Role of Perineal Length Estimation in The Prediction of Maternal and Fetal Outcomes

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ABSTRACT

Context: Female perineum is a significant part of females because perineal tears and episiotomy habitually happen in childbirth with first-time deliveries.
Aim: This study aimed to explore the role of perineal length (PL) estimation in the prediction of maternal and fetal outcomes.
Methods: A prospective cohort observational design used to collect data from the Department of Obstetrics and Gynecology, Laboring room, Kafrelsheikh General Hospital, Kafrelsheikh City, Egypt. A purposive sample of 139 parturient women recruited during the period from the first of December 2018 to the end of August 2019. Six tools used to conduct this study. Maternal and newborn characteristics questionnaire, disposable standardized paper tape for measuring PL in centimeters, a standardized scale for measuring maternal height by meters, and body weight in kilograms to calculate Body Mass Index (BMI) (k/m2), REEDA scale, partograph for labor process and Apgar score.
Results: There were statistically significant differences regarding the mean age, previous episiotomy and cesarean section of both studied groups (PL less than or equal to 4 cm and more than 4 cm) at p-value <0.001. Out of 139 parturient women, the two groups of PL less than or more than 4 cm had 16.7% versus 56.9%, respectively had normal vaginal delivery, with a statistically significant difference between both groups, while 46.7% versus 6.3% respectively had an episiotomy. However, the mean duration of the second stage of labor had statistically significant differences between both studied groups, with 116.7 ± 44.3 versus 85.1 ± 42.0, respectively. Additionally; Mean birth weight/grams, cephalohematoma, caput succedaneum, and mean APGAR score after 5 minutes had a statistically significant difference between the two groups.
Conclusions: Short perineum accompanied by increased duration of the second stage of labor. Cesarean section delivery and perineal trauma are associated with primigravida with short perineum. Regarding the mean APGAR score after 5 minutes, there were statistically significant differences between both studied groups. Maternity and newborn health nursing need to improve the illustration of the risk factors that can lead to undesirable consequences. Further research in the area of perineal anatomy may help patients avoid severe tears and many complications.

Keywords: Perineal length, prediction, maternal, and fetal outcome.

1. Introduction

Female perineum is the distance between the anus and the vulva. It is the region of the body between the pubic arch (pubic symphysis) and the tail bone (coccyx), including the perineal body and adjoining structures. The perianal area is a subdivision of the perineum (peri- and anal). It is an important part for females because perineal tears and episiotomy habitually happen in childbirth with first-time deliveries. However, the risk of these injuries can be abridged by getting ready the perineum, frequently through massage *(Trinh, Nippita, Dien, Morris, & Roberts, 2017)*.

The perineal body is a pyramidal fibromuscular form in the middle line of the perineum. It located at the junction between the urogenital and the anal triangles. It found between the vagina and anus. The perineal body is vital for the veracity of the pelvic floor. Its aperture during vaginal birth leads to an extension of the gap between the anterior free borders of levator ani muscle of both sides, thus inclining the woman to prolapse of the uterus, rectum, or even the urinary bladder *(Trinh et al., 2017)*.

The clinicians mostly ignored the practical significance of the perineum, though its significance in the diagnosis and classification of pelvic organ prolapse has been respected near the end of the twentieth century *(Delancey, 1998)*. Impartial sizes of the perineum have been comprised of the International Continence Society (ICS) in its new consistent terminology of pelvic organ prolapse and pelvic floor dysfunction *(Cundiff et al., 1997)*.

Though the PL was mentioned firstly in the literature as a cause of traumatic vaginal delivery by Nichols and Randall in 1996 *(Nichols & Randall, 1996)*. *Rizk & Thomas (2000)* were the first researchers to study the effect of PL and anal position on vaginal delivery. The study reported that the PL could ascertain primigravida who is at danger of perineal injury during vaginal delivery and in whom elective episiotomy is beneficial. In Egypt, the first study concerning PL was enrolled by *Hussein (2004)* about factors associated with using of episiotomy and its effects on the perineum. The study reported that long perineum had more liability to be intact.

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Unfortunately, the standard PL rarely described in an anatomy textbook. However, short perineum (<3 cm) recognized as being associated with weakness of the anatomical support of the pelvic viscera *(Delancey, 1998).* Still, short perineum is definite as <4 cm. According to *Rizk & Thomas (2000),* who reported that the perineum located between the vaginal orifice and the anus and its length is therefore dependent on the position of the anus. In Egypt, *Hussein (2004)* reported that PL in Egyptian women ranged from 2.5 to 8 cm, and 64.3% of women in the study sample (350 women) had short perineum with Mean ± SD of 4.3 ± 2.1.

Perineal injuries can be accompanied by significant long-term morbidity. Third and fourth-degree perineal tears, also known as extreme perineal injuries or obstetric anal sphincter injuries (OASIS) suggest lacerations that extend to the anal sphincter and damage the musculature of the anal sphincter (third-degree tear) or the anal mucosa (fourth-degree tear) *(Royal College of Obstetricians and Gynaecologists, 2015).* Furthermore, long term adverse physical and psychological consequences (pain, fecal incontinence, sexual dysfunction, and lifestyle alteration); OASIS can consequence in prolonged periods of hospitalization or readmission for repair *(Ampt, Ford, Roberts, & Morris, 2013)*. In high-income countries, Asian women are reported to be at increased hazards for both episiotomy and OASIS. These hazards continue after alteration for other risk factors such as parity, instrumental delivery, and birth weight *(Wheeler, Davis, Fry, Brodie, & Homer, 2012).*

Nurses play a dynamic role during labor and delivery by providing essential nursing assessments and interventions. The nurse is the initial person who comes to interact with a pregnant woman. The nurse should be respectful, available, encouraging, professional, and supportive during labor and delivery. The nurse should ensure comfort measures, information, instructions, emotional supports, advocacy, and support for the family as nursing interventions during labor and delivery *(Maria, 2018).*

A nursing role for parturient women includes; assessment, diagnosis (first, second, and third stage of labor), planning, implementation, and evaluation. Nursing assessments of the mother and fetus continue as the woman nears birth. During the second stage, the woman's perineum should be observed to determine when to make final birth preparations. The exact time for final birth preparations varies according to the woman's parity, inclusive speed of labor, and fetal station. Preparations usually completed when crowning in the nullipara reaches a diameter of about 3 to 4 cm. The multipara prepared sooner, often when the cervix becomes fully dilated, and the fetal head is well down in the pelvis, but before much crowning has occurred. The key to a successful care plan is the accurate assessment and accurate procurement of data. The woman would be placed under observation during labor to monitor her progress and ensure a safe delivery for her and the child *(Murray & McKinney, 2018).*

2. Significance of the study

The pelvic floor constructions arise in the course of vaginal delivery with wide contradict. Precisely 85% of women suffer from some range of perineal trauma during vaginal delivery, and around 69% suturing is necessary *(McCandlish et al., 1998; Barrett et al., 1999).* Obstetric perineal trauma is an alarming occasion expressively donating to postpartum morbidity and frustration of women after delivery. In many women, childbirth trauma exhibited in progressive age when the compensatory mechanisms of the pelvic floor become weakened, making the problem graver among the aged women *(Tinelli et al., 2010).*

Perineal trauma can be associated with significant long-term morbidity. Whereas several studies have looked at PL with regards to the risk of perineal trauma, none have produced normative data for PL in a group of women of childbearing age. The perineal body is an imperative anatomical construction in women providing distal support to the pelvic viscera. However, the averages for PL in the obstetric nursing population have not been defined before. This study offers average data that can be used as a yardstick in future research to explore the role of PL estimation in the prediction of maternal and fetal outcomes.

3. Aim of the study

This study aimed to explore the role of perineal length (PL) estimation in the prediction of maternal and fetal outcomes.

3.1. Research question

- Is there a relationship between the perineal length and maternal and fetal outcomes?

4. Subjects and Methods

4.1. Research design

A prospective cohort observational design. Observational studies fall under the category of analytic study designs and are further sub-classified as observational or experimental study designs. The goal of analytic studies is to identify and evaluate causes or risk factors of diseases or health-related events *(Song & Chung 2010).*

4.2. Research Setting

Department of Obstetrics and Gynecology, Laboring room, Kafrelsheikh General Hospital, Kafrelsheikk City, Egypt.

4.3. Subjects

Purposive sample of 139 parturient women divided into two groups (First group: PL was less than or equal to 4 cm and second group: PL was more than 4 cm). Data collected during the period from the first of December 2018 to the end of August 2019. Women included in the study were all parturient women with the following:

Inclusion criteria

- No maternal or fetal risk factors.
- Admission in the first stage of labor.

- A live singleton cephalic presentation.
- At 37 weeks of gestation.
- Accepted to participate in the current study.

Excluded criteria

- Malposition, malpresentation.
- Preterm labor.
- Multiple pregnancies.
- Previous vaginal surgery.
- Any other pre-decided indication of cesarean section (CS).
- Election to have epidural analgesia during labor.
- The second stage of labor at the time of admission.
- A fetal station greater than zero.

Sample size: The required sample size estimated considering 95% level of confidence (an error = 5%), and a study power of 80% (β error=20%) and based on data from the literature, the sample size calculated using the following formula *(Farghaly et al., 2017).*

$$[(Z1-\alpha/2)\ 2.SD2]/d2$$

Where,

Z1-α/2 = is the standard normal variate, at 5% type 1 error ($p<0.05$) it is 1.96.

SD = standard deviation of variable.

d = absolute error or precision.

So, Sample Size = [(1.96)2. (10.4) 2]/(1.73)2 =138.8

Based on the above formula, the sample size required for the study was 139.

Recruitment technique: All parturient women who met the inclusion criteria recruited consecutively, one by one, until the assigned sample size completed during the study period.

4.4. Tools of data collection

Data collected using the following six tools:

4.4.1. Structured Interviewing Questionnaire:

It was developed by the researcher to assess maternal and newborn characteristics. It consists of two parts that were initially designed to collect maternal characteristics, such as personal data (age, education, occupation, and BMI). The second part included the assessment of medical and obstetrical data (gestational age/weeks, parity, previous episiotomy, previous CS, cervical dilation assessment at 1st and 2nd stage of labor/cm, and fetal presentation).

Information regarding the mode of delivery (normal, assisted vaginal delivery or CS), duration of 1st and 2nd stage of labor/min, premature rupture of membrane (PROM), use, and type of analgesia, oxytocin used, episiotomy, perineal or vaginal tears were also assessed.

The estimation of a laceration degree based on the following classification: First-degree lacerations involve only the epithelial layer. Second-degree lacerations can extend into the perineal body but not into the external anal sphincter. Third-degree lacerations extend into the anal sphincter. Fourth-degree lacerations extend through the rectal mucosa)

4.4.2. REEDA Scale

It developed by Davidson in 1979 to reach objective results in the postnatal assessment of perineum. Hill completed the validity and reliability of the scale in 1989 and Ustunsoz in 1996 *(Alvarenga et al., 2015).*

Scoring system

The scale contained five wound healing parameters such as redness, edema, ecchymosis, discharge, and approximation. Scale parameters evaluated by giving 0, 1, 2, and 3 scores to each assessment. The lowest score was 0, and the highest score is 15. The highest score indicates the most serious perineal trauma (table 1).

Table (1): Scoring system for REEDA scale

Points	Redness	Oedema	Ecchymosis	Discharge	Approximation
0	None	None	None	None	Close
1	Within 0.25 cm of the incision bilateral	Perineum less than 1 cm from the incision	Within 0.25 cm of the incision bilaterally or 0.5 cm unilateral	Serum	Skin separation 3 mm or less
2	Within 0.5 cm of the incision bilaterally	Perineum and or between than 1-2 cm from the incision	Between 0.25 cm to 1 cm bilaterally or between 0.5-2 cm unilateral	Serosa guineas	Skin and subcutaneous fat separation
3	Larger than 0.5 cm of the incision bilaterally	Perineum and or vulvar greater than 2 cm from the incision	Greater than 1 cm bilaterally or 2 cm unilateral	Bloody purulent	Skin and subcutaneous fat and facial layer separation

4.4.3. The Disposable Standardized Paper Tape

This tool used for measuring the perineal length in centimeters. The PL was measured early in the 1st stage of labor. The PL measured with flexed knees (dorsal lithotomy position) for the parturient woman lying on her back and was performed between contractions to facilitate relaxation for women. A single-use or disposable paper tape (to prevent infection) used to measure the distance from the fourchette to the center of the anus (perineal length) in centimeters (cm). Researchers designed these disposable paper tapes. The study researcher performed the perineal length measurements. The researcher independently measured PL on eligible women until 4 to 5 consecutive measurements were the same to the nearest millimeter.

4.4.4. Standardized Tape and Weighing Scale

The scale used for measuring maternal height by meter and body weight by kilograms to calculate BMI (k/m^2). Body Mass Index (BMI) calculated as women's weight in kilograms divided by her height in meters squared (kg/m^2). If the BMI is 18.5 to <25, it falls within the normal. If the BMI is 25.0 to <30, it falls within the overweight range. If the BMI is 30.0 or higher, it falls within the obese range.

Scoring system

The women's BMI scored as following according to the world health organization *(WHO, 2019).*

Table (2): Scoring system of BMI

Classification	BMI (kg/m2)	Risk of comorbidities
Underweight	< 18.5	Low
Normal range	18.5 to 24.9	Average
Overweight	25.0 to 29.9	Mildly increased
Obese	> 30.0	Sever

4.4.5. The Partogram Assessment Chart

It is used to assess labor progress (Intervention and application tool (WHO partogram). Partogram contains a fetal and maternal record. The fetal record may track fetal heart rate, the descent of the fetal presenting part, condition of amniotic fluid, and molding of the fetal skull. The maternal record includes temperature, heart rate, blood pressure, urine test (for protein and ketones), uterine contractions, use of medications (such as oxytocin), membrane condition, cervical dilatation, randomization to delivery time, action line crossed and action is taken *(WHO, 1994).*

4.4.6. APGAR Score

The Apgar score comprises five components of neonates: color, heart rate, reflexes, muscle tone, and respiration.

Scoring system

Each of these components has given a score of 0, 1, or 2. Thus, the Apgar score quantitates clinical signs of neonatal status, such as cyanosis or pallor, bradycardia, depressed reflex response to stimulation, hypotonia, and apnea or gasping respirations. The score reported at 1 minute and 5 minutes after birth for all neonates. The Apgar score provides an accepted and convenient method for reporting the status of the neonates immediately after birth. The Apgar score widely recognized that a rating of 7-10 is average, 4-6 is moderately abnormal, and 0-3 is abnormal. Any score of lower than seven should alert the medical practitioner to consider whether the baby requires any intervention as resuscitation or SCBU if it is needed *(Medeiros et al., 2018).*

Table (3): Scoring system of Apgar score

Score	0 point	1 point	2 points
Appearance (skin color)	Cyanotic/pale all over	Peripheral cyanosis only	Pink
Pulse (heart rate)	0	<100	100-140
Grimace (reflex irritability)	No response to stimulation	Grimace (facial movement)/weak cry when stimulated	Cry when stimulated
Activity (tone)	floppy	Some flexion	Well when stimulated
respiration	Apneic	Slow, irregular breathing	Strong cry

4.5. Procedures

A panel of three experts reviewed the used tools in this study in the Maternity and Newborn Health Nursing specialty before introducing them to the participants to ensure its validity, and their comments considered. The researchers developed the tools after reviewing the relevant literature. Tools wrote in the English language. All study tools adopted from valid original tools. The reliability of the REEDA Scale tested by the Cronbach Alpha test. The reliability analysis investigated the degree of agreement between the observer's evaluations (intra-rater reliability). A higher agreement between evaluations provided by the professionals was considered greater reliability. For this analysis, the Kappa Coefficient was used, which ranges from 0 to 1. A kappa value of ≥ 0.75 considered an excellent agreement, and a result > 0.45 and < 0.75 indicated good agreement. A value ≤ of 0.45 was considered marginal agreement *(Alvarenga et al., 2015).*

Official permission obtained from the study setting director. Ethical approval granted from the Ethics Committee of the Nursing Faculty, Kafrelshiekh University. Permission and oral consent to carry out the study obtained from parturient women. The researcher introduced herself to all health care providers and parturient women, and the aim of the study was explained before their participation to obtain their acceptance and cooperation.

The pilot study conducted on 10% of the total sample (14 parturient women). The pilot study aimed to assess the required time for a researcher to perform the task for each parturient woman and to assess clarity, feasibility, and applicability of the tools and feasibility of the research process. The results of the pilot study indicated that the task needed 15 to 25 minutes to be completed. The participants of the pilot sample included later in the study sample because there were no modifications of the tools and instruments' statements were clear and applicable.

Implementation phase: After obtaining an oral consent and explained the study aims as well as evaluation for inclusion and exclusion criteria, the researcher approached women in early labor soon after admission to the pre-labor room and recorded the number of women approached. The researcher collected baseline data (personal and obstetrical history), measured the PL, and recorded the cervical dilation. Baseline data included maternal age, parity, level of education, occupation, gestational age, number of previous episiotomies, previous CS, and maternal height and weight for calculation of BMI (kg/m^2), duration of both 1st and 2nd stage of labor, use, and type of analgesia, fetal presentation, mode of delivery, episiotomy, perineal or vaginal tears, newborn gender and birth weight. There was no missing information for any of the women recruited to the study.

The PL was measured early in the 1st stage of labor. PL should not be measured during the 2nd stage of labor because of bulging of perineum leading to misreading. PL measured with the parturient woman lying on her back with flexed knees (dorsal lithotomy position), and it measured between contractions to promote women's comfort. A single-use or disposable paper tape (to prevent infection) was used to measure the distance from the fourchette to the center of the anus (perineal length) in centimeters (cm). The PL measurements made by the researcher. The researcher independently measured PL on eligible women until 4 to 5 consecutive measurements were the same to the nearest millimeter. The researcher monitored intrapartum practices of labor and early detection of labor complications. If the cervix was not fully dilated within 2 hours, operative treatment was indicated, and CS was done.

After delivery, data on oxytocin use, length of the second stage of labor, fetal presentation, use of episiotomy, perineal or vaginal lacerations, degree of laceration, and delivery type recorded. The delivering physicians, who included both residents and attending physicians, graded perineal lacerations clinically as none or first through the fourth degree according to the previously mentioned criteria. As related to fetal outcomes, baby needs for SCBU depending on APGAR score that determined after 1 minute and 5 minutes, and the baby weight was measured.

Outcome assessment phase: The outcomes in the present study were assessment of maternal and fetal outcomes. Maternal outcomes include the duration of the second stage of labor, mode of delivery, need for episiotomy, the possibility of perineal or vaginal tears, and needing repair. Additionally, perineal pain after 24 hours and wound healing assessed regarding the REEDA scale. Fetal outcomes include the baby's need for SCBU depending on APGAR score.

4.6. Limitation of the study

The study sample nominated from a single setting, so a generalization of the findings could not be accessible. Additionally, Egyptian studies deficient in exploring the role of PL estimation in the prediction of maternal and fetal outcomes in maternity and newborn health nursing specialties. It was an additional limitation of the current study. The cause of deprived in national references in the introduction and discussion partitions

4.7. Data analysis

All statistical analyses were performed using Statistical Package for Social Science for windows version 20.0 (SPSS, Chicago, IL). Continuous data were normally distributed and expressed in mean ± standard deviation (SD). Categorical data expressed in number and percentage. The comparisons were determined using Student's t-test for variables with continuous data. A chi-square test used for comparison of variables with categorical data. Statistical significance was set at $p<0.05$.

5. Results

One hundred and thirty-nine eligible parturient women included in the study according to inclusion and exclusion criteria. Result findings of the current research presented in five sections each one described the study factors. Concerning PL, it was less than or equal to 4 cm (Group 1, n = 60) or more than 4 cm (Group 2, n =79). Distribution of the parturient women by their demographic and obstetrical history, according to PL, the relationship of maternal outcomes to PL, the relationship of labor stages to mean PL, and the relationship of newborns outcomes to PL.

Table 4 shows statistically significant differences regarding the age groups, mean age, and maternal occupation between both groups (PL less than or equal to 4 cm and more than 4 cm). There were no significant differences regarding maternal education as well as maternal BMI.

There is a highly statistically significant difference between two studied groups regarding gestational age, previous episiotomy, previous CS, and cervical dilatation at the 2nd stage of labor, as presented in table 5.

Table 6 represents a highly statistically significant difference between both groups regarding the mode of delivery, and a high number of premature ruptures of the membrane, more analgesia, and oxytocin use were observed with a high statistical significance difference between the two groups. As regarding perineal pain after 24 hours, there is a highly statistically significant difference between both groups, but there is a statistically significant difference between both groups regarding wound healing after 24 hours.

Regarding the occurrence of the perineal tear (total), figure 1 illustrates 83.3% versus 24.1%, respectively, in both studied groups (PL less than or equal to 4 cm and more than 4 cm).

Table 7 represents a comparison of the mean duration of the first and second stages of labor between both studied groups. The table concludes that; there are statistically significant differences between the two groups in the two labor stages.

Table 8 reports that newborn gender had statistically significant differences between two groups; the p-value was<0.001, while macrosomia, stillbirth, and also; SCBU

admission had no statistically significant differences between the two groups. On the other hand, mean birth weight/grams had statistically significant differences between the two groups. Moreover, cephalohematoma and caput succedaneum had statistically significant differences between the two groups at the p-value of <0.001 and added that mean APGAR score after 5 minutes was (9.23 ±0.64 versus 8.50±1.04 respectively) between two groups and had statistically significant differences, the p-value was<0.001.

Table (4): Frequency and percentage distribution of demographic characteristics of the parturient women according to perineal length.

Demographic characteristics	Perineal length less than or equal to 4 cm (group 1) (n = 60)		Perineal length more than 4 cm (group 2) (n = 79)		x^2	P
	N	%	N	%		
Maternal age/year						
<20 years	30	50.0	10	12.7		
20-30 years	10	16.7	40	50.6	27.571	<0.001
More than 30 years	20	33.3	29	36.7		
Maternal age /year (Mean ±SD)	24.5±6.7		26.8±5.1		2.299	0.023
Body mass index/ kg/m^2						
Underweight	10	16.7	20	25.3		
Normal weight	20	33.3	20	25.3	6.309	0.098
Overweight	15	25.0	29	36.7		
Obese women	15	25.0	10	12.7		
Education						
Primary education	30	50.0	39	49.4		
Secondary education	20	33.3	20	25.3	1.946	0.378
Higher education	10	16.7	20	25.3		
Occupation						
Housewife	40	66.7	10	12.7	43.187	<0.001
Worker	20	33.3	69	87.3		

Table (5): Frequency and percentage distribution of obstetric history of the parturient women according to perineal length.

Items	Perineal length less than or equal to 4 cm (group 1) (n = 60)		Perineal length more than 4 cm (group 2) (n = 79)		x^2	P
	N	%	N	%		
Gestational age/weeks (Mean ±SD)	39.6 ±1.1		37.1±1.3		8.910	<0.001
Parity						
Nulipara	10	16.7	19	24.1		
Multipara	50	83.3	60	75.9	1.126	0.289
Previous episiotomy	25	41.6	5	6.3	25.16	<0.001
Previous cesarean section	20	33.3	3	3.8	21.543	<0.001
Cervical dilation /cm at 1ststage assessment (Mean ±SD)	2.7±0.8		2.8±0.8		0.730	0.467
Cervical dilation /cm at 2ndstage assessment (Mean ±SD)	7.7±0.5		8.8±0.9		8.517	<0.001

Table (6): Comparison of maternal outcomes between two groups.

Items	Perineal length less than or equal 4 cm (n = 60)		Perineal length more than 4 cm (n = 79)		x^2	P
	N	%	N	%		
Mode of delivery						
Normal vaginal delivery	10	16.7	45	56.9		
Assisted vaginal delivery	43	71.7	31	39.2	23.664	<0.001
Caesarean section	7	11.7	3	3.7		
Premature rupture of membrane	30	50.0	4	5.1	37.267	<0.001
IV Analgesia	30	50.0	5	6.3	34.52	<0.001
Oxytocin used	40	66.7	20	25.3	23.767	<0.001
Episiotomy	28	46.7	5	6.3	30.647	<0.001
Blood loss (mL)/(Mean ±SD)	130.3±83		125±66		0.419	0.676
Perineal tears						
No	10	16.7	60	75.9	12.906	<0.001
Grade 1	5	8.3	11	13.9	1.046	0.306
Grade 2	5	8.3	4	5.1	0.602	0.438
Grade 3	25	41.7	3	3.8	30.401	<0.001
Grade 4	15	25.0	1	1.3	66.252	<0.001
Perineal pain after 24 hours	50	83.3	8	10.1	75.159	<0.001
The wound healing after 24 hours	40	66.7	70	88.6	9.943	0.002

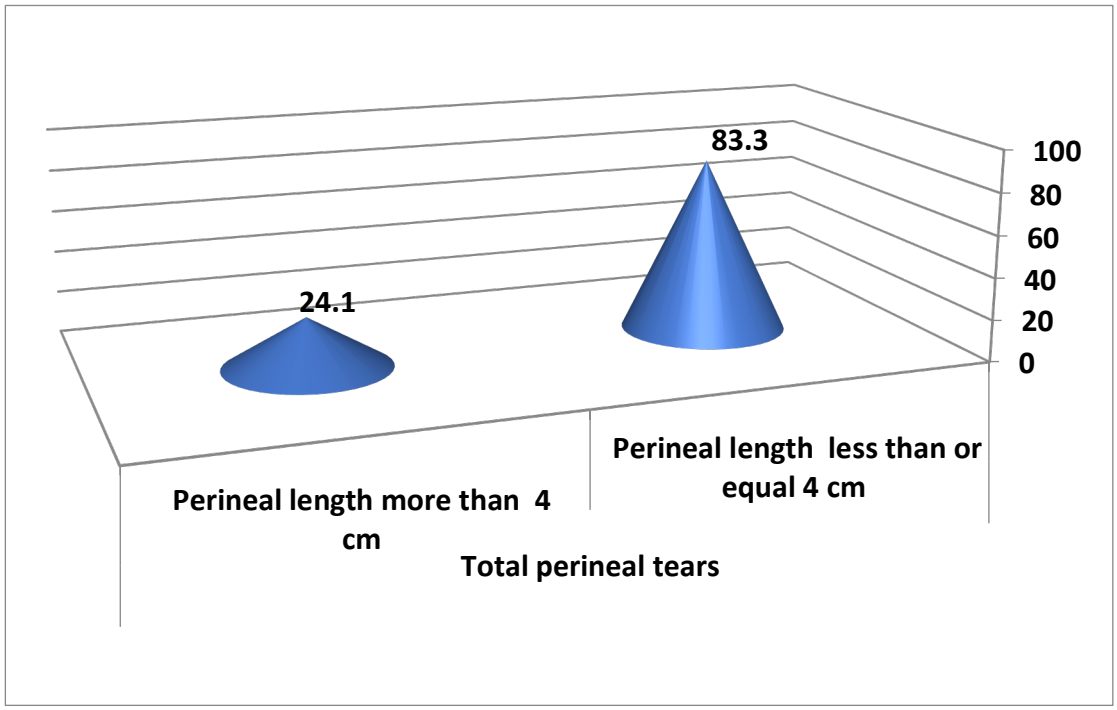

Figure (1): Percentage distribution of total perineal tears for both studied groups.

Table (7): Comparison of the mean duration of first and second stages of labor between both studied groups.

Item	Perineal length less than or equal 4 cm (n = 60)	Perineal length more than 4 cm (n = 79)	T	P
The first stage of labour (Mean ±SD)	309.9±69.7	226.9 ±63.6	7.311	<0.001
The second stage of labour (Mean ±SD)	116.7±44.3	85.1 ±42.0	4.291	<0.001

Table (8): Comparison of newborn outcomes between both studied groups.

Items	Perineal length less than or equal 4 cm (n = 60)		Perineal length more than 4 cm (n = 79)		x^2	P
	N	%	N	%		
Newborn gender						
Female	40	66.7	30	38.0	18.316	<0.001
Male	20	33.3	49	62.0		
Stillbirth	2	3.3	1	1.3	0.690	0.406
Birthweight /grams (Mean ±SD)	2085±317		2253±370		2.818	0.006
Macrosomia	1	1.7	0	0.0	1.326	0.250
Chephalohematoma	40	66.7	2	2.5	66.522	<0.001
Caput succedaneum	30	50.0	1	1.3	46.739	<0.001
Apgar score						
Apgar score 1 min **(Mean ±SD)**	8.68±1.04		8.80±1.04		0.674	0.502
Apgar score 5 min **(Mean ±SD)**	9.23±0.64		8.50±1.04		4.790	<0.001
SCBU admission*	3	5.0	1	1.3	1.701	0.192

**SCBU= Special Care Baby Unit*

6. Discussion

The tiny and long-standing morbidity from perineal or vaginal trauma had been an imperative disorder. Also, the credentials of women who were in need for episiotomy had been a domineering sickness. Creation of a reliable strategy in dealing with this irrefutable risk aided to advance patients' care and reduce proceedings (*Trinh et al., 2017).* The study aimed to explore the role of PL estimation in the prediction of maternal and fetal outcomes. To our knowledge, the present study is one of the first studies that contribute to this subject in maternity and newborn health nursing specialty; this might augment more significance in this study.

The following research question formulated to fulfill the aim of this study: Is there a relationship between the perineal length and maternal and fetal outcomes? To answer that question and achieve the study's aim, the analysis of the results would be addressed.

One hundred and thirty-nine eligible parturient women included in the study according to inclusion criteria. Result findings of the current study presented in five sections each one described the study factors concerning PL. It was less than or equal to 4 cm (Group 1, n = 60) or more than 4 cm (Group 2, n =79). Distribution of the parturient women by their demographic and obstetrical history, according to PL, the relationship of maternal outcomes to PL, the relationship of duration of labor stages to PL, and the relationship of newborns outcomes to PL.

The current study showed that; there were statistically significant differences regarding the mean age of both studied groups (PL less than or equal to 4 cm and more than 4 cm), which were (24.5 ± 6.7 versus 26.8 ±5.1 respectively). Additionally, half of the subjects in group 1 were younger (less than 20 years). This finding may be tilted to most younger women were primipara that means no previous chance for the perineum to stretch as multipara, that stretching lead to long perineum. This finding contradicted with Farghaly and coworkers, who stated that PL is longer in younger women compared with older ones. This finding could be clarified by the leaning of the increased number of para with age that injured the perineum and shortened it *(Farghaly et al., 2017).*

The change in the PL between primipara and multipara had been previously proven *(Howard, Davies, Delancey, & Small, 2000; Fenner, Genberg, Brahma, Marek, & Delancey, 2003; de Parades et al., 2004).* On the other hand, this result had not proven by the current study as there was no significance between PL between both studied groups and parity. Although the researcher's viewpoint was; multiparity women had a chance for stretching the perineum during previous delivery. Trinh et al. reported that PL measurements were similar regardless of parity among Vietnamese women, which supported the current study result *(Trinh et al., 2017).*

The PL in the present study was established by *Hussein, (2004), Farghaly et al., (2017)* because these studies included primi and multipara. This finding was different by Rizk et al., who informed longer PL as 4.6 cm versus 2.5 cm as short perineum, respectively than what has been measured in the present study *(Rizk & Thomas, 2000).* This difference could be credited to the enclosure of solitary primipara in Rizk and coworkers' study who usually had long untraumatized perineum compared with women of mutable parities in the current study (*Rizk, Abadir, Thomas, & Abu-Zidan, 2005).*

Furthermore, the present study evidenced prior results that there was no association between PL and other maternal factors such as maternal BMI *(Trinh et al., 2017; Dua, Whitworth, Dugdale & Hill, 2009).* In this circumstance, An Egyptian nursing study explained that; the increase of BMI leads to increased adipose fatty tissues in the perineum that leads to the difficulty of perineum stretching that associated with short perineum *(Hussein, 2004).*

Auspiciously, the present study evidenced prior results that there was a statistical significance difference between perineal length and other maternal and obstetric outcomes such as cervical dilatation at second stage, duration of first and second stage of labor, premature rupture of membrane, IV analgesia and oxytocin used *(Trinh et al, 2017; Deering, 2002; Dua et al., 2009).*

Fortunately, the cesarean section rate in the present study was low, and this could be because all deliveries were characterized without maternal or fetal risk features omitted from the participation of the study. Completely the current study contributors were low-risk deliveries, and most of them were delivered or overseen by an obstetrician in charge. Unfortunately, the nurse-midwifery system is not applied in a study setting or other civic hospitals in Egypt. Episiotomies rate (about half versus lea than one-tenth respectively between both studied groups) and total perineal tears (more than four-fifths versus quartered respectively between both studied groups) were unacceptable taking in attention that a large number of the study sample were multipara. Nevertheless, if episiotomies and perineal tears rate was 30%, this finding was acceptable from Farghaly and colleagues as a respectable number of their study participants were primiparous *(Farghaly et al., 2017).* In the same context, the rate of episiotomy was higher among parturient women with shorter perineum in the present research (about half). Nevertheless, the incidence of obstetric trauma that needed repair was higher to parturient women with short perineum among those who did not have an episiotomy.

Episiotomy with perineal tears in one category was included by previous studies that revealed an antagonistic relationship between PL and obstetric trauma needing repair *(Rizk & Thomas, 2000; Walfisch, Hallak, Harlev, Mazor, & Shoham-Vardi, 2005).* The difference in the relation between episiotomy and PL between the current and previous studies might be endorsed to the actual need for episiotomy with long perineum. Long perineum might be associated with shorter genital hiatus. A factor that was earlier recognized as one of the essential causes of episiotomy affected the possibility of perineal or vaginal injuries *(Rizk et al., 2005).* Conversely, mismanagement of optional episiotomy in primipara by beginning obstetricians might be a part of that difference.

The second stage of labor duration in the present study was longer (116.7 ±44.3 Versus 85.1 ±42.0) in those with PL less than four cm compared to those with more than or equal to four cm. The same concern discussed by prior research *(Farghaly et al., 2017).* However, *Deering (2002)* critiqued this concern and displayed that; there was no significant difference between the second stage of labor duration and perineal length, even it was short or long. The present research postulated that; this might be secondary to the further time needed for the perineum to stretch to open the obstetric outlet. The stretching ability of the perineum was a perplexing factor that might affect the second stage of labor duration *(Walfisch et al., 2005).* Observation of more traumas with short perineum might be ascribed to that the short perineal body was revealing of either a smaller bony pelvis or a smaller vaginal opening that was suggested by the previous studies *(Rizk & Thomas, 2000; Walfisch et al., 2005).*

Moreover, Farghaly and co-workers suggested a relation might be attributed to single or extra of the next suggestions. Initial was that; the short perineum inhibited the head from one of the natural supports during its way in the birth canal (the rigid perineum) that normally inhibiting its early extension during delivery. Lack of this needed natural support did permit early extension of the head, bringing longer anterior-posterior diameter and increases the obstetrical trauma possibility. Additionally, this remark might be secondary to the shortness in the 2nd stage of labor duration established in their study, especially in multipara (most of those who did not have episiotomy). Short 2nd stage might not let adequate time to put the mother in a lithotomy position to have excellent perineal support. Moreover, short perineum might cause a shorter 2nd stage of labor, giving less time for stretching of the perineum (an issue that had not been informed in their study). Quickly stretched perineum was rigid and more likely for tears *(Rizk et al., 2005; Farghaly et al., 2017).*

What is more; the present study evidenced prior results that there was a statistical significance difference between perineal length and other maternal and obstetric outcomes such as perineal pain after 24 hours and the wound healing after 24 hours (REEDA Scale) *(Trinh et al., 2017; Dua et al., 2009).* Equally, appropriate supervision of delivery might be significantly influencing the difference. On the other hand, there was no relation between perineal length and other maternal outcomes, such as maternal blood loss. That might be due to the small sample size in the current study.

The newborn mean birth weight/grams had statistically significant differences between the two groups. This finding was established by Eggebo and coworkers who studied ultrasound assessment of fetal head–perineum distance before induction of labor *(Eggebo et al., 2008).* Moreover, chephalohematoma and caput succedaneum had a statistically significant difference between both studied groups; these results illustrated increasing in fetal head circumferences in relation to the perineal length that promoted stretching in case of longer perineum. Additionally, the mean Apgar score after 5 minutes had a statistically significant difference between both studied groups. In the same context, the mean Apgar score after 5 minutes was 9.23 ±0.64 versus 8.50±1.04, respectively, between both studied groups and had a statistically significant difference. Above and beyond, stillbirth, macrosomia, and SCBU admission had no statistically significant difference between both studied groups; those findings were established by Eggebo and coworkers *(Eggebo et al., 2008).*

On the other hand, there was a positive relation between perineal length and other newborn outcomes, such as gender. That might be due to a lack of sample extent. Finally; Obstetricians or midwives should anticipate normal vaginal delivery or episiotomy needed when provoked with primigravida with long perineum. Conversely, if the perineum was short, they should not be deceived, short perineum was more probably torn, and the newborn was under risk if her mother had short perineum.

7. Conclusion

The current study concluded that, out of 139 parturient women, both studied groups of PL less than or more than 4 cm had a statistically significant difference in relation to mode of delivery while the mean duration of the second stage of labor had a statistically significant difference between both studied groups. Episiotomies rate (about two-third versus quartered respectively between both studied groups) and total perineal tears (more than four-fifths versus quartered respectively between both studied groups) were associated with PL. In assumption, shorter perineum was accompanied by an increase in the second stage of labor duration. Regarding fetal outcomes, there were statistically significant differences between both studied groups regarding the mean APGAR score after 5 minutes and. The discussion of findings presented to answer the research question that there is a relationship between the perineal length and maternal and fetal outcome and to achieve the aim of the study.

8. Recommendations

Perineal length should be focused on maternity and newborn health nursing curriculum. The long-standing illness accompanied by severe perineal tears leftover is important. Maternity and newborn health nursing fields need to endure to improve the illustration of the risk factors that can lead to these undesirable consequences. Further research in the area of the perineum may help patients avoid severe tears.

9. References

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