

Pelvic Floor Muscle Function Changes after an Inspiratory Muscle Training Intervention In Women With and Without Stress Urinary Incontinence: a Pilot Study

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- Canmore, Alberta



Conflict of Interest and Disclosures

- Financial support was received from the Clinical Research Innovation Fund, jointly funded by Physiotherapy Alberta: College + Association and the University of Alberta's Department of Physical Therapy
- Jessica DeMars is the Canadian Distributor of POWERbreathe Inspiratory Muscle Trainers that are used in the study

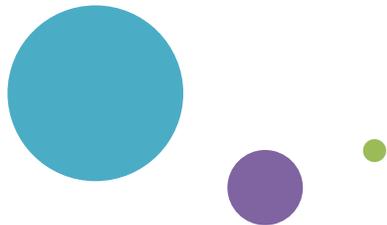


Introduction



Idea for the study:

- Known relationship between breathing and pelvic floor
- cross-referrals between pelvic floor and breathing physios
- Jessica was using Inspiratory Muscle Training (IMT) in practice and wanted to see what the effect was on the pelvic floor muscles



Research Question

Is there a change in pelvic floor muscle function after a breathing intervention of IMT?

Literature Review/Theory

Smith MD, Russell A, and Hodges PW Disorders of breathing and continence have a stronger association with back pain than obesity and physical activity. *Australian Journal of Physiotherapy* 2006; 52: 11-16.

Hodges PW, Sapsford R, Pengel LHM. Postural and Respiratory Functions of the Pelvic Floor Muscles. *Neurourology and Urodynamics* 2007; 26:362-371.

Park H, Han D. The effect of the correlation between the contraction of the pelvic floor muscles and diaphragmatic motion during breathing. *Journal of Physical Therapy Science*. 2015; 27: 2113-2115.

Talasz H, Kofler M, Kalchschmid E, Pretterklieber M, Lechleitner M. Breathing with the pelvic floor? Correlation of pelvic floor muscle function and expiratory flows in healthy young nulliparous women. *International Urogynecological Journal*. 2010; 21(4):475-81. doi:10.1007/s00192-009-1060-1

Enright SJ, Unnithan VB, Heward C, Withnall L, Davies DH. Effect of High-Intensity Inspiratory Muscle Training on Lung Volumes, Diaphragm Thickness, and Exercise Capacity in Subjects Who Are Healthy. *Physical Therapy*. 2006; 86(3): 345-354.



Inclusion Criteria:

- Women between the ages of 18 and 60
- Diagnosis of Stress Urinary Incontinence
- Healthy control subjects will have no symptoms of stress urinary incontinence

Exclusion Criteria:

- Significant pelvic organ prolapse beyond the pelvic floor muscles on Valsalva Maneuver
- Previous pelvic surgery (for urinary incontinence, pelvic organ prolapse or hysterectomy)
- Dysfunctional diastasis rectus
- Hernia
- Lumbopelvic pain
- Respiratory disorders, or history of spontaneous pneumothorax
- Diagnosed bowel dysfunction
- Diagnosed pain syndromes (ie: chronic pain, fibromyalgia)
- BMI greater than 35
- Neurological disease
- Heart Disease
- Diabetes
- Ruptured Eardrum, or any other condition of the ear
- Marked osteoporosis with a history of rib fractures

Research Methods

- Pelvic Floor muscle Pre-Intervention Assessment
- Breathing Intervention
- Pelvic floor muscle Post-Intervention Assessment
- Physiotherapists were blinded from knowing results of pre-intervention assessment and from breathing intervention performance

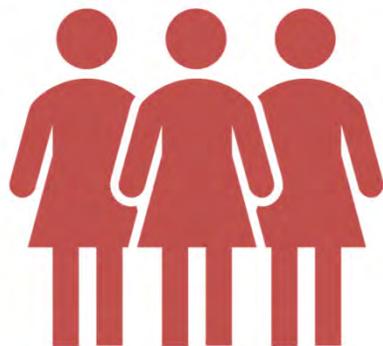


Table 1. Sample Characteristics

		Report	
Group		Age	BMI
N	Mean	47.67	22.0222
	N	9	9
	Std. Deviation	10.075	2.13376
S	Mean	45.27	23.9409
	N	11	11
	Std. Deviation	6.665	4.46809
Total	Mean	46.35	23.0775
	N	20	20
	Std. Deviation	8.222	3.65833

Data Collection

Results

Figure 1A: Changes in Strength from Pre- to Post-Intervention by Group

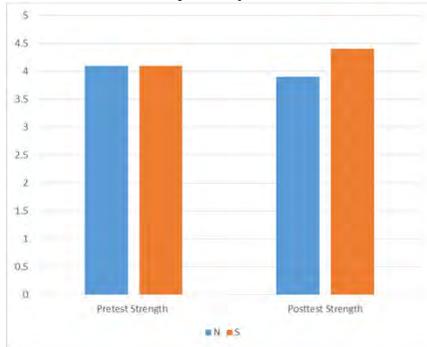
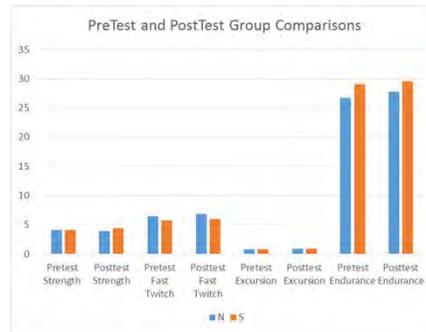


Figure 1B: Changes from Pre- to Post-Intervention by Group



Discussion

- We were somewhat surprised at the limited findings from the data collected
- the sample size was small
- intervention was brief
- the groups were too similar

Clinical Implications

Unable to conclusively decide whether IMT would be beneficial as an adjunct to treating pelvic floor dysfunction.

Future Research

What is the effect of using IMT on hypertonic pelvic floor muscles

What effect does high vs, low load IMT have on the PFM

What empirical measures are available to gauge effect on pelvic floor muscles



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Questions



Kinematic and Stability Changes in Women Using a Sacroiliac Belt

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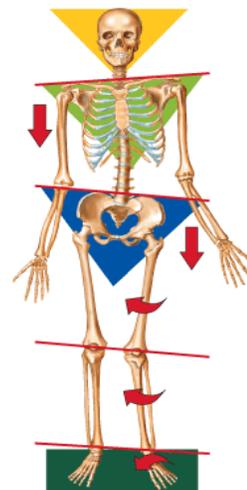
Background

- Pelvic gridle pain (PGP) is LBP extending between the posterior iliac crest and the gluteal fold
- Affects between 15-30% of those with LBP (Cohen 2013)
- Results in impaired load transfer either primarily or compensatory
- No gold standard test to identify sacroiliac instability
 - European guidelines which recommend provocative test (Vleeming 2008)
 - Intra-articular injection with anaesthetic agent (Zheng 2019)
- Sacroiliac belt is one management option
 - Joint compression
 - Change proprioception
 - Recruitment of muscles



Review concluded that there was a greater need to look at the role of the belt in functional tasks such as walking in people with PGP (Arumugam 2012)

- Primary objective:
- Does use of the belt change lumbopelvic load transfer?
 - Measured by following the kinematic chain to the feet
 - Measure changes in pressure distribution (CoP)
- Secondary objective:
- Can we differentiate women with PGP and controls with and without the SI belt?
 - gait analysis
 - CoP



Methods

- Recruited 5 women with PGP who were using a SI belt
 - 2 or more positive provocative tests
 - Positive ASLT
 - Feet size between 7-9 US
 - Exclusion: pregnancy within last 6 months, leg length discrepancy of 1 centimeter or greater, significant lumbar, hip or knee dysfunction, surgery to the lower back, hip, knee or ankle and previous prolotherapy
- Controls: matched for age, BMI, parity

Methods continued



Pressure data from the soles was collected during the 30 second standing. Conforming insoles with 99 pressure points (Pedar, novel GmbH, Germany) in New Balance shoes were used

3-dimensional gait-analysis data was measured using 8 motion-analysis cameras (model Eagle; Motion Analysis Corp, Santa Rosa, CA)

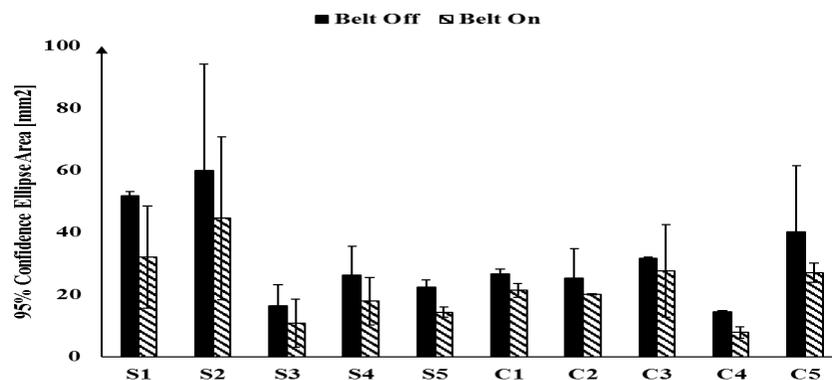


Methods continued

- 3 Tasks
 - standing on the force plate with both feet for 30 seconds three times
 - walking with controlled speed for 10 times
 - walking at normal speed two times
- Belt off and belt on (order was randomized per subject-control pair)
- Statistics:
 - Means and standard deviations were calculated for the 3 standing and 10 walking trials
 - Wilcoxon signed rank test for non-parametric
 - $P < 0.05$ statistically significant

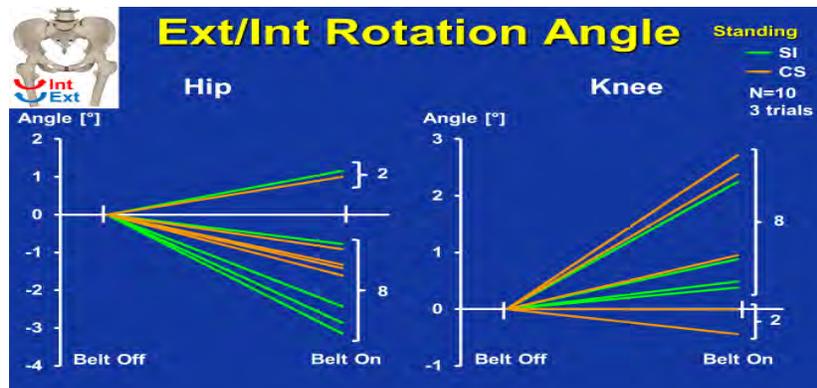
Results: standing

- CoP data showed that all women had a significant decrease in 95% confidence ellipse area with application of the belt ($p = .005$)



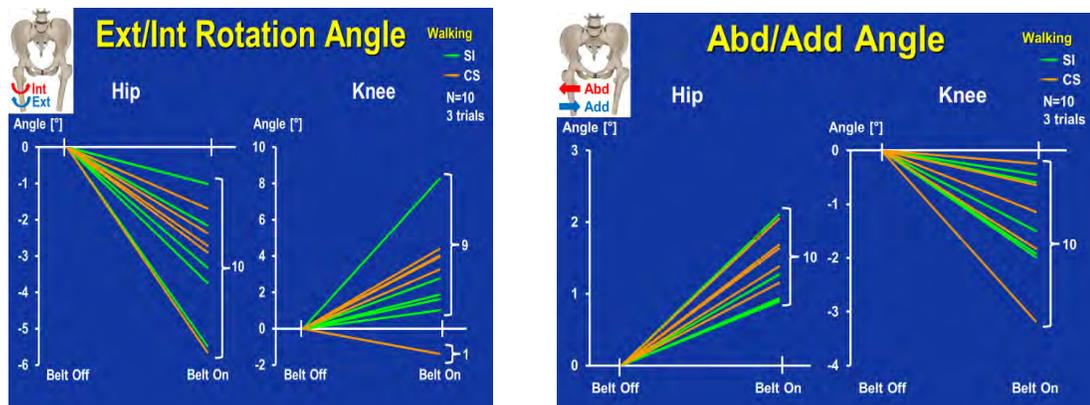
Results: standing

- Eight of 10 participants showed significantly higher internal rotation of the hip relative to the pelvis ($p = .040$) and greater external rotation of the knee relative to the thigh with the belt applied



Results: walking stance phase

- All participants showed significantly greater internal rotation of the hip relative to the pelvis ($p = .005$) with the belt applied than without the belt.
- All participants showed significantly higher abduction of the thigh ($p = .005$)

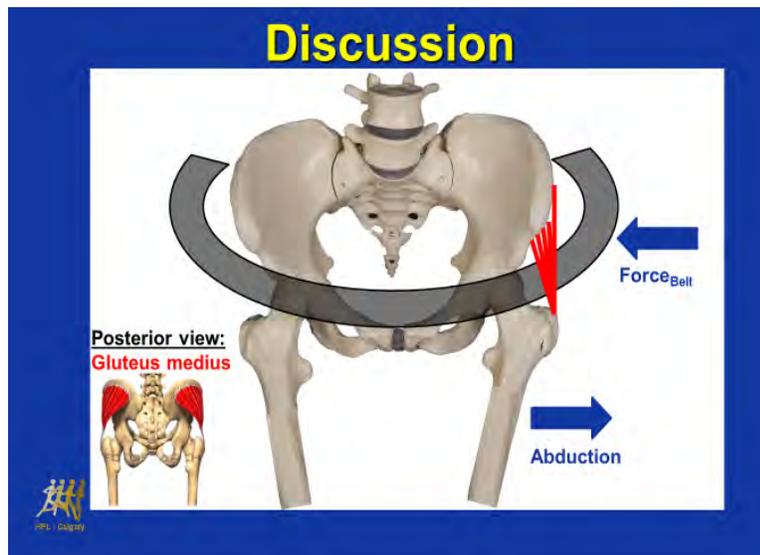


Conclusion

- Decrease in CoP in ALL women with belt on, during standing
- Differences in internal rotation and abduction in ALL women during stance phase of walking
- Cannot differentiate those women with PGP and those without by the CoP and kinematic changes with belt application
- Limitations:
 - Small study size
 - All measures were done on right side
- Strengths:
 - Rigour of the testing
 - Looked at other possible parameters but results always the same

Questions





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A Physiotherapy Research Experience from a Clinician Perspective



The "Back
Story"

- How it all started

Logistics

- Coordinating schedules
- Time commitment
- "Research fatigue"



What we wish we'd known



How difficult it is to recruit participants



How to use technology in a research format



The challenges of coordinating schedules



Better understanding of data interpretation

For Future Clinical Researchers

-  Pair with an academic/researcher with knowledge in your area
-  Consider the time commitments and availability of those involved outside of work, family, personal time
-  How can we make clinical research work in the real world?

Positive Points

-  Collaborating with colleagues
-  Working to expand our knowledge/ understanding
-  Feeling of helping to improve our profession by contributing to evidence-based practice
-  Overall a good learning experience