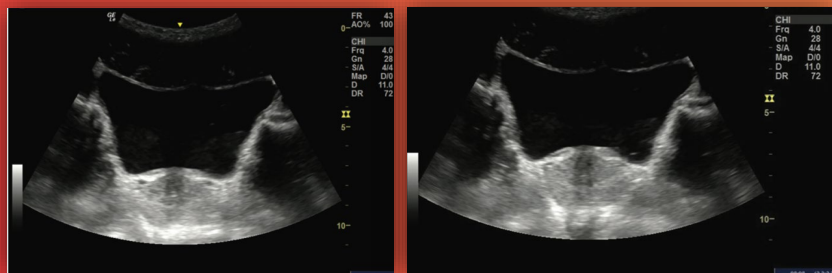


Pelvic Floor Morphometry and Functional Contractility in Two Geographically Distinct Cohorts of Healthy Adults

USA vs UAE • CROSS-SECTIONAL COMPARATIVE STUDY



258 healthy women
129 USA | 129 UAE

Different absolute measurements do not necessarily mean different pelvic floor function.

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BACKGROUND

Transabdominal ultrasound (TAUS) provides a non-invasive method for assessing pelvic floor muscle (PFM) function through visualization of bladder base movement during voluntary contraction. However, pelvic floor ultrasound measurements may be influenced by demographic and anthropometric characteristics, raising questions about whether reference values derived from one population can be applied to another. Comparative data from geographically distinct populations assessed using the same acquisition and analysis protocol remain limited.

OBJECTIVE

To compare TAUS measurements of PFM function in healthy women from the United States (USA) and United Arab Emirates (UAE), including measurements at rest, during voluntary contraction, and bladder base displacement from rest to contraction.

METHODS

Design & participants
Cross-sectional comparative study using a female-only analytic dataset of 258 healthy women (USA n=129; UAE n=129), aged 18–40 years. Participants were healthy, non-pregnant women without a history of pelvic floor dysfunction.

TAUS protocol
Participants consumed 600–750 mL water approximately 1 hour before testing. Measurements were obtained in crook-lying with hips and knees flexed $\approx 60^\circ$. B-mode TAUS was performed using a suprapubic approach with the transducer individually angled approximately 15° – 30° .

Participants performed three voluntary PFM contractions, each ≤ 10 seconds. Bladder base displacement was calculated as the distance between resting and maximal contraction positions. The participant-level mean of the three trials was used for analysis.

STATISTICAL ANALYSIS

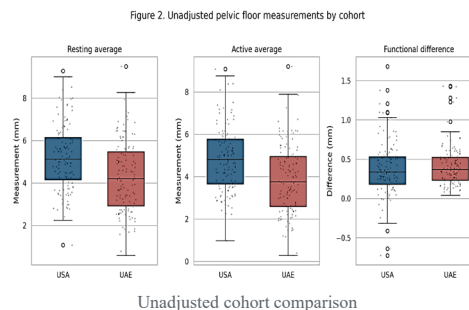
Primary outcomes were resting measurement, active measurement during voluntary PFM contraction, and bladder base displacement. Unadjusted comparisons were followed by ANCOVA including cohort, age and BMI. Sensitivity analyses examined alternative anthropometric adjustment, the overlapping 21–25-year age range, and exclusion of BMI $< 18.5 \text{ kg/m}^2$.

RESULTS

Women from the USA demonstrated significantly higher absolute TAUS measurements at rest and during voluntary contraction. In contrast, bladder base displacement did not differ significantly between cohorts.

UNADJUSTED

REST: 5.25 ± 1.58 vs $4.21 \pm 1.68 \text{ mm}$; $p < 0.001$
ACTIVE: 4.78 ± 1.49 vs $3.79 \pm 1.65 \text{ mm}$; $p < 0.001$
DISPLACEMENT: 0.37 ± 0.34 vs $0.41 \pm 0.25 \text{ mm}$; $p = 0.259$



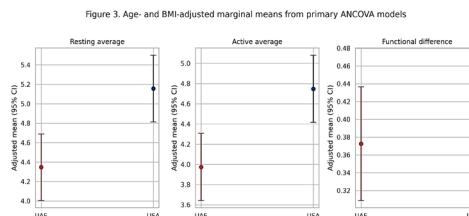
ADJUSTED ANALYSIS

After adjustment for age and BMI, differences in absolute measurements persisted:

REST: adjusted mean difference $+0.81 \text{ mm}$ (95% CI 0.25–1.37); $p = 0.005$

ACTIVE: adjusted mean difference $+0.77 \text{ mm}$ (95% CI 0.23–1.32); $p = 0.006$

DISPLACEMENT: adjusted mean difference $+0.04 \text{ mm}$ (95% CI -0.07 to 0.14); $p = 0.505$.



INTERPRETATION

The central finding is the dissociation between absolute ultrasound measurements and dynamic function.

Healthy women from the USA and UAE demonstrated differences in absolute bladder base measurements at both rest and voluntary contraction. However, the magnitude of movement from rest to contraction was comparable between cohorts.

Therefore, differences in absolute TAUS measurements should not automatically be interpreted as differences in pelvic floor contractile function.

CLINICAL IMPLICATION

Absolute TAUS values may be population-dependent, whereas dynamic bladder base displacement may provide a more transferable measure of pelvic floor muscle function across populations. Population characteristics should therefore be considered when interpreting absolute TAUS reference values.

SENSITIVITY ANALYSES

Sensitivity analyses using alternative anthropometric adjustment and the overlapping age range maintained the direction of the resting and active differences, although precision was reduced in the age-restricted analysis.

LIMITATIONS

Convenience samples of healthy young women limit generalizability to clinical populations. Cohorts differed in demographic and anthropometric characteristics, although these were addressed through adjusted and sensitivity analyses. Ultrasound assessors were not blinded to cohort membership.

CONCLUSION

Geographically distinct cohorts demonstrated significant differences in resting and active TAUS measurements, whereas no statistically significant between-cohort difference was detected in bladder base displacement. These findings support population-informed interpretation of absolute ultrasound measurements.