

Risk Factors for Perineal Tears Among Women Delivering at Kawempe National Referral Hospital, Uganda: A Case Control Study

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Abstract

Background: Perineal tear is a common complication of vaginal delivery with a significant negative impact on the quality of life. The condition commonly occurs among un-attended deliveries or those conducted by unskilled birth attendant especially in low-resource settings. The risk factors for perineal tear were not known at Kawempe Hospital. We conducted this study to determine the risk factors for perineal tear among women delivering at Kawempe National Referral Hospital, Uganda.

Methods: This was a case control study that was conducted among women who had vaginal delivery at Kawempe National Referral Hospital from 20th December 2019 to 5th February 2020. Data on sociodemographic, maternal, fetal and provider characteristics were collected using an interviewer's administered questionnaire. Risk factors were determined using bivariate and multivariate logistic regression analysis.

Results: The risk factors for perineal tear were: maternal age of ≥ 20 years (AOR=7.24, 95% CI=2.28- 23.00, P<0.001), delivery by assistant nursing officer (AOR=16.39, 95% CI=5.74-46.81, p <0.001), primiparity (AOR=12.46, 95% CI=3.41-45.52, P<0.001), single marital status (AOR=14.39 95%, CI=4.28-48.39, P<0.001), precipitate labour (AOR=7.8, 95% CI=2.21-27.55, P< 0.001), assisted vaginal delivery (AOR= 8.33, 95% CI=1.43-48.6, P<0.019), fetal weight ≥ 3.5 Kg (AOR=2.19, 95% CI= 1.06- 4.53, P<0.033), duration of active first stage of labour ≥ 8 hours (AOR=12.65, 95% CI=5.65-28.25, P<0.001) and duration of second stage of labour > 1 hour (AOR=10.21 95% CI=3.32-31.41, P<0.001).

Conclusions. The risk factors for perineal tear during vaginal delivery at Kawempe National Referral Hospital were: maternal age ≥ 20 years, delivery by assistant nursing officer, primiparity, single marital status, precipitate labour, assisted vaginal delivery, fetal weight ≥ 3.5 kg, duration of active first stage of labour ≥ 8 hours, duration of second stage of labour ≥ 1 hours.

Background

A perineal tear is defined as a break in the continuity of either the perineal skin, mucosa, muscles/ connective tissues, anal sphincter complex and or rectal mucosa [1]. It is estimated that up to 85% of women experience perineal tear at one time during vaginal delivery [2], with undesirable maternal outcomes [3]. These perineal tears especially the severe ones are most common among deliveries that are either unattended or conducted by un skilled birth attendants [4]. There is some evidence that the incidence of severe perineal tear may be increasing worldwide [5], but it is unclear if this is due to improved recognition , reporting or actual rise. A study at Mbarara Teaching Hospital in South Western Uganda indicated the incidence of 6% for severe perineal tears among vaginal deliveries [4]. In relation to this, a survey by WHO in 2014 reported that severe perineal tear occurred in up to 15 % of deliveries in Philippine [6]. The overall prevalence of perineal tear was 36.5% at Mulago National Referral Hospital,

Kampala Uganda [7]. In other study, second degree perineal tears occurred up to 31% of vaginal deliveries [8]. Women who sustain birth related perineal injuries are at risk of undesirable maternal outcomes. The most common outcomes are, postpartum hemorrhage, perineal pain, sexual dysfunction, rectovaginal fistula and anal incontinence

The risk factors for perineal tear consistently highlighted in previous studies are:-duration of second stage of labour >1hours, [5], [9], [10], nulliparity [6], [11], fetal weight $\geq 3.5\text{kg}$ [12], [4], fetal weight $\geq 4.0\text{ Kg}$ [6], [9], assisted vaginal delivery [9], [6], [13], occiput posterior position [14], [15],

precipitate labour [13], [16], and fetal head circumference >35cm [17]. Episiotomy has been linked to occurrence of perineal tear, but with conflicting reports. In this context, the procedure has been reported to be protective against tears [18], [9], [19], and a risk factor for perineal tear especially the midline type of episiotomy [20], [12], [14]. Episiotomy is one of the factors identified to increase the risk for Anal sphincter injuries based on a study at Mbarara Hospital [4]. Another risk factor identified was duration of second stage of labour ≥ 1 hour. In similar study, the protective factors against perineal tear were maternal age of 25 years or more, manual perineal support, and annual income of $\geq 50,000$ Uganda shillings.

Generally, there limited data on risk factors for perineal tears in our setting. Our study aimed at determining the risks factors for perineal tear among women having vaginal delivery at Kawempe National Referral Hospital, Central Uganda. The findings will inform policy formulation and clinical practices geared to enhance better management and prevention of obstetric perineal tear.

Methods

This was a hospital based un-matched case control study among women who delivered at Kawempe National Referral Hospital (KNRH), central Uganda. The study was conducted from 20th December 2019 to 5th February 2020. KNRH is a public National Referral Hospital specialized in Obstetrics and Gynaecology, Pediatrics and Child health. The hospital serves as a teaching facility for postgraduate trainees in obstetrics and Gynaecology but also for undergraduate medical students of Makerere and St Augustine Universities. Other nearby medical training institution such as Mulago and Mengo school of nursing also use the hospital for teaching. Being a national referral, the hospital is one of the busiest facilities in the country with 80-100 deliveries daily, approximately 32000 deliveries per year. In our study, we defined a case as a mother who either got a second, third or fourth-degree perineal tear during vaginal delivery at KNRH. Controls were mothers who had vaginal delivery at KNRH without getting any perineal tear. We recruited and interviewed 348 participants (116 cases and 232 controls).The sample size was estimated using an online formula for case control study by Glaziou Phillippe [21]. We used primiparity as an independent risk factor based on a study at Tygerberg Hospital in South Africa [22]. The cases were consecutively sampled and for each case, two controls were recruited by considering women who delivered following recruitment of a case. If a case was followed by a case, then the next four women delivering without sustaining a tear were selected as controls. The diagnosis of a case was done by trained research assistants who were professional midwives, with assistance from a residents and

obstetricians on duty. Data were collected on, social demographic, maternal-obstetric, fetal and provider variables among the study participants. The pretested questionnaires administered by the research assistants were used for data collection. The questionnaires were checked for completeness and accuracy on daily basis by the first author. Data were double entered and cleaned using Epi data 3.1 and then exported to and analyzed using Stata version 14.1. Using the Chi-square test for categorical variables and Student's t-test for continuous variable, crude odds ratios (CORs) and p-values for the variables were determined with their 95% confidence intervals. The factors with p-value of ≤ 0.2 at bivariate analysis were entered into the multivariate logistic regression model. The adjusted odds ratio (AOR) and P-values for each variable were determined at multivariate level, with statistical significance at a P-value of ≤ 0.05 .

Results

A total of 348 women (116 cases and 232 controls) were recruited into the study. Of the 116 cases, 106 (91.4 %) had second degree tear, 9 (7.8 %) third degree tear and 1 (0.9%) fourth degree tear. The participants were aged 14 to 41 years, with mean age of 25.6 years and standard deviation (SD) of ± 5.6 . Majority of participants were married; 92 (79.3%) of cases and 226 (97.4%) of the controls. The rest of the details are in Table 1.

Table 1
Socio- Demographic Factors of Study Participants

Variable	Case, n = 116/%	Control, n = 232/%	Crude odds ratio (COR)	95%CI	P- value
Age					
< 20	11(9.5)	27(11.6)			
20–30	92(79.3)	144(62.1)	1.00		
> 30	13(11.2)	61(26.3)	1.57	0.74–3.31	0.239
Education					
None	8(7.0)	14(6.0)	1.00		
Primary	41(35.6)	70(30.2)	1.03	0.40–2.65	0.959
secondary	50(43.5)	130(56.0)	0.67	0.27–1.70	0.403
Tertiary	16(13.9)	18(7.8)	1.56	0.52–4.67	0.431
Residence					
Rural	16(13.8)	38(16.4)	1.00		
Urban	100(86.2)	194(83.6)	1.22	0.65–2.30	0.530
Marital status					
Married	92(79.3)	226 (97.4)	1.00		
Single	24 (20.7)	6 (2.6)	9.42	3.71– 23.88	< 0.001
Religion					
Catholic	25(21.6)	60(25.9)	1.00		
Pentecostal	38(32.8)	51(22.0)	1.79	0.95–3.35	0.070
Muslim	30(25.9)	59(25.4)	1.22	0.64–2.32	0.543
Others	23(19.8)	62(26.7)	0.89	0.46–1.74	0.733
Occupation					
Employed	15(12.9)	21(9.1)	1.00		
Business	47(40.5)	85(36.6)	0.77	0.36–1.64	0.505
Housewife	46(39.7)	111(47.8)	0.58	0.28–1.22	0.153
Others	8(6.9)	15(6.4%)	0.99	0.29–2.59	0.89

At bivariate analysis (Table 2), women aged above 30 years, single marital status, and Pentecostals were more likely to suffer a perineal tear. Being a house wife was protective against perineal tears. The Obstetric, Antenatal and delivery factors that significantly increased the likelihood for a perineal tear (Table 2 and 3) were: being nulliparous, primiparity, history of perineal tear during a more recent vaginal birth, ANC visit < 4 times, duration of active first stage of labour \geq 8 hours, duration of second stage of labour > 1 hour, precipitate labour, assisted vaginal delivery, and having an episiotomy, fetal birth weight, fetal head circumference, delivery by assistant nursing officer, all significantly increased the likelihood for perineal tear in this context. All variables with a $p \leq 0.2$ at bivariate analysis were entered into multivariate logistic regression model. After testing for interactions and controlling for confounding, statistically significant risk factors are presented in Table 4. The risk factors for perineal tears were: maternal age above 20 years and more (AOR = 7.24 95% CI = 2.28-23.00, $P < 0.001$), delivery by assistant nursing officer (AOR = 16.39, 95% CI = 5.74-46.81, $p < 0.001$), primiparity (AOR = 12.46 95%CI 3.41-45.52), a single marital status (AOR = 14.39 95%CI = 4.28-48.39 $P < 0.001$). precipitate labour, (AOR = 7.8, 95% CI = 2.21-27.55, $P < 0.001$), assisted vaginal delivery (AOR = 8.33, 95% CI = 1.43-48.6, $P < 0.019$), fetal weight \geq 3.5Kg, (AOR = 2.19, 95% CI = 1.06-4.53, $P < 0.033$), duration of active first stage of labour of \geq 8 hours (AOR = 12.65, 95% CI = 5.65-28.25 $P < 0.001$) and duration of second stage of labour of > 1 hour (AOR = 10.21 95% CI = 3.32-31.41, $P < 0.001$)

Table 2
Bivariate Results of Antenatal Factors for Perineal tears

Variables	Case, n = 116/%	Control n = 232/%	Crude Odds ratio(COR)	95% CI	P- value
Number of pregnancy					
3	66(56.9)	39(16.8)	1.00		
2-3	36(31.0)	111(47.9)	1.90	0.96- 3.75	< 0.064
>1	66(56.9)	39(16.8)	9.91	4.97- 19.79	<0.001
Parity					
1	69(59.5)	39(16.8)	13.45	6.24- 28.96	< 0.001
2-3	37(31.9)	117(50.4)	2.40	1.13- 5.12	0.380
> 3	10(8.6)	76(32.8)	1.00		
History of Perineal tear					
No	77(67.5)	194(83.6)	1.00		
Yes	37(32.5)	38(16.4)	0.63	0.34- 1.15	0.131
Antenatal ANC					
Yes	115 (99.1)	222(96.1)	0.19	0.11- 0.33	<0.001
No	1 (0.9)	1 (3.9)	0.10	0.05- 0.20	
Number of ANC visits					
< 4 visits	50(43.1)	124(53.5)	1.00		
≥ 4 visits	25(21.6)	29(12.5)	0.18	0.10- 0.31	<0.001
Pregnancy intervals					
< 2 year	23(39.0)	56(28.6)	1.000		
≥ 2 years	36(61.0)	140(71.43)	0.382	0.240	0.609

Variables	Case, n = 116/%	Control n = 232/%	Crude Odds ratio(COR)	95% CI	P- value
Herbal medicine use					
Yes	110(94.8)	219(94.8)	1.00		
No	6(5.2)	12(5.2)	0.99	0.36– 2.72	0.993
BMI					
< 18.5	1(0.9)	1(0.4)	1.00		
18.5–24.9	35(30.2)	68(29.3)	1.94	0.12- 32.00	0.642
25-29.9	51(44.0)	106(45.7)	0.93	0.56– 1.58	0.802
30.0-39.9	29(25.0)	57(24.6)	0.99	0.54– 1.81	0.97

Table 3
Bivariate Results of Obstetric Risk Factors for Perineal tear.

Variables	Case, n = 116/%	Control n = 232/%	Crude Odds ratio(COR)	95% CI	P- value
Duration of second stage					
< 30 minutes	55(47.1)	196(84.5)	1.00		
30–60 minutes	32(27.6)	29(12.5)	1.42	0.61–3.33	0.414
> 60 minutes	29(25.0)	7(3.0)	10.21	3.32–31.41	< 0.001
Precipitate Labour					
NO	107(92.2)	224(96.6)	1.00		
Yes	9 (7.8)	8 (3.5)	2.36	0.88–6.27	0.087
Oxytocin Use					
Yes	67(51.0)	110(47.4)	1.00		
No	48(42.0)	122(52.6)	0.07	0.02–0.25	< 0.001
Assisted Vaginal Delivery					
No	98(84.5)	229(99.1)	1.00		
Yes	18(15.5)	2(0.9)	14.02	4.04–48.69	< 0.001
Episiotomy					
No	82 (70.7)	42(81.9)	1.00		
Yes	34(29.3)	190(18.1)	1.88	1.11–3.16	0.018
Birth weight of baby					
< 3.5kg	75(64.7)	177(76.3)	1.00		
≥ 3.5 Kg	41(35.3)	55(23.7)	1.76	1.08–2.86	0.023
Head circumference(cm)					
< 35.0	72(62.1)	167(72.0)	1.00		
≥ 35.0	44(37.9)	65(28.0)	1.57	0.98–2.52	0.061

Variables	Case, n = 116/%	Control n = 232/%	Crude Odds ratio(COR)	95% CI	P- value
Birth attendant					
Enrolled midwives	78(67.2)	217(93.5)	1.00		
Assistant Nursing Officer	36(31.0)	8(3.5)	12.52	5.58–28.10	<0.001
Student	2(1.7)	6(2.6)	1.00		
Labour onset					
Spontaneous	112(96.6)	228(98.3)	1.00		
Induced	4(3.4)	4(1.7)	2.04	0.50–8.29	0.31
Method of induction					
Oxytocin	2(33.3)	1(33.3)	1.00		
Prostaglandins	4(66.7)	2(66.7)	1.00	0.05–18.91	1.000
Active labour duration					
Less than 8hours	55(47.4)	209(90.1)	1.00		
8 hours or more	61 (52.6)	23(9.9)	10.08	5.73–17.72	< 0.001

Table 4
Multivariate Analysis for Risk Factors of Risk Factors for Perineal tear

Variable	Crude odd's ratio (COR)	Adjusted odd's ratio (AOR)	95% CI	P value
Age				
< 20	1.00	1.00		
20–30 years	1.57	7.24	2.28–23.00	0.001
More than 30 years		7.83	1.63–37.54	0.001
Birth attendant				
Enrolled midwife	1.00	1.00		
Assistant Nursing officer	12.52	16.39	5.74–46.81	< 0.001
Students	0.93	0.59	0.07–5.33	0.639
Parity				
> 3	1.00	1.00		
2–3	2.40	1.67	0.53–5.30	< 0.380
1	13.45	12.46	3.41–45.52	< 0.001
Marital Status				
Married	1.00	1.00		
Single	9.42	14.39	4.28–48.39	< 0.001
Precipitate Labour				
No	1.00	1.00		
Yes	2.36	7.80	2.21–27.55	< 0.001
Assisted Vaginal delivery (AVD)				
No	1.00	1.00		
Yes	14.02	8.33	1.43–48.60	0.019

Variable	Crude odd's ratio (COR)	Adjusted odd's ratio (AOR)	95% CI	P value
Birth Weight				
< 3.5 Kg	1.00	1.00		
≥ 3.5 Kg	1.76	2.19	1.06–4.53	0.033
Duration of Active stage labour				
< 8 hours	1.00	1.00		
≥ 8hours	17.58	12.65	5.65–28.25	< 0.001
Duration of second stage of labour				
< 30 minutes	1.00	1.00		
30–60	3.93	1.42	0.61–3.33	0.414
> 60	14.76	10.21	3.32–31.41	<0.001

Discussion

This was an index case control study on risk factors for perineal tear in our setting of KNRH. The risk factors for perineal tear in this setting were- maternal age of 20 years or more, primiparity, a single marital status of a woman, precipitate labour, assisted vaginal delivery, fetal weight $\geq 3.5\text{kg}$, active first stage of labour ≥ 8 hours, second stage of labour duration > 1 hour and delivery by assistant nursing officer. In our study, women who were aged 20 -30 years were 7.2 times more likely to get a perineal tear during vaginal delivery, compared to those below 20 years. The risk was even greater for women aged more than 30 years (AOR= 7.83). The results could be due to reduced distensibility during labour and delivery among parturients 20-30 years of age. With advancing age reduction in estrogen levels of a woman has been linked to qualitative reduction of perineal muscle strength, hence the likelihood of sustaining a tear [23]. Advanced maternal age as risk factor for perineal tear has been reported in other studies [24], [25]. The observation highlights the need for vigilance on preventive measures and special precautions during delivery for women risk.

Marital status was a significant risk factor. In this case being single was a risk factor for perineal tear. The likelihood of experiencing a perineal tear was 14.39 times among women of a single marital status

compared to those who were married. This could be due to the fact that women who are unmarried are deprived of the psychosocial, emotional and economical support during pregnancy, labour and delivery resulting into anxiety, stress, loss of confidence and tension during throughout pregnancy and labour. Maternal anxiety and tension has been associated with increased risk for perineal tear due to increased tension in the pelvic muscles [8], [16].

Primiparity was a risk factor for perineal tear. The risk for perineal tear was 12.46 times more likely when a woman was primiparous compared to a multiparous counterpart. This could be due to minimal level of elasticity and flexibility among nulliparous compared to the multiparous group [26]. The observation highlights the need to sensitize all primiparous women during ANC about the importance of delivering under a skilled birth attendant. Several other studies have reported similar findings [6], [27], [25].

Precipitate labour was risk factor for perineal tear. This has been attributed to the fact that rapid labour progression provides no room for sufficient distension and compliance of the perineum [16]. The findings highlight the need for health workers to anticipate and diagnose precipitate labour promptly for timely preventive measures. This observation was also reported in others studies [13], [16].

Also, assisted vaginal delivery was identified as a risk factor. The odds of getting a perineal tear was 8.33 times when a woman had vacuum assisted delivery compared to a normal delivery. This could be attributed to the mechanical effect of the device to the perineum during extraction of the fetal head. The outcome could also dependent on to the user technique and experience. Inappropriate placement and choice of the cup type and size has been associated with high failure rates and perineal injury [28]. This observation highlights the need for good skills and precautions while conducting the procedure. The findings were in agreement with reports from other studies [6], [9], [29].

Newborn birth weight of $\geq 3.5\text{kg}$ was a risk factor. The risk of getting a perineal tear was 2.19 times more likely when fetal weight was $\geq 3.5\text{kg}$. This could be due to the increased likelihood of cephalopelvic disproportion associated with a big fetus. The findings remind us of the need to always estimate the fetal weight during antenatal clinic visits, labour and time of admission.

Understanding the estimated fetal weight before delivery allows special precautions against perineal tears. Furthermore, a decision may be made to deliver a mother with fetal macrosomia by caesarean section. Similar findings have been reported in other studies [30], [10].

Duration of active first stage of labour ≥ 8 hours was a risk factor for perineal tear. The odds for sustaining a perineal tear was 15 times more likely when active first stage of labour was ≥ 8 hours. Protracted labour duration has been associated with reduced optimal tissue distention and compliance, hence the observed odds for perineal injury [16]. The findings highlight the need for a mandatory, effective monitoring of labour progress with partograph and timely interventions. The possible interventions could be fluid administration, rupture of membranes, bladder drainage among others. Similar findings have been reported in other studies [11], [16].

Duration of second stage of labour >1 hour was also a risk factor for perineal tear. The odds of having a perineal tear was 10 times higher when second stage of labour exceeded one hour. This could be explained by the increase of genital tract edema which prevents optimal distention and compliance during descent of the presenting part [16]. This observation has clinical implications regarding current clinical practices as it highlights the need for effective monitoring of all mothers in labour. The close monitoring is to allow timely diagnosis of abnormal progress for specific intervention. Similar findings were also highlighted in several studies [11], [9], [10].

Delivery by assistant nursing officer (Nursing Officer); was an independent risk factor for perineal tear. This could be due to the fact that highly qualified midwives tend to handle the more complicated referred cases hence exposed to interventions known to carry extra risk for tears. In our setting, most pregnant women who are referred, tends to undergo obstetric interventions such as labour augmentation with oxytocin, episiotomy or instrument delivery which further increases their risk for perineal tear [9]. Important to note, personal behavior, altitude, skills and experience a birth attendant in this context could influence the delivery outcomes. Hence, although well qualified, assistant nursing officers may not have the relevant experience in midwifery compared to their counterparts (enrolled midwives). The findings highlight the need to provide continuous medical education to health workers in this context. This was contrary to previous studies where high qualification was associated with reduced risk for perineal tear [31], [8], [11].

Our study revealed that augmentation of labour with oxytocin was not a risk factor for perineal tear contrary to other studies [5]. This was concurrent to other studies [32], [27]. However, another study with a large sample size may be conducted to determine the effect of oxytocin augmentation of labour on occurrence of perineal tears. Also episiotomy was not a risk factor for perineal tear contrary. The observation was concurrent with other studies which highlighted that episiotomy especially the mediolateral episiotomy was protective against perineal tear [9], [18]. Also, fetal head circumference \geq 35cm was not a risk factor for perineal tears. The results were contrary to studies done in other countries [33], [34]. This was a surprise finding because a large head circumference would be expected to increase risk of perineal injuries. Another study with larger sample size could be conducted to evaluate effect of head circumference on perineal tears.

Study limitations

It was difficult to establish a significant relationship for some variables such as face presentation occiput posterior due to lack of enough power. Previous studies have indicated that these factors increase the risk for perineal tear. Also being a hospital-based study, most of the patients were referrals so the findings may not be generalizable to the entire county population.

Conclusions

The risk factors for perineal tear among women delivering at Kawempe National Referral Hospital are- maternal age of above 20 years and more, being primiparous, single marital status, precipitate labour, assisted vaginal delivery, fetal weight $\geq 3.5\text{kg}$, duration of active first stage of labour ≥ 8 hours, duration of second stage of labour of > 1 hour and delivery by assistant nursing officer. We recommend CME, coaching, technical support supervision on effective monitoring of labour with a mandatory third trimester ultrasound scan before labour onset to estimate the fetal weight. Every mother should have an estimated fetal weight documented on her clinical chart at labour onset. Evidence based preventive measures for perineal tear such as manual perineal support, should be used where appropriately to protect the perineum during labour. Another case control study with larger sample size could be conducted to evaluate effect of head circumference of perineal tears.

Abbreviations

CME	Continous Medical Education
ANC	Antenatal Care
AOR	Adjusted Odd's Ratio
CI	Confidence Interval
OR	Odd's Ratio

Declarations

Ethical Approval and Consent to Participate.

The study was approved by the School of Medicine Research and Ethics Committee of Makerere University (# REC REF 2019-161). Permission to conduct the study was obtained from administration of Kawempe National Referral Hospital. Written informed consent was obtained from each study participant and legal guardians or parents consented for minors. All methods were performed in accordance with the relevant guidelines and regulations

Consent for publication.

Not applicable

Availability of data and materials.

All data generated or analysed during this study are included in this published article (and its supplementary information files)

Competing Intrests.

The authors declares that they have no competing intrests in regard to the study.

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Authors Contributions.

GM conceived the initial idea of the study, spearheaded the study design, participated and supervised data collection process, wrote the manuscript.

BJK, supported the first author to develop the study design, read and agreed to submit the final manuscript

KL Supervised, data collection, read and agreed to submit the final manuscript

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