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ORIGINAL ARTICLE

Perineal length: norms in gravid women in the first stage of labour

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Abstract
Introduction The purpose of this study was to generate normative data for perineal length for Caucasian and Asian women in labour.
Methods The distance from the posterior fourchette to the centre of the anal orifice was measured in 1,000 women in the first stage of labour. Data on ethnicity, body mass index, delivery mode and perineal trauma were collected prospectively.
Results The mean perineal length in Caucasian women was 3.7±0.9 cm and in Asian women, 3.6±0.9 cm. Primigravid women with short perineum were more likely to have a third-degree perineal tear in labour (p=0.03).
Conclusion This is the first paper to report normative data for perineal length in Caucasian and Asian women in labour. We found a negative correlation between perineal length and third-degree tear in primigravid women. These data may be useful in clinical practice to determine the risk of significant perineal tears in labour

Keywords Perineum · Perineal length · Perineal tears · Ethnic origin

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Introduction

With the decline in maternal mortality over the past century, increased attention has been focused on morbidity associated with childbirth, particularly on perineal trauma and pelvic floor dysfunction.

Anatomically, the perineum is defined as the area situated between the vaginal orifice and the anus. Its length is, therefore, dependent upon the position of the anus. Concerns exist over the incidence and sequelae of perineal trauma associated with vaginal delivery, specifically faecal and urinary incontinence and sexual dysfunction. Numerous factors have been cited as influencing the incidence and severity of perineal trauma, including instrumental delivery, foetal size, ethnicity, length of second stage and also perineal length. Standard obstetric textbooks cite the length of perineum as a major influence on the resistance exerted by the perineum in association with childbirth [1]. However, normative data on perineal length do not exist for adult gravid women.

The aim of our study was to provide normative data of perineal length for women in the first stage of labour and to correlate the length with perineal tears during labour.

Materials and methods

A prospective, observational study was conducted at Royal Blackburn Hospital, Blackburn, UK from August 2005 to March 2007. The study protocol was approved by the local research and ethics committee. The maternity unit delivers almost 4,000 newborns in the hospital per year. All women in labour were eligible to participate in the study. Informed consent was obtained during the first stage of labour and prior to the administration of sedative analgesia. During routine vaginal examination in

the first stage of labour, the distance between the fourchette and the centre of the anal orifice was measured. The senior midwife leading the study taught delivery suite midwives the measuring technique and undertook regular evaluation of assessment performance. When the senior supervising midwife was present, random checks were conducted to ensure measurements were performed in accordance with agreed standards.

All measurements were performed using a standard disposable tape measure with the woman in the dorsal position. A power calculation was based on an estimated incidence of third- and fourth-degree tears of up to 3%. One thousand women were recruited to the study. At the time of consent, a short questionnaire was completed which included questions about parity, ethnic origin and existing problems with urinary or faecal incontinence. All women were systematically examined following vaginal delivery for evidence of perineal trauma. The midwives at Royal Blackburn Hospital attend regular mandatory training workshops on examination and identification of obstetric anal sphincter injury following delivery. The tears were graded according to the classification described by Sultan [2]. Ultrasound was not used for evaluation or grading of perineal tears. Women who underwent elective or emergency caesarean section were excluded from the study. The data were analysed using SPSS. An independent sample *t* test was used to examine the differences in means and significance was defined at 5% ($p<0.05$). Regression analysis was used to correlate length with tears.

Results

Seven hundred thirty-four women (73.4%) were identified as white and 250 (25%) as Asian or Asian–British by the "National Statistics Classification" [3]. The remaining 16 women (1.6%) were either black Caribbean, black African or Chinese. This reflects the usual composition of Royal Blackburn Hospital's antenatal population. Demographic data are outlined in Table 1 for the two groups, white and Asian.

Table 1 Demographic composition of the two groups

	White (n=734) Mean ± SD	Asian (n=250) Mean ± SD
Age	27.4±6.9	26.5±4.8
Height	164.3±6.4	159.6±5.9
Weight	67.4±13.9	61.9±13.8
BMI	25.0±4.8	24.3±4.9
Primiparous	353 (48.1%)	95 (38.0%)
Birth weight	3.4±0.5	3.2±0.5
Gestation	39.8±1.5	39.5±1.6

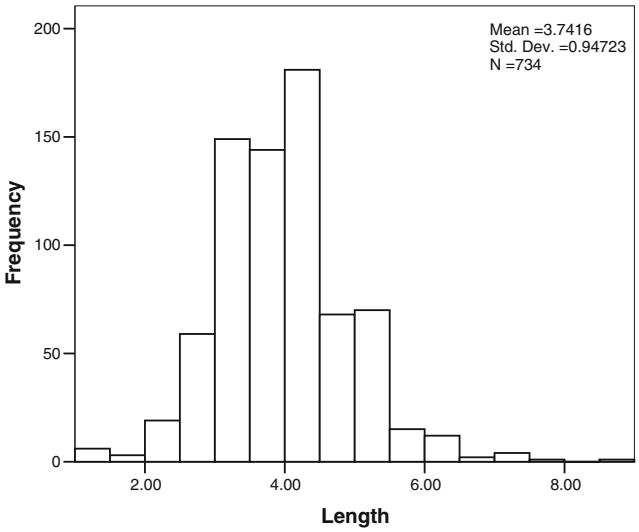

Fig. 1 Frequency distribution of length of the perineum in centimetres for Caucasian women (n=734)

The mean perineal length in Caucasian women was 3.7 cm (SD=0.09) and in Asian women 3.6 cm (SD=0.09). The frequency distribution of perineal length for the two ethnic groups is shown in Figs. 1 and 2. The perineal length of Asian women demonstrated an approximately normal frequency distribution, but the histogram for Caucasian women suggested that there were a higher number of women with a long perineum than would be expected (although this sample was approximately three times larger than that for the Asian women). This was confirmed using Q–Q and box plots. There was no significant difference in the mean perineal length of the two groups white vs Asian, 3.7±0.9 cm vs 3.6±0.9 cm (p= 0.06; 95% confidence interval, −01 to 0.26). No significant correlation was found

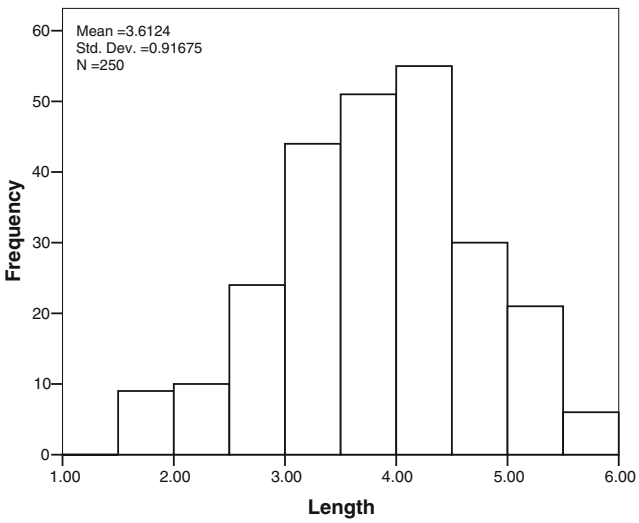

Fig. 2 Frequency distribution of the length of the perineum in centimetres for Asian women (n=250)

between perineal length and height, weight or body mass index (BMI) for either group of women (all values less than 0.1 in magnitude).

Of 185 women who were delivered with the assistance of forceps or ventouse (18.5%), 137 were primigravid and 48 were multigravid. Two hundred eighty-five (28.5%) women underwent a right mediolateral episiotomy. The interventions were evenly distributed between the two groups (Fisher's exact test $p=0.22$). There was no relationship between perineal length and the need for instrumental delivery ($p=0.99$). There were 25 who had third-degree tears (2.5%), 20/734 (Caucasian) and 5/250 (Asian) with no significant difference in distribution between the two groups (Fisher's exact test $p=0.65$).

Four hundred fifty-seven women were primigravid and 543 were multigravid. The mean perineal length in primigravid women (3.77 cm±0.9) was significantly more as compared with the mean length in multigravid women (3.65 cm±0.9; t test $p= 0.03$). Of the 25 women who had third-degree tears, 17 were primigravid and five were multigravid. Of the 543 multigravid women, data on previous third- or fourth-degree tears were available in 451 women. Of these 451 women, five had previous third- or fourth-degree tears. The numbers were small to do a separate subgroup analysis. In primigravid women, a weak correlation was noted between perineal length and third-degree tears, which failed to reach statistical significance.

A logistic regression model on all 1,000 cases demonstrated a 32% reduction in the probability of a third- or fourth-degree perineal tear per 1 cm increase in perineal length (odds ratio=0.68), but this was not statistically significant ($p=0.085$). However, on adjusting for confounding factors including BMI, foetal position parity and birth weight, a strong correlation ($r=0.6$) was noted between length and third-degree tears which was significant ($p=0.047$).

Discussion

Although a number of studies have evaluated perineal length in respect of the risk of perineal trauma, none have reported normative data for perineal length in a cohort of women in early labour. This is the largest study to present such normative data for women in the first stage of labour. This is also the first study to determine perineal length in women from different ethnic backgrounds (Caucasian and Asian). Table 2 shows a summary of some other studies where perineal length was measured.

Green and Soohoo [4] reported risk factors associated with rectal injury (including third- and fourth-degree perineal tears) associated with spontaneous delivery. This was the first study to address the possibility of ethnic

Table 2 Studies where perineal length was measured

Authors (year)	Study population	Age (years)	Mean perineal body length ± SD	Measurement	Ethnicity
Deering (2004)	133	28.0	3.9 (0.7)	During initial assessment	No comment
Nager (2000)	62	26	4.3 (not given)	Before the 2nd stage of labour with patient straining forcefully. Measured to nearest 0.5 cm	45% Hispanic, 38% white, 10% Asian/Pacific Islander, 5% African–American
Rizk (2000)	212	24.1	4.6 (0.9)	1st stage of labour	No comment
Rizk (2005)	114	26.6	4.1 (0.7)	2nd stage of labour	Indian/Pakistani 19.3%, Arabic 62.3%
Current study	984	27.4 Caucasian 26.5 Asian	3.7 (0.9) Caucasian 3.6 (0.9) Asian	1st stage of labour	73.4% Caucasian, 25% Asian
Athanasopoulos (2005)	102 women undergoing urodynamic study. Two groups compared 57 (A) with urodynamic stress incontinence and 45 (B) without	44.3 (A) vs 50.2 (B) years	1.9 (A) 1.49 (B)	Dorsal lithotomy position prior to urodynamic investigation	No comment
Aytan (2005)	400 women. 200 with midline episiotomy (A) and 200 with mediolateral episiotomy (B)	21.08±2.98 (A) 22.20±3.87 (B)	3.98±0.54 (A) 3.33±0.50 (B)	Dorsal lithotomy position before 3 cm cervical dilatation	No comment

variation in the risk of rectal injury and concluded that the increased risk of rectal injury observed in Chinese women was due to the common observation that Chinese women have short perineal bodies [4]. However, they recognised that quantitative data do not exist to substantiate this observation. Hopkins et al. determined the racial and ethnic differences in perineal, vaginal and cervical lacerations. They reported a widely varying risk of perineal laceration in women with different ethnicities; with Chinese, Filipino and Asian women at higher risk of third- and fourth- degree lacerations [5]. Hopkins et al. concluded that perineal anatomic variation may be a contributor to the difference in incidence of severe perineal trauma between different ethnic groups. Our study failed to show any significant difference in the length of perineum in Caucasian and Asian women, contrary to the hypothesis by Green and Soohoo and Hopkins et al. Ethnicity did not have any impact on the grade of perineal tear in labour.

We found a significantly higher incidence of third-degree perineal tears in women with short perineum. This is similar to the findings by Rizk and Thomas, who measured the perineal length of 212 primigravid women [6] and reported significantly higher rates of perineal tears, episiotomy and instrumental delivery in women with short perineum. We, however, did not find any correlation between perineal length and the need for instrumental deliveries. The mean perineal length in their study was 4.6±0.9 cm as compared with the 3.7±0.9 cm in our study.

In our study, the midwives, caring for women in labour, measured the perineal length. Even though the midwives were trained to measure the length and a senior midwife carried out periodic assessment checks on the technique, there is the possibility of subjective variation in measurement in those cases where random checks were not carried out. However, in view of the large number of cases included in our study, measurement by a single investigator was not possible. An acceptable inter-observer and intra-observer variations for perineal measurements in this context has been demonstrated in the study by Rizk and Thomas [6]. We excluded women undergoing elective or emergency caesarean section from the study in order to assess the relationship between length and tears. A further study will be required to define the norms for perineal length in this group.

The perineal body provides an important support to the distal half of the posterior vagina, anterior wall of the rectum and urethra. The importance of perineal body length in providing anatomical support to the pelvic viscera has also been evaluated by the International Continence Society and was included in the standardisation of pelvic organ prolapse. Abendstein et al. [7] and Jaszczak and Evans [8] have also highlighted the importance of reconstructing perineal body during surgical repair for prolapse to prevent recurrence and by creating a more physiological vaginal axis postoperatively. Hence, these data on perineal length may also be useful to assess the future risk of the development of pelvic organ prolapse or stress urinary incontinence; however, further studies addressing these issues are needed.

In conclusion, we have established the normal perineal length for Caucasian and Asian women in labour. We have also established strong correlation between short perineal length and third-degree tears. These data may be useful for determining the risk of perineal trauma in labour and for counselling women. Further randomised controlled trials are needed to determine the role of mediolateral episiotomy in preventing perineal trauma in women with short perineum. The impact of perineal length on development of prolapse and stress incontinence is also an important issue that remains to be answered.

Conflicts of interest None.

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