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WHAT IS THE RELATIONSHIP BETWEEN PELVIC FLOOR MUSCLE STRENGTH, PROLAPSE STAGE AND PROLAPSE SYMPTOM SEVERITY?

Hypothesis / aims of study

Pelvic floor muscle (PFM) function is considered to influence the support system for the pelvic organs. A recent study (1) has demonstrated that clinically, PFM function is associated with pelvic organ prolapse (POP), showing a strong inverse relationship between PFM parameters (vaginal resting pressure, contraction strength and endurance) and (POP quantified (POP-Q) stage in women with ≥stage II POP. The aim of this study was to investigate the association between pelvic floor muscle (PFM) characteristics and both staging of prolapse (POP-Q) and pelvic organ prolapse symptom severity (POP-SS) in a cohort of women presenting with ≥stage I POP of mild to moderate symptom severity. The hypothesis was that better PFM would be associated with less severe prolapse and less prolapse–specific symptoms.

Study design, materials and methods

Baseline characteristics of all 170 women from 3 centres who consented to participate in an international randomised controlled trial to investigate the effects of a PFM training program on POP were analysed (irrespective of trial group).Women with POP Stage I, II or III were recruited to this study. Prolapse symptoms were measured using the Pelvic Organ Prolapse Symptom Score (POP-SS) (2) and staging of POP was measured using the POP-Q method (3). Measures of PFM function taken at baseline included digital strength testing using the ICS recommended 4-point scale and pressure manometry. Manometry measures were recorded in the lying and standing positions. Values recorded were maximum voluntary contraction (a peak value obtained within the first 3 seconds to record strength), and the total (area) contraction pressure over the time sustained (tested for up to 30 seconds to record endurance). Digital strength testing and the peak and total area manometry scores were chosen to represent a combined PFM profile, to test for associations with POP-SS and POP-Q.

Results

POP-SS and POP-Q: No relationship was found between the POP-SS and POP-Q, in fact a weak but inverse (negative) relationship was found (Table 1).

Table 1 ANOVA of POP-SS scores by POP-Q stage

POP-Q stages	N (%)	Mean POP-SS (95% CI)	Significance
I	12 (7.1%)	12.4 (9.37 – 15.46)	*p*=0.11
II	139 (82.2%)	10.2 (9.27 – 11.1)	
III	18 (10.7%)	8.1 (5.5 – 10.8)	
Totals	169 (100%)	10.1 (9.3 – 11)	

PFM variable correlations: In the lying position, 167/170 participants (98.2%) were able to sustain a maximum voluntary contraction for 30 seconds, and 163/170 (95.9%) could sustain this in the standing position therefore duration of hold was not investigated independently. Medium to large associations were found between all PFM strength variables tested in lying and standing, as shown in Table 2. Significance was $p<0.001$ (2-tailed) for all correlation values. As lying and standing scores correlated strongly with each other, and both manometry values correlated strongly with each other, only lying digital strength testing and peak manometry were used in further analysis.

Table 2. Correlations between pelvic floor muscle strength variables

Variables	1a	1b	1c	2a	2b	2c
1. Lying values:						
a. digital strength testing	-	0.58	0.49	0.63	0.42	0.42
b. manometry: peak contraction		-	0.87	0.43	0.74	0.69
c. manometry: total area			-	0.35	0.70	0.71
2. Standing values:						
a. digital strength testing				-	0.32	0.36
b. manometry: peak contraction					-	0.89
c. manometry: total area						-

POP-SS/POP-Q and PFM variables: As POP-SS and POP-Q scores were found not to be associated with each other, each of these variables was tested for independent association with PFM strength variables. No significant associations were found amongst these variables. The correlation values between the POP-SS and PFM strength measures were inverse and ranged from -0.08 (POP-SS and manometry total area) to -0.04 (POP-SS and manometry peak contraction).

There were no statistically significant relationships between any of the PFM strength variables and POP-Q stage (Table 3).

Table 3 ANOVA of pelvic floor muscle strength by POP-Q stage

Variables	N (%)	Mean PFM strength (95% CI)
POP-Q stages with lying digital strength		

testing			
I	14 (8.2%)	2.8 (2.3 – 3.2)	
II	139 81.3%)	2.7 (2.6 – 2.8)	
III	18 (10.5%)	2.6 (2.3 – 3.0)	0.78
Totals	171 (100%)	2.71 (2.6 – 2.8)	
POP-Q stages with lying peak manometry			
I	14 (8.2%)	33.3 (21.6 – 45.0)	
II	137 (80.1%)	24.8 (22.4 – 27.3)	
III	18 (10.5)	22.1 (14.2 – 29.9)	0.10
Totals	169 (100%)	25.2 (22.9 – 27.6)	

Interpretation of results

The findings from this study support previous literature which has demonstrated a lack of strong correlation between prolapse symptoms and POP-Q staging I, II and III. The inverse relationship observed in this cohort was unexpected. The lack of association between these subjective and objective measures of POP suggests that both should be evaluated before and after planned interventions. As shown in previous studies, PFM strength measures on digital testing and manometry demonstrated moderate to strong correlations with each other, and this correlation appears to hold in a POP cohort. While the mean values of the PFM strength measures declined with increasing stage of prolapse, there was no significant relationship between these variables.

Concluding message

While there have been some reports in the literature of associations between PFM strength and POP symptoms or POP-Q, the findings from this cohort did not show evidence of a relationship. Further explorations are required to understand the nature of this relationship.

References

1. Braekken, I. H., M. Majida, et al. Pelvic floor function is independently associated with pelvic organ prolapse. BJOG : an international journal of obstetrics and gynaecology. 2009; 116(13): 1706-1714.
2. Hagen S, Glazener C, Sinclair L, Stark D, Bugge C. Psychometric properties of the Pelvic Organ Prolapse Symptom Score (POP-SS). BJOG: an International Journal of Obstetrics and Gynaecology. 2009; 116:25-31.
3. Bump, R. C., A. Mattiasson, et al. The standardization of terminology of female pelvic organ prolapse and pelvic floor dysfunction. American Journal of Obstetrics and Gynecology 1996; 175(1): 10-17.

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Specify Name of Public Registry, Registration Number	**Australian New Zealand Clinical Trials Registry (ANZCTR Number: 12608000113358)**
Is this a Randomised Controlled Trial (RCT)?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**School of Health Sciences HREC, The University of Melbourne, Australia**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**