fetuses from the uterus through the vagina into the outside **(Gelaw et al., 2023).** In uncomplicated-term pregnancies, labor usually begins within 2 weeks (before or after) of the expected delivery date. In a first pregnancy, labor lasts 12 to 18 hours on average; subsequent labor is often shorter, averaging 6 to 8 hours **(Moldenhauer, 2024).**

Normal labor is divided into 4 stages, the 1st stage starts from the onset of painful and regular uterine contractions until the full dilatation of the cervix. The 2nd stage starts from full dilatation of the cervix (10 cm) up to the expulsion of the fetus. The 3rd stage of labor starts from the delivery of the fetus to the

expulsion of the placenta and its membranes. The last stage is referred to the 4th stage which represents a few hours after the expulsion of the placenta **(Militon, 2024).**

During the second stage of labor, in women who have a previous vaginal delivery, the second stage may only require a brief trial. In contrast, a longer duration may be required for nulliparous women. In primiparous women without neuraxial anesthesia, the second stage of labor typically lasts less than 3 hours in nulliparous women and less than 2 hours in multiparous women **(Khamehchian et al., 2020).**

In addition, the transition from the 1st stage to the 2nd stage of labor is characterized by complete dilatation of the cervix as evidenced by vaginal examination, initiation of pushing effort, the crowning of the head, urge to defecate during a contraction when the head presses the rectum, anal dilation during uterine contraction. The uterine contractions are more regular, more powerful, and last longer during the 2nd stage. During the descent of the presenting part, the resistance offered by the soft tissue and elastic recoil offered by the pelvic floor's soft tissue is overcome by strong uterine contractions and retraction and pushing efforts **(Vila Pouca et al., 2022).**

Maternal pushing is a natural method used to assist labor during the second stage. Maternal pushing is an indispensable contributor to involuntary expulsive force developed by uterine contraction. Moreover, the type of pushing includes directed or spontaneous pushing efforts **(Deusa-López et al., 2024).** Directed pushing is a common practice for the nurse or obstetrician to direct these efforts by instructing the woman when to begin the "active" stage of labor and thereupon to inhale deeply and to push with a closed glottis for 10 seconds, 2 to 3 times during each uterine contraction **(Vila Pouca et al., 2022).**

In addition, a popular alternative method is spontaneous pushing, which is carried out naturally by the woman according to her desire to push down progressively. There is no deep breathing, and it starts only when the full uterine contraction is well established. Generally, 3 to 5 pushes occur near the peak uterine contraction for 3 to 5 seconds with approximately 2 seconds of breathing between efforts, although 1 bigger push near the peak of the contraction is also used **(Froeliger et al., 2023).**

Health problems arising from the muscles and organs of the pelvis during normal labor are among the most common of all health problems in women. Combined, these problems called pelvic floor morbidity that have a complex and multifactorial pathophysiology that affects women's health **(Peinado-Molina et al., 2023)**. Pelvic floor morbidity in women encompasses a wide range of clinical disorders such as urinary incontinence (UI) means involuntary loss of urine when coughing or sneezing or having a sudden urge to go but can't get to the bathroom in time, pelvic organ prolapse (POP) means descending or drooping of pelvic organs into the vagina and fecal incontinence (FI) means the involuntary loss of solid or liquid stool, and loss of stool or gas **(Hutchison et al., 2022).**

The role of the maternity nurse during the second stage of labor is to provide motivation and encouragement for the woman. The strategies implemented may include emphasizing to the woman the benefits of relaxation of the perineum or coordinating pushing efforts with the contraction pattern. The

nurse will coach the woman to maximize pushing efforts and coordinate pushing and breathing efforts. The nurse should also provide feedback to the woman about their pushing efforts and maintain continuous communication with the provider about the pushing progress **(Barca et al., 2021)**.

Significance of the study

Pelvic floor morbidity is highly associated with normal labor, and the type of pushing applied during delivery may also have an impact on this likelihood **(Chen and Pang, 2024).**

The prevalence of pelvic floor morbidity in women is high. Pelvic floor morbidity is a prevalent problem worldwide and is underdiagnosed. The prevalence of pelvic floor morbidity ranges from 11% - 35.5% globally. The most common pelvic floor morbidity includes overactive bladder (OAB) with an estimated prevalence of 7.6% - 13%, stress urinary incontinence (SUI) with an estimated prevalence of 1.7% - 35.5%, pelvic organ prolapse with an estimated prevalence of 2.9% - 20% and anal incontinence (AI) with an estimated prevalence of 0.2 - 13% **(Dheresa et al., 2018).** In the United States, 25% of women who seek gynecological care have at least one pelvic floor morbidity, and 20% have a lifetime chance of requiring pelvic floor surgery **(Tuuli et al., 2023).**

Knowledge about pelvic floor morbidity in Egypt and other Middle Eastern countries is rare, however, a recent study in Egypt reported that the prevalence of stress urinary incontinence and overactive bladder was (22.2%, 39.0%) respectively. Whenever, there are no published studies regarding the prevalence of pelvic floor disorders in a primary care setting in Egypt **(Araby, 2024).** So, this study was conducted to evaluate the effect of spontaneous versus directed pushing during the second stage of labor on pelvic floor morbidity among primiparous women. Also, by conducting this study, the researchers aimed to enhance obstetric care, promote evidence-based practices, and ultimately improve maternal health outcomes.

Aim of the study:

The current study aimed to evaluate effect of spontaneous versus directed pushing during the second stage of labor on pelvic floor morbidity among primiparous women.

Study hypotheses:

H1: Primiparous women who would apply spontaneous pushing would exhibit more favorable labor outcomes than women who would undergo directed pushing.

H2: Primiparous women who would apply spontaneous pushing would exhibit less fecal incontinence than women who would undergo directed pushing.

H3: Primiparous women who would apply spontaneous pushing would exhibit less pelvic floor distress than women who would undergo directed pushing.

H4: Primiparous women who would apply spontaneous pushing would exhibit less pelvic floor impact than women who would undergo directed pushing.

Subjects and methods

Study design: A quasi-experimental design ("two groups post-test only") was used to fulfill the aim of the present study.

A quasi-experimental design is research that resembles experimental research but is not true experimental research and aims to establish a cause-and-effect relationship between independent and dependent variables. Although the independent variable is manipulated,

participants are not randomly assigned to conditions or orders of conditions **(Miller et al., 2020).**

Study setting: The study was conducted in the labor unit in the obstetrics and gynecological department at Benha University Hospital.

Sample type: A purposive sample was used.

Sample size: Primiparous women admitted to the previous setting for six months according to the following inclusion criteria:

- Primiparous with singleton fetus and presented by cephalic.
- With a full-term baby (39^{th} to 42^{nd} week).
- No contraindication for normal vaginal delivery.
- Don't receive epidural analgesia during labor.
- Free from obstetrics or medical complications.
- Free from any psychological disease.
- Can read and write to communicate on social media in case of delayed postpartum follow-up visits.

According to the inclusion criteria, the total number of women admitted to the previous setting for six months is 140 primiparous women.

Tools of data collection: Two main tools were utilized for data collection:

Tool I: A structured Interviewing Questionnaire: It was constructed by the researchers after reading and reviewing related literature (**Hassan et al., 2021; Mohamed et al., 2022**). It included:

Part (1): General characteristics of the studied sample: It included 4 items such as (age, residence, educational level, and occupation).

Part (2): Current labor history (7 items) such as (condition of amniotic membrane on admission, amniotic fluid characteristics, engagement of fetal head on admission, episiotomy, perineal condition, mode of vaginal birth, and duration of 2^{nd} stage of labor).

Tool II: Pelvic Floor Morbidity Questionnaires:

Part (1): Fecal Incontinence Severity Index (FISI): It was adapted from **(Rockwood et al., (1999)** and was used to assess the incontinence leakage. It described the severity of different types of incontinence for bowel contents **over last 3 months** after labor. It consisted of (5 items): (incontinent to gas, incontinent for mucous, incontinent for liquid stool, incontinent for solid stool, wearing a pad or some form of protection for bowel problems).

Scoring system:

All items used the following response scale: 0= not at all, 1= a little, 2= moderately, 3= a great deal. The total score ranged from (0-15). The higher scores indicated increased severity of fecal incontinence. The score of each item was summited and **the total scoring was categorized as follows:**

- 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 assess if women had certain bowel, bladder, or pelvic symptoms and how much they bothered them over **last 3 months** after labor. It consisted of (20 items).

Scoring System:

All items used the following response scale: 0= never, 1= somewhat, 2= moderately, 3= quite a bit. The total score ranged from 0 to 60, the higher scores indicated more pelvic floor distress. The score of each item was summited

and **the total scoring was categorized as follows:**

- 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 assess women's activities, relationships, and feelings that were affected by bladder, bowel, and vaginal symptoms **over last 3 months** after labor, it consisted of 3 sections as following:

- Urinary Impact Questionnaire (UIQ-7): 7 items under the column "Bladder or urine."
- Colorectal-Anal Impact Questionnaire (CRAIQ-7): 7 items under the column "Bowel or rectum."
- Pelvic Organ Prolapse Impact Questionnaire (POPIQ-7): 7 items under the column "Pelvis or vagina."

Scoring system:

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

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

Tools validity and reliability: Data collection tools were reviewed by a panel of three obstetrics and gynecological nursing experts who reviewed the content of tools for comprehensiveness, accuracy, clarity, relevance, and applicability. The questionnaires were modified according to the expert's comments and recommendations. Moreover, the reliability of the proposed tools was done utilizing the Cronbach alpha test. The internal consistency of FISI was 0.81, the internal consistency of PFDI-20 was 0.92, also the internal consistency of PFIQ-7 was 0.91.

Ethical consideration:

- The study approval was obtained from the scientific research ethical committee of the faculty of nursing at Benha University for fulfillment of the study (REC-OBSN-P 69).
- An official permission from the director of the selected study settings was obtained for the fulfillment of the study.
- Before applying the tools, the researchers explained the aim and significance of the study to gain women's confidence and trust.
- The researchers took informed consent from women to participate in the study and confidentiality was maintained.
- The study tools ensured that the study didn't cause any harm to any women during data collection. Also, the study didn't include any immoral statements and respect for human rights.
- The women had the option to withdraw from the study at any time.

Pilot Study:

The pilot study was carried out for 10 % of the total duration of six months approximately (3 weeks) in which 14 primiparous women were to test the clarity, the usability of the tools and modifications. It also aimed to identify any problems specific to the statements, such as sequences and clarity of the questions. It was also useful to estimate the time needed for data collection. Some modifications were made based

on the pilot results and the pilot sample was excluded from the total duration to avoid sample contamination.

Fieldwork:

The researchers visited the previously mentioned setting four times per week (Sunday, Monday, Tuesday, and Thursday) from 8.00 a.m. to 3.00 p.m. until the predetermined duration is completed (six months from the beginning of February 2024 to the end of July 2024). To fulfill the aim of this study, the following phases were adopted; preparatory phase, interviewing and assessment phase, implementation phase, and evaluation phase.

Preparatory phase: The preparatory phase was the initial stage of the study. The researchers reviewed relevant local and international kinds of literature about the research problem. This aided the researchers in understanding the magnitude and seriousness of the problem and directed the researchers to prepare the required data collection tools.

Interviewing and assessment phase:

- At the beginning of the interview the researchers greeted the women.
- The researchers introduced herself and explained the aim of the study to the women.
- The women were provided with all information about the study and informed consent was taken to participate and maintain cooperation.
- According to the inclusion criteria from the admissions records of women's history cards, interviews, and physical examinations, the researchers checked the data of the primiparous women.
- During 1st stage of labor, the researchers collected the data by using the following tools (Tool I: A structured interviewing questionnaire sheet to assess women's general characteristics and current labor history). The average time for the completion of each woman's interview was around (10-15 minutes).

Implantation phase:

- For the **spontaneous group**, the primiparous woman was instructed for spontaneous pushing during the second stage of labor when women felt the need to do and push spontaneously. Women didn't start pushing until they felt obliged to. In the first stage, the researchers gave the primiparous woman instructions on how to relax during uterine contractions by breathing deeply and slowly inhaling and exhaling until the contraction stopped. In the second stage, the researchers gave primiparous women instructions on how to push on the initiative, only pushing during a contraction and breathing out for five to six seconds when they felt the need to (opening their glottis). Primiparous women were not given specific instructions regarding when or how long to push. The primiparous woman was taken to the delivery room to complete the birthing process when the crowning 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, exhale 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 **(Araby et al., 2024)**.

- For the **directed group**, despite being monitored during delivery, these women received no special treatment beyond what was provided by standard hospital procedures. The primiparous women were instructed for directed pushing by taking a deep breath and holding it (Valsalva maneuver which is routinely applied in the hospital) and, with each uterine contraction, replicating the same technique stopped. During the second stage of labor up until birth. The obstetricians used vaginal examination to assess the progression of labor. Regardless of whether primiparous women felt the need to push or not, the researchers advised and encouraged primiparous women to push at the start of each uterine contraction once the cervix had fully dilated. The researchers identified the woman's uterine contractions by placing the palm at the uterus's funds above the woman's abdomen. Directed 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 a woman'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 **(Araby et al., 2024)**.

Evaluation phase: 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 effect of pushing techniques on pelvic floor morbidity as follows: **Tool II**: Pelvic floor morbidity questionnaires, which include three parts; Fecal incontinence severity index, Pelvic floor distress inventory questionnaire, and Pelvic floor impact questionnaire, assess if women had certain bowel; bladder or pelvic symptoms and evaluate women's activities; relationships and feelings that were affected by bladder, bowel, and vaginal symptoms **over last 3 months** after labor. The researchers followed the women during postnatal visits in obstetrics outpatient clinics or via telephone and social media.

Statistical analysis:

The gathered data was coded, computerized, and subjected to appropriate statistical tests and methods of organization. The results were then displayed using inappropriate tables and figures. Data analysis was performed using IBM SPSS statistical software version 22. Descriptive statistics comprised means, standard deviations, frequencies, and percentages. Inferential statistics, particularly the independent t-test and the Chi-square test, were used to test the study hypotheses. There was no statistically significant difference if the p-value was larger than 0.05; a statistically significant difference if it was less than 0.05; and a highly statistically significant difference if it was less than 0.001.

Results:

Table (1) clarifies that (71.4% & 58.6%) of both spontaneous pushing and directed pushing groups respectively were in the same age group (25-< 30 years) with a mean age of

25.89±3.06 and 26.71 ±3.93 years old respectively. As well as (57.1%) of the spontaneous pushing group & (65.7%) of the directed pushing group lived in the urban area. Pertaining to educational level, it was indicated that (72.9% & 65.7%) of both groups respectively had secondary education. According to occupation, (58.6%& 47.1%) of both groups were housewives. Therefore, there was no statistically significant difference between both spontaneous pushing and directed pushing groups regarding general characteristics ($p>0.05$) that reflected group homogeneity.

Table (2) demonstrates that there was a statistically significant difference between both spontaneous pushing and directed pushing groups regarding the most elements current labor history (amniotic fluid characteristics, episiotomy, perineal condition and mode of vaginal birth) ($p\leq0.05$); it was showed that the amniotic fluid was clear for women in the spontaneous pushing group more than the directed pushing group. Also, the number of women who did not need an episiotomy in the spontaneous pushing group was greater than the directed pushing group, and perineal laceration occurred in (2.9%) of women in the spontaneous pushing group compared to (11.4%) of the women in the directed pushing group. Concerning mode of vaginal birth, (85.7%) of women in the spontaneous pushing group had spontaneous vaginal birth without need to any extra intervention compared to (71.4%) of women in the directed pushing group. Furthermore, the mean duration of 2nd stage was shorter in spontaneous pushing group (30.76±6.77 minutes) compared to (34.29±7.58 minutes) in Valsalva pushing group. On the other hand, there was not statistically significant difference between both spontaneous pushing and directed pushing groups regarding condition of the amniotic membrane on admission and engagement of fetal head on admission.

Table (3) shows that there was a statistically significant difference between the two groups regarding each item of the Fecal Incontinence Severity Index ($p\leq0.05$). The total mean scores of the Fecal Incontinence Severity Index was higher in the directed pushing group compared to the spontaneous pushing group; 3.21±1.87 versus 1.90±1.06 respectively with a highly statistically significant difference between the two groups ($p\leq0.001$).

Figure (1) illustrates that (42.9%) and (64.3%) of both directed pushing and spontaneous pushing groups respectively reported that the pushing technique had no impact on Fecal Incontinence over last 3 months postpartum. In addition, (35.7%) and (28.6%) of both directed pushing and spontaneous pushing groups respectively reported that the pushing technique had a mild impact over last 3 months postpartum.

Table (4) shows that there was a statistically significant difference between the two groups regarding each item of the Pelvic Floor Distress Inventory ($p\leq0.05$). The total mean scores of the Pelvic Floor Distress Inventory was higher in the directed pushing group compared to the spontaneous pushing group; 9.54±6.24 versus 4.72±3.25 respectively with a highly statistically significant difference between the two groups ($p\leq0.001$).

Figure (2) illustrates that (37.1%) and (55.7%) of both directed pushing and spontaneous pushing groups respectively reported that the pushing technique had no impact on Pelvic Floor Distress over last 3

months after delivery. Increasingly, (18.6%) and (7.1%) of both directed pushing and spontaneous pushing groups respectively reported that the pushing technique had a after delivery.

Table (5) shows that the total mean scores of Pelvic Floor Impact (urinary impact, colorectal-anal impact, and pelvic organ prolapse impact") was higher in the directed pushing group compared to the spontaneous pushing group; 22.18±13.46 versus 11.22±5.74 respectively with a highly statistically significant difference between two groups (p≤.001).

Figure (3) illustrates that (28.6%) and (42.9%) of both directed pushing and spontaneous pushing groups respectively reported that the pushing technique had no Pelvic Floor Impact on women's activities over last 3 months after delivery. Increasingly, (18.6%) and (40.0%) of both directed pushing and spontaneous pushing groups respectively reported that the pushing technique had a moderate Pelvic Floor Impact on women's activities over the last 3 months after delivery.

Table (1): Distribution of the studied sample in both groups according to their general characteristics (n=140).

General characteristics	Directed pushing group n=70		Spontaneous pushing group n=70		X^2	P value
	No	%	No	%		
Age:						
< 25	20	28.6	15	21.4	**2.74**	**0.253**
25-< 30	41	58.6	50	71.4		
30 – 35	9	12.9	5	7.1		
Mean ± SD	**26.71±3.93**		**25.89±3.06**		**independent t test= 1.39**	**0.166**
Residence:						
Rural	24	34.3	30	42.9	**1.08**	**0.298**
Urban	46	65.7	40	57.1		
Educational level:						
Read and write	5	7.1	5	7.1	**1.31**	**0.725**
Primary education	9	12.9	8	11.4		
Secondary education	46	65.7	51	72.9		
University education	10	14.3	6	8.6		
Occupation:						
Housewife	37	47.1	41	58.6	**0.463**	**0.496**
Working	33	47.1	29	41.4		

Table (2): Distribution of the studied sample in both groups according to their current labor history (n=140).

Current labor history	Directed pushing group n=70		Spontaneous pushing group n=70		FET/X^2	P value
	No	%	No	%		
Condition of the amniotic membrane on admission:						
Intact Rupture	23 47	40.4 82.5	15 55	26.3 96.5	**2.31**	**0.128**
Amniotic fluid characteristics:						
Clear Bloody Meconium stained	59 8 3	84.3 11.4 4.3	68 1 1	97.1 1.4 1.4	**7.08**	**0.029***
Engagement of fetal head on admission:						
Yes No	40 30	57.1 42.9	35 35	50.0 50.0	**0.718**	**0.397**
Episiotomy:						
Done Not done	30 40	42.9 57.1	16 54	22.9 77.1	**6.34**	**0.012***
Perineal condition:						
Intact Perineum Laceration	62 8	88.6 11.4	68 2	97.1 2.9	**3.87**	**0.049***
Mode of vaginal birth:						
Spontaneous vaginal birth Fundal pressure-assisted vaginal	50 20	71.4 28.6	60 10	85.7 8.5	**4.24**	**0.039***
Duration of 2nd stage of labor (in minutes):						
Mean ± SD =	34.29±7.58		30.76±6.77		**independent t test= 2.90**	**0.004***

Table (3): Mean score of Fecal Incontinence Severity Index (FISI) of the studied sample in both groups (n=140).

Fecal Incontinence Severity Index (FISI)	Possible score	Directed pushing group n=70	Spontaneous pushing group n=70	Independent t-test	P value
		Mean ± SD	Mean ± SD		
Incontinent to gas.	0/3	1.39±1.08	1.01±0.62	2.48	0.014*
Incontinent for mucous.		0.71±0.78	0.37±0.68	2.75	0.007*
Incontinent for liquid stool.		0.57±0.77	0.29±0.56	2.48	0.014*
Incontinent for solid stool.		0.40±0.73	0.19±0.46	2.07	0.040*
Wearing a pad or some form of protection for bowel problem.		0.14±.42	0.03±0.16	2.08	0.039*
Total Mean ± SD	**0/15**	**3.21±1.87**	**1.90±1.06**	**5.10**	**0.000****

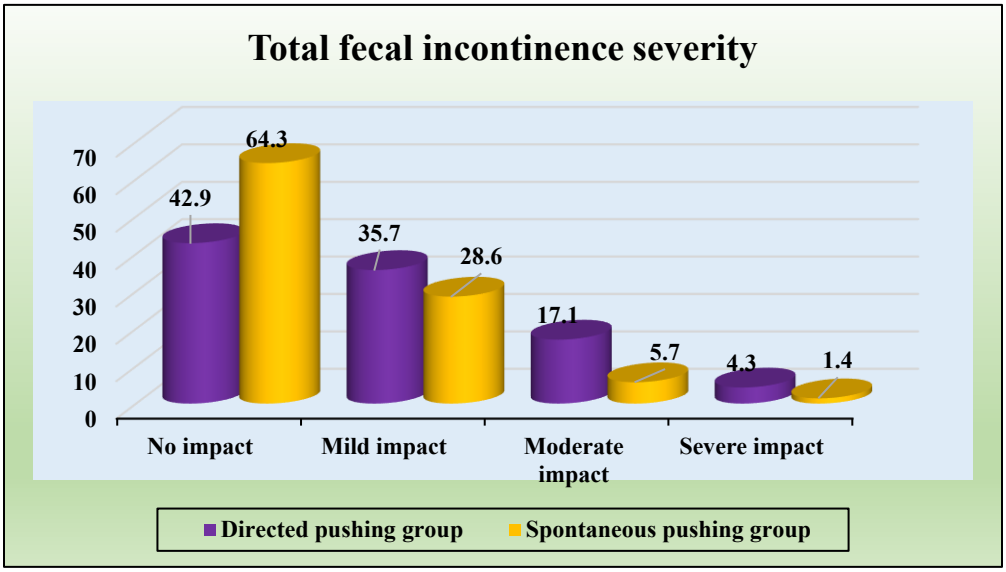

Figure (1): Distribution of studied women in both directed pushing and spontaneous pushing groups regarding their total Fecal Incontinence Severity over last 3 months after delivery (n=140).

Table (4): Mean score of Pelvic Floor Distress Inventory (PFDI) of the studied sample in both groups (n=140).

Pelvic Floor Distress Inventory (PFDI)	Possible score	Directed pushing group n=70	Spontaneous pushing group n=70	Independent t-test	P value
		Mean ± SD	Mean ± SD		
Pressure in the lower abdomen	0/3	0.67±0.92	0.36±0.81	2.12	0.035*
Heaviness or dullness in the lower abdomen		0.74±0.91	0.60±0.07	2.62	0.010*
A bulge or something falling out that can see or fell in the vaginal area		0.23±0.64	0.06±0.23	2.10	0.037*
Feeling of incomplete bladder emptying		0.19±0.39	0.06±0.23	2.35	0.020*
Have to push on the vagina or around the rectum to have a complete bowel movement		0.29±0.61	0.11±0.32	2.06	0.041*
Have to push up in the vaginal area with fingers to start or complete urination		0.40±0.60	0.14±0.35	3.09	0.002*
Need to strain too hard to have a bowel movement		0.34±0.58	0.17±0.41	1.99	0.048*
Have not completely emptied bowels at the end of a bowel movement		0.20±0.40	0.06±0.23	2.56	0.011*
Lose stool beyond control if stool is well-formed		0.17±0.38	0.03±0.16	2.88	0.005*
Lose stool beyond control if stool is loose or liquid		0.54±0.60	0.26±0.50	3.03	0.003*
Lose gas from the rectum beyond control		1.39±1.08	1.01±0.62	2.48	0.014*
Have pain when pass the stool		0.34±0.67	0.09±0.28	2.92	0.004*
Strong sense of urgency and have to rush to the bathroom to have a bowel movement		0.54±0.69	0.23±0.42	3.23	0.002*
Part of the stool ever pass through the rectum and bulge outside during or after a bowel movement		0.21±0.41	0.06±0.23	2.76	0.006*
Frequent urination		1.03±0.94	0.57±0.73	3.19	0.002*
Urine leakage associated with a feeling of urgency		.26±.65	0.07±0.31	2.15	0.033*
Urine leakage related to laughing, coughing, or sneezing		0.71±0.78	0.43±0.55	2.49	0.014*
Small amounts of urine leakage (that is, drops)		0.14±0.35	0.03±0.16	2.44	0.016*
Difficulty emptying bladder		0.19±0.39	0.06±0.23	2.35	0.020*
Pain of discomfort in the lower abdomen or genital region		0.74±0.97	0.40±0.68	2.40	0.018*
Total Mean ± SD	**0/60**	**9.54±6.24**	**4.72±3.25**	**5.71**	**0.000****

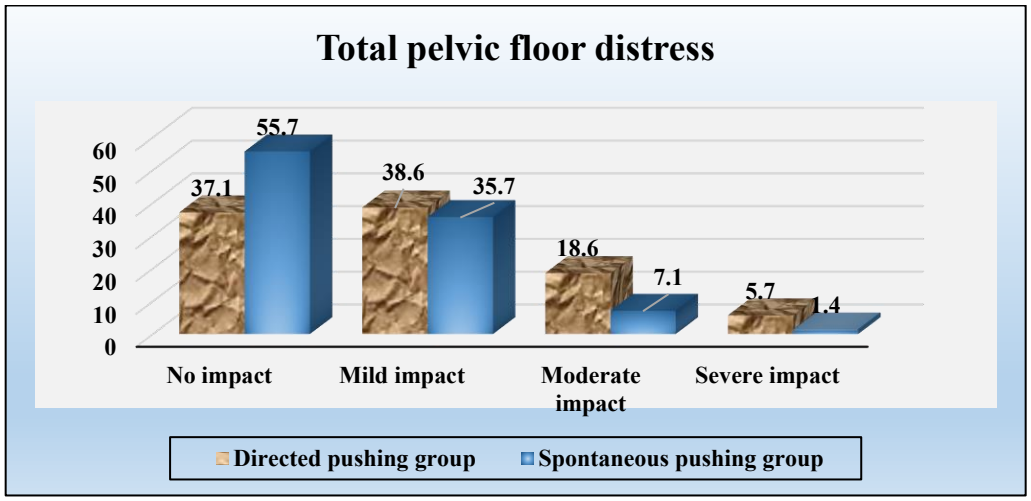

Figure (2): Distribution of studied women in both directed pushing and spontaneous pushing groups regarding their total Pelvic Floor Distress over last 3 months after delivery (n=140).

Table (5): Total mean score of pelvic floor Impact of the studied sample in both groups (n=140).

Pelvic Floor Impact	No. of items	Possible score	Directed pushing group n=70	Spontaneous pushing group n=70	Independent t-test	P value
			Mean ± SD	Mean ± SD		
Urinary Impact	7	0/21	4.52±2.97	2.42±1.74	5.09	0.000**
Colorectal-Anal Impact	7	0/21	2.20±2.20	0.98±1.10	4.11	0.000**
Pelvic Organ Prolapse Impact	7	0/21	2.70±3.57	1.18±1.59	3.23	0.002*
Total Mean ± SD	**21**	**0/63**	**22.18±13.46**	**11.22±5.74**	**6.26**	**0.000****

*A Statistical significant p ≤ 0.05 **A Highly Statistical significant p ≤ 0.001

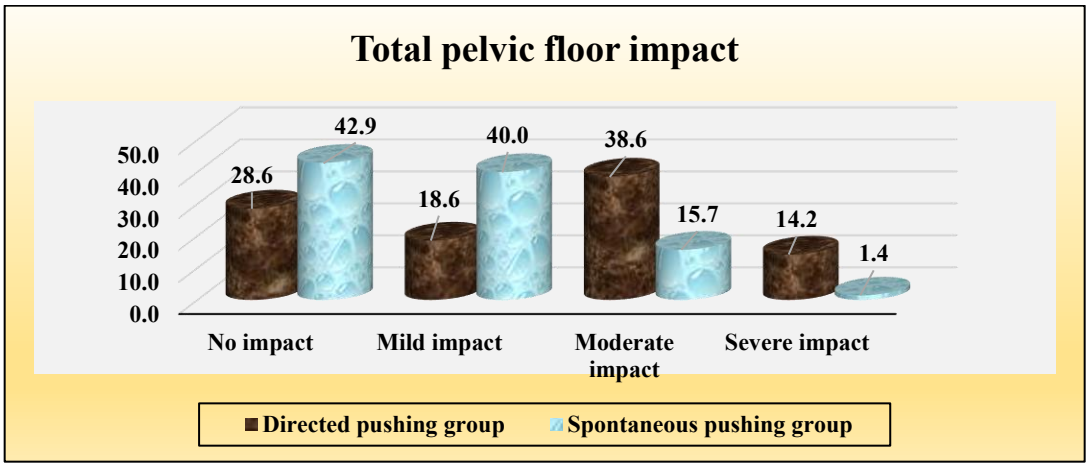

Figure (3): Distribution of studied women in both directed pushing and spontaneous pushing groups regarding their total Pelvic Floor Impact 3 month after delivery (n=140).

Discussion

Pelvic floor morbidity is called pelvic floor disorders, which include urinary incontinence, fecal incontinence, and pelvic organ prolapse. Pelvic floor morbidity is common, affecting at least one-quarter of women, with a significant impact on the quality of life. The differential prevalence of pelvic floor morbidity in various populations and cultures worldwide has not been determined using the same definition and time framework **(Kenne et al., 2022).**

Management of the second stage of labor has typically included a set of behaviors that begins with full cervical dilation. During the second stage of labor, the woman can follow two types of pushing: Spontaneous or directed pushing. Research consistently shows that spontaneous pushing, where women push according to the body's natural reflexes, may lead to better pelvic floor outcomes and reduce maternal fatigue than directed pushing, where women are instructed to push in a structured and sustained manner **(Yao et al., 2022).**

Regarding **general characteristics,** the results of the current study revealed that both the spontaneous and directed pushing groups shared similar general characteristics, less than three-quarters and more than half of both spontaneous pushing and directed pushing groups respectively were in the same age group (25-< 30 years) with a mean age of 25.89±3.06 and 26.71±3.93 years old respectively. As well as more than half of the spontaneous pushing group & less than two-thirds of the directed pushing group lived in the urban area. Pertaining to educational level, it was indicated that less than three-quarters and less than two-thirds of both spontaneous pushing and directed pushing groups respectively had secondary education. According to occupation, more than half and less than half of both groups were housewives. Therefore, there was no statistically significant difference between both spontaneous pushing and directed pushing groups regarding general characteristics that reflected group homogeneity. This demographic similarity enhances the reliability of the study's comparative outcomes, as it minimizes the potential for confounding variables related to age, education, residence, and occupation.

These results were in the same line with **Araby et al., (2024)** represented that there was a lack of a statistically significant difference between the spontaneous and directed groups regarding the general characteristics of participants including age, residence, educational level, and occupation (p>٠,٠5). Consequently, the lack of a statistically significant difference (p>٠,٠5) in the personal characteristics of the spontaneous and directed pushing groups indicated the homogeneity of the groups.

Additionally, these findings were supported by **Mahmoud et al., (2022)** reported that when comparing the women in the spontaneous and directed groups in terms of personnel characteristics (age, residence, educational level, and occupation), there was no statistically significant difference (P>0.05). In addition, the majority of the women in both the spontaneous and directed groups had completed their secondary education, were employed, and resided in cities, all of which indicated the homogeneity of the group.

Similarly, **Mohamed et al., (2022)** found that there was no significant difference (P>0.05) in participant age, educational attainment, occupation, residence, and family income

between the two groups. Also, these findings agreed with **Hassan et al., (2021)** who revealed that there was no statistically significant difference in participant age and education level between directed and spontaneous pushing groups.

Regarding **current labor history**, our study showed that there was a statistically significant difference between both spontaneous pushing and directed pushing groups regarding the most elements current labor history (amniotic fluid characteristics, episiotomy, perineal condition and mode of vaginal birth); it was showed that the amniotic fluid was clear for women in the spontaneous pushing group more than the directed pushing group. Also, the number of women who did not need an episiotomy in the spontaneous pushing group was greater than the directed 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 directed pushing group. Concerning mode of vaginal birth, the majority of women in the spontaneous pushing group had spontaneous vaginal birth without need to any extra intervention compared to less than two-thirds of women in the directed pushing group. Furthermore, the mean duration of 2nd stage was shorter in spontaneous pushing group (30.76±6.77 minutes) compared to (34.29±7.58 minutes) in directed pushing group. On the other hand, there was not statistically significant difference between both spontaneous pushing and directed pushing groups regarding condition of the amniotic membrane on admission and engagement of fetal head on admission.

This result could be explained by the fact that when the women were instructed to push during contraction in the early phase of the second stage of labor and when the cervix was fully dilated, this can lead to exhaustion and women's ability to push decreased in the active phase in the second stage of labor, which result in a longer second stage of labor in the directed pushing group compared to the spontaneous pushing group.

Similarly, a systematic review conducted by **Yao et al., (2022**) represented that spontaneous pushing by women in the second stage of labor had favorable outcomes concerning the reduction of cesarean section and extended episiotomy rates. The second stage of labor, mode of birth, perineal laceration, and neonatal outcomes were not negatively affected by spontaneous pushing. Furthermore, spontaneous pushing during the second stage resulted in some cases, better maternal and neonatal outcomes than directed pushing.

Also, the present study results agreed with **Mahmoud et al., (2022)** who found that the spontaneous pushing method enhanced woman and newborn outcomes during the second stage of labor, the directed pushing technique was associated with a longer second stage of labor and a higher likelihood of negative outcomes. Also, reported that the duration of the second stage of labor was significantly different between the two groups ($P<0.05$). The spontaneous group reported a shorter duration of the second stage of labor (5-10 min) than the directed pushing group. Further supporting these findings, a study conducted by **Petitprez et al., (2021)** showed that limiting episiotomy use contributed to a significant reduction in posterior perineal lacerations, reinforcing the advantages of spontaneous pushing and minimal interventions during labor.

Furthermore, **Hassan et al., (2021)** demonstrated that the duration of the second

stage of labor was shorter (5-10 min) in a spontaneous pushing group compared to the direct pushing group. Using a spontaneous pushing approach during the second stage of labor is less exhausting and safer. Spontaneous pushing reduces the risk of perineal lacerations and significantly shortens the duration of the second stage of labor. In comparison to direct push during the second stage of labor, it also results in greater newborn Apgar's score and postpartum maternal fatigue.

The current study results contrasted with **Araújo et al., (2022)** observed that the following outcomes for women and newborns were all the same: length of the second stage of labor; episiotomy; vaginal, cesarean, or instrumental delivery; and perineal lacerations.

Conversely, a study that was performed by **Bayraktar, (2023)** indicated that there were statistically significant differences in the incidence of episiotomy and perineal-cervical lacerations were lower in the directed pushing group than that in the spontaneous pushing group ($p<0.001$). Excessive fatigue, uncontrolled tears, and unnecessary straining can result from spontaneous pushing. Regarding the duration of the second stage of labor, the directed pushing group was shorter than that of the spontaneous pushing group.

Concerning **pelvic floor morbidity,** our study results revealed that the total 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") were higher in the directed pushing group compared to the spontaneous pushing group with a highly statistically significant difference between the two groups.

This might be explained by the fact that the pelvic floor muscles (PFMs) can become loosened as a result of applying intense abdominal pressure repeatedly because during directed pushing in the second stage of labor, the muscles are severely strained.

Specifically, the mean score of **fecal incontinence** severity index**,** current study findings showed that there was a statistically significant difference between the two groups regarding each item of fecal incontinence severity index. The total mean scores of fecal incontinence severity index was a higher in the directed pushing group compared to the spontaneous pushing group with a highly statistically significant difference between two groups. The results suggested that the pushing techniques may have a notable impact on post-procedure outcomes.

Regarding **pelvic floor distress inventory questionnaire**, current study findings showed that there was a statistically significant difference between the two groups regarding each item of pelvic floor distress inventory. The total mean scores of pelvic floor distress inventory was higher in directed pushing group compared to spontaneous pushing group with a highly statistically significant difference between two groups. This might be explained by the fact that spontaneous pushing appeared to be less detrimental to the pelvic floor, potentially reducing postpartum pelvic floor dysfunction, while directed pushing, often guided by healthcare providers, may place more strain on the pelvic floor muscles, leading to higher distress scores.

Pertaining to the **Pelvic Floor Impact** Questionnaire (urinary impact, colorectal-anal impact, and pelvic organ prolapse impact"), the

total mean scores were higher in the directed pushing group compared to the spontaneous pushing group; respectively with a highly statistically significant difference between two groups ($p \leq .001$). These results were explained by the fact that directed pushing increased intra-abdominal pressure, compressing the pelvic floor muscles and urethral structures, and colorectal-anal region which may lead to trauma or dysfunction. Spontaneous pushing allows the primiparous woman to push in response to natural urge, resulting in shorter, less forceful pushing periods. Spontaneous pushing reduces undue strain on the pelvic floor, preserving its integrity.

The present research results were supported by **Araby et al., (2024)** who noticed that the pelvic floor morbidity questionnaires (fecal incontinence severity index, pelvic floor distress inventory, and pelvic floor impact "urinary, colorectal-anal and pelvic organ prolapse impacts") had higher overall mean scores in the directed pushing group when compared to the spontaneous pushing group; the differences were highly statistically significant.

Additionally, a study conducted by **Özgül et al., (2022)** who explored the factors contributing to higher PFDI scores, identifying symptom duration and pelvic anteroposterior diameter as significant contributors to pelvic floor distress. These factors provide additional context for understanding how labor practices, such as directed pushing, could exacerbate pelvic floor dysfunction.

A study conducted by **Carter Ramirez et al., (2022)** who found that occupational lifting and pushing increased the risk of symptomatic pelvic organ prolapse (POP) over ten years. In the same context, a study conducted by **Han et al., (2019)** who showed that the choice of pushing technique during labor may serve as a critical intervention in managing pelvic floor outcomes after delivery.

These results were consistent with **Lee et al., (2019)** who noted that spontaneous pushing decreased the risk of pelvic floor damage and perineal lacerations compared to directed pushing. On the other side, the present study findings were in disagreement with **Tuuli et al., (2023)** who reported that directed pushing didn't lead to an increase in pelvic organ prolapse measures, perineal lacerations, or patient-reported pelvic floor symptoms at 6 weeks or 6 months after delivery. The only exception was a change in the FISI score at 6 months, which was higher in the spontaneous pushing group at 6 months but less than the minimum important difference.

Additionally, there was disagreement between the results of this study and those of **Barasinski et al., (2023)** who found that there was no difference in stage II pelvic organ prolapse between the two groups. Similarly, there was no variation in the incidence of urinary incontinence between the groups whose glottis were closed or open. In summary, regardless of the sort of directed pushing strategy utilized during labor, pelvic organ prolapses occurred two months following delivery. It is possible that spontaneous pushing protects multiparous and primiparous women from urinary incontinence.

Conclusion:

Spontaneous pushing during 2nd stage of labor had favorable outcomes related to better labor outcomes (clear amniotic fluid, reduced need for an episiotomy, improved perineal condition, mode of vaginal birth, and shorter duration of the second stage of labor) and pelvic floor morbidity compared to directed pushing; with a highly statistically significant difference

between spontaneous and directed pushing. Thus, it was concluded that the study hypotheses were reinforced and the aim of the study was attained.

Recommendations:

- Developing and disseminating clear clinical guidelines for primiparous women assessing and managing the second stage of labor and ensuring that guidelines are based on the benefits of spontaneous pushing.
- Encouraging routine postpartum assessments focusing on pelvic floor health, and early intervention for any identified issues.
- Encouraging research focused on effect of pushing techniques during 2nd stage of labor on pelvic floor morbidity to enhance a culture of inquiry and improvement.
- Future studies should use larger sample sizes to increase the statistical power and generalizability of findings about the long-term impact on pelvic floor morbidity.
- Conducting educational sessions for pregnant women on pelvic floor exercises and postpartum care to mitigate long-term morbidity.

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تأثير الدفع التلقائي مقابل الدفع الموجه في المرحلة الثانية من الولادة على إعتلال قاع الحوض بين السيدات البكريات

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تعد المرحلة الثانية من الولادة مرحلة حرجة تؤثر على نتائج الأم والجنين، وتتأثر بعدة عوامل، منها تقنيات الدفع المستخدمة من قبل الممرضات أو أطباء التوليد. لذلك هدفت هذه الدراسة إلى تقييم تأثير الدفع التلقائي مقابل الدفع الموجه في المرحلة الثانية من الولادة على إعتلال قاع الحوض بين السيدات البكريات. وتم استخدام دراسة شبه تجريبية ("مجموعتان بعد الاختبار فقط"). وأجريت هذه الدراسة في وحدة الولادة بقسم التوليد وأمراض النساء في مستشفيات جامعة بنها. وقد تم تقسيم عينة هادفة مكونة من ١٤٠ امرأة تلد لأول مرة إلى مجموعتين على مدار ستة أشهر : مجموعة الدفع الموجه (٧٠) ومجموعة الدفع التلقائي (٧٠). وقد تم استخدام أداتين لجمع البيانات: استمارة المقابلة الشخصية (لجمع البيانات حول الخصائص العامة وتاريخ الولادة الحالي). وإستبيانات اعتلال قاع الحوض (مؤشر شدة سلس البراز، استبيان جرد إعتلال قاع الحوض، واستبيان تأثير قاع الحوض). وقد أسفرت النتائج على أن هناك فرق ذو دلالة إحصائية بين مجموعتي الدفع التلقائي والموجه فيما يتعلق بتاريخ الولادة الحالي (خصائص السائل الأمنيوسي، شق العجان، حالة العجان، طريقة الولادة المهبلية، ومدة المرحلة الثانية من الولادة). كما كان هناك فرق ذو دلالة إحصائية عالية فيما يخص متوسط الدرجات الإجمالية لإستبيانات إعتلال قاع الحوض. وقد لخصت الدراسة إلى أن كان للدفع التلقائي خلال المرحلة الثانية من الولادة نتائج إيجابية فيما يتعلق بإعتلال قاع الحوض وأفضلية في نتائج الولادة مقارنة بالدفع الموجه. وقد أوصت الدراسة إلى وضع سياسات في مؤسسات الرعاية الصحية تدعم الدفع التلقائي، مما يسمح للنساء اللواتي يلدن لأول مرة بالاستجابة للحوافز الطبيعية لأجسادهن، مما يسهم في تحسين نتائج الولادة.