Abstract #776

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Pelvic Floor Muscle Function in a Population-Based Study of US Women

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Background

- Pelvic floor muscle (PFM) function plays an important role in bladder control.
- Most research on PFM strength has been conducted in clinical and/or symptomatic populations, with limited evaluation in the general female population and across the lifespan.

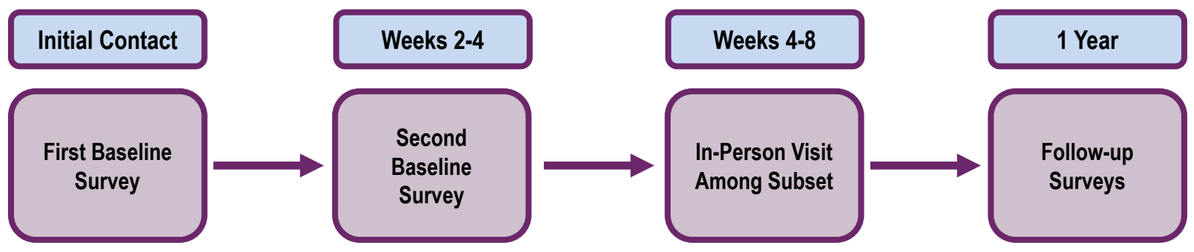
Aims of Study

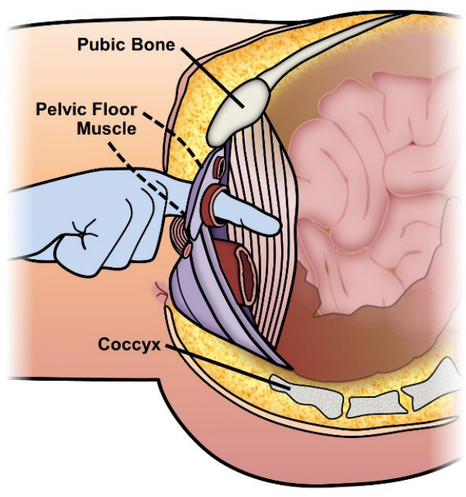
Describe PFM function in community-dwelling women and assess association with age and parity, two factors strongly associated with bladder control.

Study Design, Materials and Methods

RISE FOR HEALTH (RISE) conducted by the Prevention of Lower Urinary Tract Symptoms (PLUS) Research Consortium

- Regionally-representative cohort study of 3,422 community-dwelling women
- Subset of 504 out of 520 participants completed the baseline surveys (Bladder Health Survey/Bladder Function Index) that included urinary symptoms, medical history, and in-person visit:





- Modified pelvic examination involving circumferential digital palpation to assess PFM strength by trained examiners (physicians, nurse practitioners, physician assistants, nurse midwives) [2]
- PFM tested midline (6 o'clock position) and bilaterally at the 4 o'clock and 8 o'clock positions
- Strength evaluated with an adaptation of Modified Oxford Grading System [3]

- Descriptive statistics and proportional logistic regression models to estimate associations for age and mode of delivery with PFM strength

Results

- Mean age of 50.4 years (SD 17.5)
- Diverse with respect to:
  - Race and ethnicity:
    - 6.8% Asian
    - 14.6% Black
    - 71.5% White
    - 11.8% Hispanic any race
  - Body Mass Index (BMI): 38% BMI ≥30
  - Menopausal status:
    - 39.7% pre-menopausal
    - 46.8% post-menopausal
  - Hormonal therapy:
    - 32.2% taking hormonal contraceptives
    - 30% used systemic hormone replacement therapy
    - 37.8% used vaginal estrogen
  - Two-hundred sixty-eight (53.4%) reported any urinary incontinence (stress, urgency, mixed)
    - Parous:52.5%
  - Medical History:
    - Diabetes (13.5%)
    - Anxiety or depression (28.7%)
    - Constipation and IBS (18.1%)
    - Pelvic organ prolapse (7.3%)
    - Uterine fibroids (18.8%)
  - GU Surgical
    - Surgery for pelvic organ prolapse (4%)
    - Hysterectomy (17.3%)
  - Over half (58%) of participants reported never engaging in PFM exercises
- 16 participants did not have a pelvic examination [declined exam-5, unable to continue due to pain-2, examiner not available-4, refused to remove clothing-1, and time constraints-4]
- Similar distributions of PFM strength observed in all three muscle locations tested (**TABLE 1**). Therefore, the average of the combined location of PFM scores used in all subsequent analyses.
- Increasing age was associated with significantly worse PFM strength (**TABLE 2**).

TABLE 1. Assessment PFM strength per location in a subset of female participants in the RISE FOR HEALTH Study, n=502

Pelvic floor muscle function (Oxford, n [%])	Left side	Midline	Right side	Combined
Strong	69 (13.3%)	73 (14.0%)	67 (12.9%)	81 (15.6%)
Good with lift	126 (24.2%)	122 (23.5%)	130 (25.0%)	147 (28.3%)
Moderate	122 (23.5%)	132 (25.4%)	121 (23.3%)	124 (23.8%)
Weak	94 (18.1%)	85 (16.3%)	95 (18.3%)	77 (14.8%)
Flicker	64 (12.3%)	63 (12.1%)	67 (13.3%)	57 (11.0%)
No contraction	29 (5.6%)	29 (5.6%)	25 (4.8%)	18 (3.5%)
Not performed	16 (3.1%)	16 (3.1%)	15 (2.9%)	16 (3.0%)

TABLE 2: Associations between age, parity, and PFM strength in a subset of female participants in the RISE FOR HEALTH Study, n=502

	N (%)	Muscle Strength (Oxford)[1] Odds Ratio (Confidence Interval)
Age		
18- 25	52 (10.3)	Ref
26-44	139 (27.6)	0.96 (0.54, 1.70)
45-64	191 (37.9)	1.11 (0.64, 1.92)
65+	122 (24.2)	1.64 (0.91, 2.94)
		p (trend) = 0.0359
Parity		
Nulliparous	235 (46.9)	Ref
1 Vaginal	57 (11.4)	1.22 (0.73, 2.04)
2 Vaginal	97 (19.4)	0.93 (0.61, 1.42)
3+ Vaginal	69 (13.8)	1.21 (0.75, 1.95)
Cesarean only	42 (8.4)	1.23 (0.69, 2.21)
Birth		
No	235 (46.9)	Ref
Yes	266 (53.1)	1.09 (0.80, 1.49)

[1]The ORs indicate worsening strength, i.e., variables with ORs > 1 are associated with worsening strength. The associations are not adjusted.

Interpretation of Results

- Majority of women (96.5%) were able to contract their PFMs with moderate to strong combined strength (67.7%), which may be due to examiner training and participant instruction
- Almost one-third of women (29.5%) had poor ability to contract their PFMs
- Midline measurement of PFM function appears to be adequate
- PFM strength appears to be higher than found in previous studies of nulliparous women and those with stress urinary incontinence
- Parity and delivery mode was not associated with PFM strength
- Trend toward decreased PFM strength in the older age group which may have been related to the high utilization of female hormonal use

Concluding Message

- Majority of women across the lifespan were able to contract PFMs with moderate to strong combined strength
- Few women had ever practiced PFM exercises
- Health care providers should consider performing PFM assessment on women of all ages to identify those with weaker muscles who may benefit from a PFM exercise program.
- Future research should evaluate the role of hormonal use on PFM strength

Ethical Approval

The RISE FOR HEALTH Study was approved by the University of Minnesota as the single Institutional Review Board (IRB), with associated approval and reliance by each research center. All participants provided informed consent.

Disclosures

- DKN: Editor, Digital Science Press
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- ALS none
- SS none
- KK none
- CV none
- GM

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References

1. Frawley H, Shelly B, Morin M, Bernard S, Bø K, Digesu GA, Dickinson T, Goonewardene S, McClurg D, Rahnama'i MS, Schizas A, Slieker-Ten Hove M, Takahashi S, Voelkl Guevara J. An International Continence Society (ICS) report on the terminology for pelvic floor muscle assessment. Neurourol Urodyn. 2021 Jun;40(5):1217-1260. doi: 10.1002/nau.24658. Epub 2021 Apr 12. PMID: 33844342
2. Newman, DK, Lowder, JL, Meister, M, Low, LK, Fitzgerald, CM, Fok, CS, Geynisman-Tan, J., Lukacz, ES., Markland, A., Putnam, S., Rudser, K., Smith, AL, Miller, JM, the Prevention of Lower Urinary Tract Symptoms (PLUS) Consortium. (2023) Comprehensive pelvic muscle assessment: Developing and testing a dual e-learning and simulation-based training program. Neurourol Urodyn. June; 42(5): 1036–1054. doi:10.1002/nau.25125
3. Laycock J. Clinical evaluation of pelvic floor. In: B. Schussler., J Laycock, P Norton, S Stanton(Eds). Pelvic floor re-education. London: Springer-Verlag; 1994, pp. 42-48.