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RACIAL DIFFERENCES IN FEMALE URETHRAL SPHINCTER MORPHOLOGY.

Hypothesis / aims of study

Several studies have shown that the prevalence of different types of urinary incontinence differ significantly between different racial groups. Black women are less likely to develop stress urinary incontinence than white women and the latter have 5 times more chances to undergo surgical treatment for this condition (1). Although such differences have been shown in epidemiological studies and confirmed by others looking at the function of the female urethral sphincter, little is reported in the literature with regards to possible anatomical variations between the two groups. Vaginal delivery has been shown to decrease the size of the urethral sphincter by 10% (2). Also it has been shown that the striated sphincter (rhabdosphincter) is significantly smaller in women who have urodynamic stress incontinence compared with continent controls (3).

This study compares the urethral sphincter morphology in young nulliparous asymptomatic women using 3D translabial ultrasound scans. Racial differences may indicate why some women develop stress urinary incontinence after vaginal delivery and other women do not.

Study design, materials and methods

Twenty-eight nulliparous black and white women were recruited in a tertiary gynaecological centre. Women were recruited from general gynaecology outpatient clinics, where equal access to diverse ethnic groups is offered. All women were completely asymptomatic with regards to urinary symptoms, such as increased urinary frequency, nocturia, urgency and stress or urge incontinence using the symptoms page of the King's Health Questionnaire. The study involved a detailed clinical interview and a 3D translabial ultrasound scan of the pelvic floor at rest, after the woman had emptied her bladder. The total urethral sphincter volume, urethral volume and maximum cross sectional area were measured. Cross-sectional measurements were taken at 1mm intervals across the longitudinal axis of the urethra. The rhabdosphincter volume was calculated by subtracting the urethral volume away from the total urethral sphincter volume. Measurements of the genital hiatus area (GHarea), anterior-posterior diameter (GHap) and transverse diameter at the level of the vagina (GHv) and urethra (GHu) were also taken at rest, in the axial plane at the level of the minimum hiatal dimensions.

Results

Seventeen white women and 11 black women in total were investigated in this study. The mean age was 37 years. No patient reported urinary symptoms at the time of the clinical interview. The mean rhabdosphincter volume (RSV) for white and black women was measured 6.80cm³ and 11.7cm³ respectively (Mann Whitney U test, p=0.01). The total sphincter volume (TSV) was also significantly higher in black women (mean +/- SD index 12.79 +/- 3.47cm³ vs 7.92 +/- 1.77 cm³, (p= 0.01).

Figure 1 shows a schematic presentation of the 95% CI of the difference of the mean in total sphincter volume and rhabdosphincter in the two groups.

When genital hiatal measurements were considered, there was no statistically significant difference in the 95% CI of the means of GHarea, GHap, GHv and GHu at rest between black and white women. (Table 1).

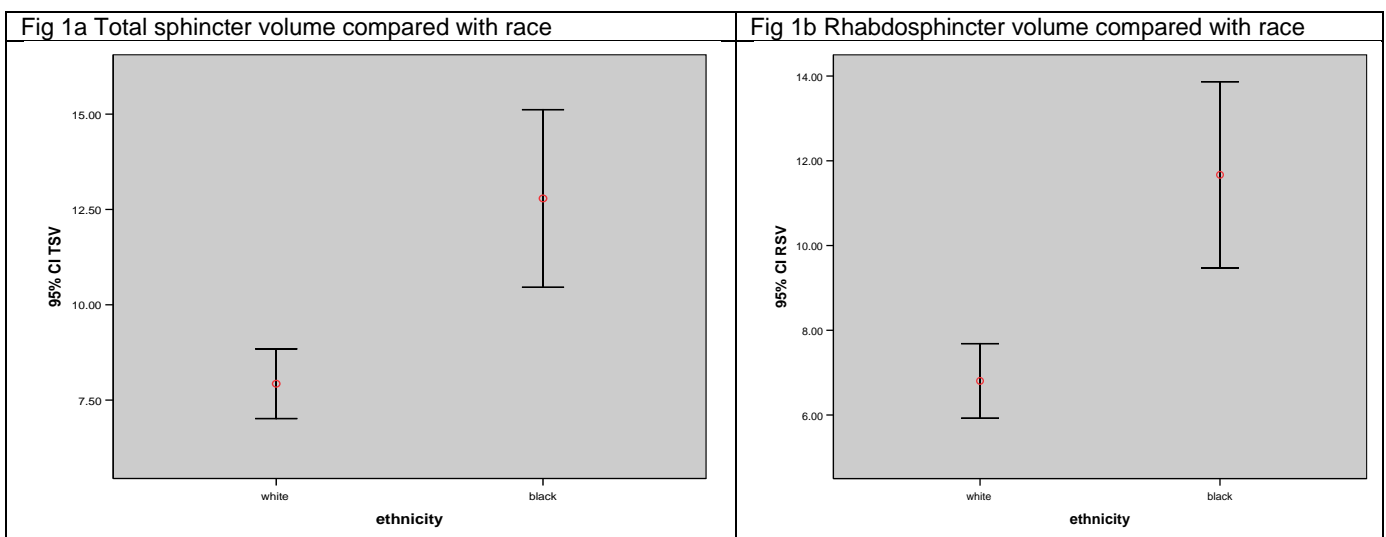


Table 1: 3D ultrasound measurements of genital hiatus (Mann Whitney U test)

Ethnic group	GHarea Mean (95% CI)	GHap Mean (95% CI)	GHv Mean (95% CI)	GHu Mean (95% CI)
White	13.7 (12.5-14.8)	5.3 (5.0-5.8)	3.6 (3.3-3.9)	3.6 (3.5-3.8)

Black	14.8 (13.1-16.6)	5.8 (5.3-6.3)	3.9 (3.6-4.2)	3.6 (3.7-3.8)
	P=0.26	P=0.10	P=0.19	P=0.96

Interpretation of results

Our study has found significant differences in the urethra sphincter volume between black and white asymptomatic women. Black nulliparous women have larger rhabdosphincter volumes than white nulliparous women. This finding suggests that having a smaller rhabdosphincter as a nulliparous woman may predispose the woman to develop stress urinary incontinence. These results also provide a possible explanation to the functional differences in urethra function between white and black women described in previous studies with urethral pressure measurements. The size of the genital hiatus at rest does not differ between nulliparous black and white women and hence is less likely to be a predisposing factor for stress urinary incontinence.

Concluding message

Asymptomatic black nulliparous women have significantly larger rhabdosphincters than asymptomatic white nulliparous women. A larger antenatal urethral sphincter may protect women from developing stress urinary incontinence after childbirth.

References

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2. Int Urogynecol J Pelvic Floor Dysfunct. 2008 Mar;19(3):407-16
3. Obstet Gynecol. 1999 Aug;94(2):295-301.

<i>Specify source of funding or grant</i>	No funding or grant received for this study.
<i>Is this a clinical trial?</i>	No
<i>What were the subjects in the study?</i>	HUMAN
<i>Was this study approved by an ethics committee?</i>	Yes
<i>Specify Name of Ethics Committee</i>	London-Surrey Borders Research Ethics Committee.
<i>Was the Declaration of Helsinki followed?</i>	Yes
<i>Was informed consent obtained from the patients?</i>	Yes