W19: Pre and postpartum pelvic floor muscle exercise in prevention of urinary incontinence - theory and practice

Workshop Chair: Siv Morkved, Norway
03 September 2019 16:00 - 17:30

Start	End	Topic	Speakers
16:00	16:05	Welcome and presentation	Siv Morkved
16:05	16:20	Pelvic floor anatomy and risk factors of birth injuries to the pelvic floor	Cornelia Betschart Meier
16:20	16:35	Evidence for pelvic floor muscle exercise during pregnancy and after childbirth	Siv Morkved
16:35	16:50	Adherence strategies in promotion of pelvic floor muscle training	Helena Frawley
16:50	17:00	Pelvic floor muscle training included in general pre- and postnatal exercise classes - an example	Signe Nilssen Stafne
17:00	17:20	Practical exercise class for pre- and postpartum women	Kari Bø
17:20	17:30	Discussion	Siv Morkved Cornelia Betschart Meier Kari Bø Helena Frawley Signe Nilssen Stafne

Aims of Workshop

The aim of this workshop is to improve the health care for women during pregnancy and after delivery, by facilitating implementation of evidence based practice.
The workshop includes a practical exercise session, an update on pelvic floor anatomy and possible birth injuries, evidence for the use of pelvic floor muscle exercises (PFME) in prevention and treatment of urinary incontinence during pregnancy and after childbirth, and strategies to improve adherence and implementation of PFME.
At the conclusion of this workshop, the participants will know the rationale and evidence behind the use of PFME in pre and postnatal care, and how they can plan and implement an exercise program in clinical practice.

Learning Objectives

The rationale and evidence behind the use of pelvic floor muscle exercises in the prevention and treatment of pre- and postnatal urinary incontinence

Target Audience

Urogynaecology, Conservative Management

Advanced/Basic

Intermediate

Suggested Learning before Workshop Attendance

1. Evidence-based Physical Therapy for the Pelvic Floor. Bridging science and clinical practice. Bø K, Berghmans B, Mørkved S, Van Kampen M. 2015 Elsevier. ISBN 978-0-7020-4443-4

2. Incontinence, 6th Edition 2017. Abrams P, Cardozo, Wagg A, Wein A. Incontinence Ch 12 Adult Conservative Management 6th Edition 2017 ISBN: 978-0-956907-3-3

3. Pelvic floor muscle training for prevention and treatment of urinary and faecal incontinence in antenatal and postnatal women.Woodley SJ, Boyle R, Cody JD, Mørkved S, Hay-Smith EJC.
Cochrane Database Syst Rev. 2017 Dec 22;12:CD007471. doi: 10.1002/14651858.CD007471.pub3. Review.

Pelvic floor anatomy and risk factors of birth injuries to the pelvic floor
Cornelia Betschart

Anatomy: The pelvic floor is a complex unity that consists of different anatomical structures. There are large, robust muscles on the pelvic side-wall like the **piriformis muscle** and the **obturator internus muscle** that are not prone to birth related injuries. The obturator muscle gives origin to the fascial structure like **levator arch**. More caudally a next condensation of connective tissue forms the **fascial arch**. Both arches support the levator ani muscle and the endopelvic fascia. The different **subdivisions of the levator ani** will be revised with focus on their fibers' vectors. The functional consequence of levator muscle injury depends on the region of muscle affected.

The vagina and the cervical ring are anchored within the **endopelvic fascia**. Most caudally we find the **perineal membrane** where the urethra, the vagina and the rectum pass through. We know from imaging studies that 15 to 35% of women giving birth, have an injury of the levator ani muscle after their first vaginal delivery.
The anatomical structures, subjected to injuries, will be revised by short video clips.

Apart from muscles' injuries there are also **ligaments and nerves** that undergo a significant stretch during pregnancy and delivery. The two most important ligaments are the **uterosacral ligament** and the **cardinal ligament**. They both reinforce the membranes of the pelvic floor. The uterosacral ligament is situated more horizontally, from ventral to posterior, and the cardinal ligament acts in a vertical way.

In one MRI-model taken at five different time points in pregnancy and up to 1 year postpartum, a significant change during pregnancy and postpartum of both, the ligaments and levator ani was demonstrated. It was shown that the ligaments and levator ani one year after delivery remained still longer than at 16 weeks of pregnancy. Within one year, they did not return to their initial length.

When it comes to **pelvic floor nerves** we also have a good model of the second stage phase where Lien et al. demonstrated the effect of passing the baby's head through the genital hiatus. In their model the posterior branches of the pudendal nerve, that means the inferior rectal nerve and the anal sphincter nerve were stretched 35% whereas the anterior nerves such as the urethral sphincter nerve and the labial nerves got stretched less, for about 15%.

Pressure on the pelvic floor: Delivery is not only a spatial issue, it is also a pressure issue. In everyday life the pelvic floor is subject to different pressures: walking, jogging, coughing, lifting weight. The rise in intraabdominal pressure during these activities is comparable to the rise of a second stage contraction that is between 60 and 70 cm H2O. The big difference is the length of the pressure impact. For example, when jogging, the rise of pressure lasts for milliseconds whereas the second stage contraction lasts for about 90 seconds. This makes a difference in the area under the curve and yields to a more than hundred times higher impact to the pelvic floor during a second stage contraction than for example jogging or lifting weights.

Literature

- Betschart C, DeLancey JOL, et al. Muscle fiber direction of the levator ani and external anal sphincter muscle in MRI. IUJ 2014
- Jean Dit Gautier E, Rubod C, et al. Pregnancy impact on uterosacral ligament and pelvic muscles using a 3D numerical and finite element model: preliminary results. IJU 2018
- Lien KC, DeLancey JO, et al. Pudendal nerve stretch during vaginal birth. AJOG 2005
- Bo K, et al. Regular exercisers have stronger pelvic floor muscles than nonregular exercisers at midpregnancy. AJOG 2018
- Shaw JM, Nygaard I, et al. Intra-abdominal pressures during activity in women using an intra-vaginal pressure transducer. J Sports Sci 2014
- Meyer S, Achtari C, et al. Continuous recording of intrarectal pressures during the second phase of labour: correlations with postpartum pelvic floor complaints. A biomechanical-clinical study. IUJ 2017

Evidence for pelvic floor muscle exercise during pregnancy and after childbirth
Siv Mørkved, PT, MSc, PhD
Professor, Department of Public Health, Norwegian University of Science and Technology, Trondheim, Norway
Associate medical director Central Norway Regional Health Authority

The role of physiotherapy in avoiding and treating pelvic floor disorders during pregnancy and after delivery

Aim of the presentation is to present literature on the evidence behind the use of pelvic floor muscle training (PFMT) during pregnancy and after delivery in prevention and treatment of urinary incontinence (UI).
There is evidence that child-bearing results in higher risk of incontinence. The challenge is to find effective and acceptable methods to avoid injury to the PFM, treat dysfunction early to stop progression, and find strategies to treat and rehabilitate pelvic floor damage related to pregnancy and delivery. One such strategy is to encourage women to do PFM exercises.

The pelvic floor muscles give pelvic organ support and are an important continence mechanism. It is a strong biological rationale for PFMT for to treat stress UI and pelvic organ prolapse (POP) (Miller et al -04, Bø & Talseth -97, Peschers -01, Brækken et al -10). The rationale for PFMT is to perform strength training over time to build up «stiffness» and structural support of the pelvic floor. In addition, to the women can learn to consciously contract before and during an increase in abdominal pressure– «The Knack» - to prevent descent to the pelvic floor.

Does pelvic floor muscle exercise during pregnancy and after delivery prevent or treat urinary incontinence?

In The International Consultation on Incontinence 2017; Conservative Management, one Chapter adresses prevention and treatment in pregnant and postnatal women. The primary outcome of interest was self-reported UI (cure, improvement, number of leakage episodes). The recommendations are:

Prevention of UI in childbearing women: Offer continent, pregnant women a supervised (including regular health professional contact) and intensive strengthening antepartum PFMT programme to prevent antepartum and postpartum UI.

Treatment of UI in childbearing women: PFMT should be offered as first line conservative therapy to women with persistent UI symptoms three months after delivery. An 'intensive' PFMT programme (in terms of supervision and exercise content) is likely to increase the treatment effect.

Where a ***population approach*** (groups of women where some did and some did not have prior UI symptoms) is used, the 'best' evidence to date suggests the following: (a) an intervention comprising of a daily home PFMT and weekly physiotherapist-led exercise classes for 12 weeks, starting at 16-24 weeks' gestation for pregnant women, and (b) an individually taught strengthening PFMT programme that incorporates adherence strategies for postpartum women who have had a forceps delivery or a vaginal delivery of a large baby (4000g or more).

Reflections

Knowledge about training principles, functional anatomy and motor learning principles including motivation theory is essential for physiotherapists dealing with exercise therapy in general. Moreover, this knowledge may be particularly important when dealing with prevention and treatment of incontinence. Pregnant women and women in the postpartum period seem to need thorough instructions in correct PFM contractions, strong motivation and close follow up if exercise is to be maximally effective.

Take home message

– To improve clinical management the interventions used should be based on high level evidence
– PFMT is an effective low-threshold treatment with no adverse effects, that should be offered to child-bearing women
– Multidiciplinary teams

Adherence strategies in promotion of pelvic floor muscle training
Helena Frawley

This presentation will cover:

- Why (long-term) exercise adherence is difficult
- How theory helps us understand adherence
- How a patient-centred and context-specific application can maximise adherence

At the end of this presentation you will be able to:

- Identify one or more behaviour change techniques that might support patients' exercise adherence in your practice
- Record adherence strategies

Phases of adherence: Initial uptake -> Adoption of main routine -> Maintenance routine -> Relapse management.
The core concepts discussed will include:

- Adherence is a process AND an outcome
- Measuring adherence is difficult – no gold standard
- Most people are partially adherent, some are over-adherent
- Certain level of adherence is required to obtain therapeutic benefit
- Treatment adherence typically requires health behaviour change: 4As: Aware, Agree, Adopt, Adhere.
    - There is attrition in this pipeline, so that fewer reach adherence than start.

We will consider adherence to PFMT as an 'exercise behaviour'.

Theories that have been used in PFMT adherence research, or theories that may be applied:

- Health Belief Model

- Social Cognitive Theory: Self-Efficacy Beliefs
- Information Motivation Behavioural Skills Model (IMB)
- Capability, Opportunity, Motivation, determining Behaviour (COM-B model)

We will discuss the research that has looked at:

- factors that modify adherence to PFMT: Knowledge, Feelings about PFMT, Physical skill, Cognitive analysis, planning and attention, Prioritisation, Service provision.
- Determinants of adherence (Moderators & Mediators) and the strategies that can be used to enable these determinants, in populations with UI, but not other PFDs.

Adherence is not uni-dimensional, there are interacting dimensions which affect adherence, highlighting the need for an individualised, context-specific approach. Important to consider the patient perspective, because does not always align with the clinician perspective.

We will discuss terminology for the exercise behaviour strategies used to promote adherence to PFMT, and optimal recording of these.

References:

- Albrecht L et al. Development of a checklist to assess the quality of reporting of knowledge translation interventions using the Workgroup for Intervention Development and Evaluation Research (WIDER) recommendations. Implement Sci. 2013; 8: 52.
- Behaviour change: http://www.marketingforchange.com.au/great-behaviour-change-mind-map/
- Borek AJ, et al. A checklist to improve reporting of group-based behaviour-change interventions. BMC Pub Health. 2015 15: 963.
- Dumoulin C, et al. Pelvic Floor Muscle Training Adherence: tools, measurements and strategies - 2011 State-of-the-Science Seminar Research Paper II of IV. Neurourol Urodyn 2015 34(7): 615-621.
- Dumoulin C, et al. Consensus Statement on Improving Pelvic Floor Muscle Training Adherence: International Continence Society 2011 State-of-the-Science Seminar. Neurourol Urodyn 2015 34(7): 600-605.
- Fisher WA, et al (2003) The Information-Motivation-Behavioral Skills model: A general social psychological approach to understanding and promoting health behavior. In: Suls J, Wallston KA (eds) Social Psychological Foundations of Health and Illness. Blackwell Publishing, 82–106.
- Frawley HC, et al. Is pelvic floor muscle training a physical or a behavioral therapy? Physical Therapy (2017) 97 (4): 425-437
- Frawley, H, et al. (2015) Health Professionals' and Patients' Perspectives on Pelvic Floor Muscle Training Adherence – 2011 ICS State-of-the-Science Seminar Research Paper IV of IV. Neurourol Urodynam, 34(7): 632-639.
- Glasziou, P. and R. B. Haynes (2005). The paths from research to improved health outcomes. Evidence-Based Medicine 10: 4-7.
- Grol, R., M. Wensing, et al., Eds. (2013). Improving patient care: the implementation of change in health care. Oxford, Wiley Blackwell
- Hay-Smith J, et al. Pelvic-Floor-Muscle-Training Adherence ''Modifiers'': A Review of Primary Qualitative Studies—2011 ICS State-of-the-Science Seminar Research Paper III of IV. Neurourol Urodyn 2015, 34(7): 622-631.
- Hay-Smith, E. J., et al (2015). "Exercise Adherence: Integrating Theory, Evidence and Behaviour Change Techniques." Physiotherapy 101(Suppl 1): e9-e10
- McClurg D et al. Scoping Review of Adherence Promotion Theories in Pelvic Floor Muscle Training - 2011 ICS State-of-the-Science Seminar Research Paper I of IV. Neurourol Urodyn 2015 34(7): 606-614
- Michie S et al (2011) The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implement Sci 6:42
- Michie S, et al. The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions. Ann Behav Med 2103; 46(1): 81-95.
- Rainbird, K et al. (2006) Identifying barriers to evidence uptake http://www.nicsl.com.au/
- Slade SC, et al, and the CERT Panel. Consensus on Exercise Reporting Template (CERT): a modified Delphi study. Phys Ther. 2016; 96(10): 1514-1524.
- Slade SC, et al. The Consensus on Exercise Reporting Template (CERT): Explanation and Elaboration Statement. Br J Sports Med. 2016;50:1428–1437
- Spring, B. & Hitchcock, K. (2009) Evidence-based practice in psychology. In I.B. Weiner & W.E. Craighead (Eds.) Corsini's Encyclopedia of Psychology, 4th edition (pp. 603-607). New York:Wiley
- https://www.wcpt.org/sites/wcpt.org/files/files/wpt15/fs/FS-09.pdf
- WHO 2003: Adherence to Long-Term Therapies - Evidence for Action http://apps.who.int/medicinedocs/en/d/Js4883e/7.2.html#Js4883e.7.2.1

Pelvic floor muscle training included in general pre- and postnatal exercise classes - an example
By Signe Nilssen Stafne

In this section I will present how pelvic floor muscle training (PFMT) can successfully be implemented in general pre- and postnatal exercise classes. The study was done in Trondheim, Norway, in 2007-2009 and was included in my PhD. The study has been published in BJOG (Stafne et al., Does regular exercise including pelvic floor muscle training prevent urinary and anal incontinence during pregnancy? A randomized controlled trial. BJOG, 2012). The study was a RCT aiming to study whether exercise training during pregnancy could prevent pregnancy related diseases as conditions, including urinary incontinence (UI). Healthy pregnant women with a single live fetus were eligible for study inclusion. In total 855 women were included in mid-pregnancy. Women randomized to the exercise group were encouraged to follow a 12-week exercise program. Women met for group training once per week and were encouraged to exercise on their own twice a week. The exercise program followed recommendations from the American College of Obstetricians and Gynecologists. The exercise groups consisted of 10-15 pregnant women and were led by a physiotherapist. The exercise program was standardized and consisted of both endurance training and strength training. The strength exercises was for upper and lower limbs, core muscles and the pelvic floor muscles. All exercise sessisons were ended with light stretching, body awarness and relaxation exercises. More specific, the PFMT followed the principles for increasing strength of skeletal muscles, and women were encouraged to perform three sets of 8-12 close to maximum contractions of the PFM, and were encouraged to hold the contraction for 6-8 seconds, and if possible to add three fast contractions at the end of the contraction. Before starting the exercise period, all women met for an individual vaginal examination with a physiotherapist to ensure that they were able to do a correct voluntary contraction. Women who were unable to contract were instructed until they managed. All women received written and verbal information in pelvic floor anatomy and why they should do PFMT. The information were given both individually and repeated in the exercise group sessions. The exercise program consisted of low impact exercises as it stresses the continence system minimally. PFMT was done in different positions for variation and we also included functional exercises. After the 12-week exercise period, in late pregnancy, significantly less women in the exercise group reported UI (42% vs. 53%, p=0.004). At three months postpartum there was significantly fewer women in the exercise group reporting UI (29% vs. 38%, p=0.008). The implications of the study is that thorough instruction in correct PFM contractions and a specific PFMT program successfully can be included in exercise classes for pregnant women.

PELVIC FLOOR MUSCLE TRAINING CLASS/ CORE MUM PROGRAM
Kari Bø, Professor, PhD, exercise scientist, physical therapist, Norwegian School of Sport Sciences, Department of Sports Medicine.

Table 1. Example of a PELVIC FLOOR MUSCLE EXERCISE CLASS (30 minutes of low impact aerobic exercise can be added to the below program).

	TIME (minutes)	EXERCISE
Music	4.00 – 6.00	Warming up; stretch, walk, step touch, body awareness, posture
	3.00	PELVIC FLOOR: STANDING
Music	2.30	Strength: back and abd (TrA); prone
	3.00	PELVIC FLOOR: PRONE, ONE LEG IN FLEXION
Music	2.30	Strength: arms, back, TrA "Dog position"
	3.00	PELVIC FLOOR: FROG POSITION
Music	2.30	Strength: abdominals, back; crook lying
Music	2.10	Relaxation, breathing. Neck and shoulder stretch; sitting position
	3.00	PELVIC FLOOR: SITTING POSITION
Music	3.19	Move to standing, stretches, ergonomics, strength: thigh, gluteals and back
	2.00	PELVIC FLOOR: STANDING & WITH FLEXED HIPS AND KNEES
Music	3.18	Stretches, breathing relaxation; standing position

CONTENT:
This model for pelvic floor muscle training consists of two main stages:

STAGE 1: SEARCH, FIND, LEARN AND CONTROL
This is done individually with a trained physical therapist (PT) and includes observation and vaginal palpation with verbal feedback of muscle performance. If the patient is able to perform a correct contraction, muscle strength is measured, and the patient can be sent to the exercise class. If she is not able to contract she comes back to the PT, and the PT may use facilitation techniques (tapping, stretching, massage, el.stim) in order to stimulate ability to contract correctly.

STAGE 2: STRENGTH TRAINING
The strength training can be performed individually in the PT's office + home training, or in groups. The aim of the strength training is to build up the muscles in order to make them able to give better structural support to counteract increase in intra-abdominal pressures. Possible changes to the pelvic floor muscles due to strength training are:
1. lifting of the pelvic floor to a higher anatomical position inside the pelvis
2. increase of the cross sectional area of the muscles (hypertrophy)
3. increase of "stiffness" of the connective tissue within and around the pelvic floor muscles
4. reduction of the area of the levator hiatus
Such changes have been verified in a recent single blind randomized controlled trial.
In the group training class strength training of the pelvic floor muscles is done in 5 different positions with attempts of 8-12 maximum voluntary contractions (MVC) in each position. The participants are instructed to hold each contraction for 6-8 seconds. In addition about half of the contractions in each position are "intensive contractions" meaning that the women are asked to contract as hard as possible, hold the contraction for 6-8 seconds, and then add 3-4 fast contractions on top of the prolonged contraction. The instructor is using strong verbal encouragement to stimulate for maximum contractions. The patients typically exercise in the class once a week, but ideally supervized PFM training classes would be done 3 times/week.

Positions with legs apart are used to avoid strong outer pelvic muscles (hip adductor, gluteals and outer abdominal muscles) to take over and mask attempts of maximum contraction of the pelvic floor muscles. Co-contractions of the inner abdominal muscles have always been allowed in this program, as it does not seem to be possible to perform maximum contractions of the pelvic floor muscles without some co-contraction of the inner abdominals (no visible movement of the pelvis, only a small tucking in of the abdomen should be observed). When the PFM are contracted first, co-contraction of the abdominals is unlikely to open the levator hiatus or press the pelvic floor downwards.

In addition to the supervised training the patients are asked to perform 3 sets of 8-12 maximum contractions every day at home and to report training adherence in a training diary/app/mobile phone.

References

Bø K 2004 Pelvic floor muscle training is effective in treatment of stress urinary incontinence, but how does it work? International Urogynecology Journal and Pelvic Floor Dysfunction 15:76-84.

Bø K, Hagen RH, Kvarstein B, Jørgensen J, Larsen S 1990 a Pelvic floor muscle exercise for the treatment of female stress urinary incontinence: III. Effects of two different degrees of pelvic floor muscle exercise. Neurourology and Urodynamics 9:489-502.

Bø K, Talseth T 1996 Long term effect of pelvic floor muscle exercise five years after cessation of organized training. Obstetrics and Gynecology 87(2):261-265.

Bø K, Talseth T, Holme I 1999 Single blind, randomised controlled trial of pelvic floor exercises, electrical stimulation, vaginal cones, and no treatment in management of genuine stress incontinence in women. British Medical Journal 318:487-493.

Bø K, Kvarstein B, Nygaard I 2005 Lower urinary tract symptoms and pelvic floor muscle exercise adherence after 15 years. Obstet Gynecol ,105: 999-1005.

Bø K, Berghmans B, Mørkved S, van Kampen M 2015: Evidence based physical therapy for the pelvic floor. Bridging science and clinical practice. Elsevier 2015

Brækken IHB, Majida M, Engh ME, Bø K: Morphological changes after pelvic floor muscle training. Obstet Gynecol, 115, 2, Part 1:317-324, 2010

Brækken IHB, Majida M, Engh ME, Bø K: Can pelvic floor muscle training reverse Pelvic organ prolapse and reduce prolapse symptoms? Am J Obstet Gynecol,

Aug, 203, 170e: 1-7, 2010

Mørkved S, Bø K, Fjørtoft T 2002 Is there any additional effect off adding biofeedback to pelvic floor muscle training? A single-blind randomized controlled trial. Obstetrics and Gynecology 100(4):730-739.

Mørkved S, Bø K. The effect of postpartum pelvic floor muscle exercise in the prevention and treatment of urinary incontinence. Int Urogynecol J 1997; 8:217-222.

Mørkved S, Bø K 2000 Effect of postpartum pelvic floor muscle training in prevention and treatment of urinary incontinence: a one-year follow up. Br J Obstet Gynaecol, 107: 1022-1028.

Mørkved S, Bø K, Schei B, Salvesen K. Pelvic floor muscle training during pregnancy to prevent urinary incontinence: A single blind randomized controlled trial Obstet Gynecol 2003: 101:313-319.