

Appendix 1 Script of the app contents

Page 1 (About the application)

Preparation of Pelvic Floor Muscles (PFM) in pregnancy

This app was developed by the Women's Health Research Laboratory (LAMU) of the Physical Therapy Department of the Federal University of São Carlos (UFSCar).

Its purpose is to present information about the pelvic floor muscles (which we will call in this app PFM) and how to train these muscles on a regular basis during pregnancy.

(video tutorial on how to navigate through the application)

(Logo of the Department of Physical Therapy, Laboratório de Pesquisa em Saúde da Mulher and the Universidade Federal de São Carlos)

Hello, future mom!

Training PFM during pregnancy is crucial. Just as you train other muscle groups at the gym, these muscles can also be trained and strengthened. When it is not working properly it can result in pelvic floor muscle dysfunction.

In this application, we will explain more about this subject!

(Button: Let's Start!)

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Page 2

Anatomy of the pelvic region

The anatomy of the pelvic region is composed of the pelvic organs (uterus, bladder, vagina, urethra, and rectum) and the PFM.

(Subpages buttons: Uterus, Bladder, PFM, Vagina, Urethra and Rectum)

(Illustration of a pelvis viewed from the side with the pelvic organs in evidence)

Ref: (1)

Subpage 2.1 (Uterus)

UTERUS

(Illustration uterus)

It's the organ responsible for **housing your baby during pregnancy**. In it we also find the endometrium, which is a layer that is prepared to receive the embryo and flakes off during menstruation if this does not happen.

Ref: (1)

Subpage 2.2 (Bladder)

BEXIGA

(Illustration bladder)

The bladder has the function of **temporarily storing our urine**. It is positioned in **front and below** the uterus, so as your baby grows and moves around, he puts a little pressure on the bladder and increases the urge to pee.

Ref: (1)

Subpage 2.3 (PFM)

PFM

(PFM Illustration)

It's a **set of muscles** and, together with ligaments and fascia, make up the pelvic floor.

(Eickmeyer, 2017)

Subpage 2.4 (Vagina)

VAGINA

(Vagina Illustration)

It's the **canal** where **penetration** occurs **during sexual intercourse**, where the **blood comes out during menstruation**, and **where the baby will pass during vaginal delivery** (also known as natural childbirth).

Ref: (1)

Subpage 2.5 (Urethra)

URETHRA

(Urethra illustration)

It's the duct **responsible for carrying urine from the bladder to the outside of the body**. The urethra is located in the middle of our PFM, so changes in this musculature end up affecting it as well.

Ref: (1)

Subpage 2.6 (Rectum)

RECTUM

(Rectum Illustration)

It's the final straight portion of the large intestine in humans. It accumulates your feces, reabsorbing water and nutrients, until the moment of defecation.

Ref: (1)

Page 3

Pelvic Floor Muscle Function

Did you know that PFM is responsible for:

(Subpages buttons: Support of pelvic organs and baby, Urinary and fecal continence, Female sexual function and Labor e delivery)

Ref: (28)

Subpage 3.1

Support of the pelvic organs and the baby

PFM, along with ligaments and fascia, supports the pelvic organs. It **closes the opening** below the pelvic bones, forming a **hammock that holds the bladder, urethra, uterus (when pregnant, it holds the baby's weight as well), and rectum**.

(Illustration of a pelvis viewed from the side with the pelvic organs in evidence)

Ref: (28)

Subpage 3.2

Urinary and Fecal Continence

PFM is also able to hold pee and feces, preventing the unintentional loss of these fluids.

Ref: (28)

Below you will find a video about urinary continence:

(LAMU's own youtube video: **Do you know what Urinary Incontinence is?**)

Subpage 3.3

Female Sexual Function

Did you know that when PFM function is not adequate, problems can arise in a woman's sex life?

(Illustration of pregnant woman on the couch thinking)

Among the main problems that a woman may have, in case of impaired PFM function, we highlight:

- Pain during sexual activity
- Difficulty or impossibility of penetration
- Difficulty reaching orgasm

Ref: (28)

Subpage 3.4

Labor and delivery

The baby's head can be up to 4 times larger than the diameter of the vaginal canal (which the baby passes through).

(Illustration of the moment when the baby's head comes off)

Therefore, it is important that the PFM has sufficient stretch to allow the baby to pass through.

Ref: (29)

Page 4

Pelvic floor muscle dysfunctions (PFMD)

In cases where PFM is not functioning well, the woman may present some dysfunctions:

(Subpages buttons: Pelvic Organ Prolapse (POP), Urinary Incontinence (UI), Anorectal incontinence and Female Sexual Dysfunctions)

Ref: (28)

Subpage 4.1

Pelvic Organ Prolapse (POP)

Pelvic organ prolapse is characterized by the falling or lowering of the pelvic organs that are above the PFM.

Ref: (28)

(Button to page 1: Pelvic organs)

(Gif of a pelvis viewed from the side with the pelvic organs falling out)

Subpage 4.2

Urinary Incontinence (UI)

Did you know that it's not normal to lose urine? Even just a tiny drop? Urinary incontinence is any loss of urine. There are three types of urinary incontinence: Stress Urinary Incontinence (SUI), Urge Urinary Incontinence (UUI) and Mixed Urinary Incontinence (MUI).

Ref: (28)

(Subpage buttons: SUI, UUI and MUI)

Urinary incontinence is one of the most common PFM dysfunctions in pregnant women, and if left untreated, it tends to worsen, diminishing their quality of life.

Ref: (Sangsawang e Sangsawang , 2013)

Subpage 4.2.1

Stress Urinary Incontinence (SUI)

Stress incontinence happens when physical movement or activity promotes increased pressure inside the belly. This pressure creates a force on the bladder, causing a leak urine.

(Illustration of a woman lifting weights with urine loss)

Usually this pressure happens when you **cough, sneeze, exercise, jump, and climb stairs**, for example.

Ref: (D'Ancona C et al, 2019)

Subpage 4.2.2

Urge Urinary Incontinence (UUI)

A UUI occurs in episodes **when there is a very strong urge to go to the bathroom, but the woman cannot hold it in until she gets there**. This happens because the bladder muscle contracts repeatedly and without "warning" to the woman.

(Illustration woman loses urine beside the toilet)

Ref: (D'Ancona C et al, 2019)

Subpage 4.2.3

Mixed Urinary Incontinence (MUI)

And MUI is when urine loss occurs in situations of both stress and urgency.

Ref: (D'Ancona C et al, 2019)

Subpage 4.3

Anorectal incontinence

It's related to involuntary loss of flatus or feces.

(Illustration of a woman with loose stool)

Ref: (28)

Subpage 4.4

Female Sexual dysfunctions

The most common sexual dysfunctions in women are:

Sub-page buttons: **Orgasmic dysfunction**, Dyspareunia, and Vaginismus.

If you identify any of these symptoms **ask a health professional for help**, because there is treatment! The ideal is an **integrated treatment** between a physical therapist, gynecologist, and a psychologist or sex therapist.

(Illustration of a pregnant woman receiving orientation from the physiotherapist)

Ref: (28)

Subpage 4.4.1

Orgasmic dysfunction

It is the difficulty or inability to reach orgasm during sexual intercourse with or by yourself. It is not normal not to feel pleasure!

Ref: (28)

Subpage 4.4.2

DYSPAREUNIA

It is the pain during the introduction of some object in the vaginal canal or during penetration during sexual intercourse. It is important to emphasize that it is not normal to feel pain and/or discomfort (burning or stinging) during the introduction of any object (for example the pap smear) or during intercourse itself.

Ref: (28)

Subpage 4.4.3

VAGINISM

Vaginismus generates the closing of the vaginal canal opening due to an excessive contraction of the PFM, which does not allow the introduction of objects into the vaginal canal or penile penetration.

Ref: (28)

Page 5

Pelvic floor muscle training (PFMT)

PFMT is an exercise program consisting of voluntary, repeated contractions of the pelvic floor muscles.

This training helps **prevent the aforementioned dysfunctions** and assists in **reducing the risk of urinary incontinence both in late pregnancy (over 34 weeks) and postpartum** - how great is that!

(Gif pelvic floor muscles contracting)

In addition, studies show that PFMT reduces the time of labor, because the pregnant woman becomes more aware of these muscles and can better relax the pelvic floor muscles - faster labor is the wish of every pregnant woman, isn't it?

Come **learn how to contract** your pelvic floor muscles.

(Subpages buttons: How to contract PFM, PFMT program)

Ref: (2)

Subpage 5.1

How to contract PFM

Imagine that your vaginal canal can function like a straw. During contraction, this straw should perform a suction, moving in and up.

(PFM Illustration)

- Concentrate and try to contract only the pelvic floor muscles, avoiding contracting the glutes and the abdominal muscles.
- Avoid performing an expulsion force (movement contrary to contraction)
- Hey, don't hold your breath during the contraction, okay? Contract while you breathe out.
- In any case, it's ideal to check with a physiotherapist who is specialized in women's health, so that he or she can help you with the proper way to do the PFM contraction.

(Illustration of a pregnant woman being assisted by a physical therapist)

Ref: (2)

Subpage 5.2

PFMT program

Now you know the importance of PFM, its functions and dysfunctions, and how to contract the muscles.

So, let's train?

(Video that teaches how to contract the PFM, with sustained contraction timing the sustained time, counting the rest time and with fast contraction)

To help you train these muscles, we have created a daily program of PFMT, lasting 16 weeks (from the 20th week of pregnancy to the 36th week), which you can perform at the most comfortable and convenient time for you, for example: at home, at work, in the transportation, wherever is best for you!

(Button with a video with the 3 sets of the PFMT program so that the pregnant woman can follow along while she trains)

In the button above you will find a video of the entire PFMT program to accompany you during your daily training.

(Subpages buttons: Positions, Series and Repetitions, reminders)

The important thing is to train! You don't need any tools, just your own body.

Ref: (2,30,31)

Subpage 5.2.1

Positions

During the training you can adopt different positions according to your comfort. You can start training in the easiest position (lying down) and progress to the most difficult position (standing up):

(Subpages buttons: Lying down, Four point kneeling, Sitting and Standing)

Ref: (2,30,31)

Subpage 5.2.1.1

Lying

Lie down on the bed, if you want to place a back or head support, and let your legs bend slightly apart.

This is the easiest position to perform PFMT.

(Illustration of a pregnant woman lying with her back resting on a pillow)

Ref: (2,30,31)

Subpage 5.2.1.2

Four point kneeling

For this position, the ideal is to use a mat or mattress on the floor to support your knees and hands. Your hands should be spread apart, in the same direction as your shoulders, your knees should be in line with the positioning of your hips, and your spine straight.

(Illustration of a pregnant woman in the four-legged position on a yoga mat)

This position can be a little more uncomfortable in late pregnancy, because the weight of the belly is down. So remember to always adopt a position that is comfortable for you.

Ref: (2,30,31)

Subpage 5.2.1.3

Sitting

Sit in a chair, with your back straight and well supported by the backrest, and your hips fully supported by the seat. Also leave your legs slightly apart and your feet flat on the floor.

(Illustration of a pregnant woman sitting on a chair)

Ref: (2,30,31)

Subpage 5.2.1.4

Standing

Stand upright, keeping your back and shoulders straight, leaving your legs slightly apart.

(Illustration of a pregnant woman standing with her legs slightly apart)

This is one of the most difficult positions to perform PFMT.

Ref: (2,30,31)

Subpage 5.2.2

Series and Repetitions

You should perform 3 sets of exercises with sustained and fast contractions. In each series, 6 to 12 sustained contractions will be performed with a 12-second rest in between.

Ref: (2,30,31)

Subpage 5.2.3

Reminders

- Contract your PFM before making any effort, such as coughing, sneezing, or jumping.
- Do these exercises every day so that your PFM remains strengthened and functioning normally.
- Don't hold your breath while doing the exercises.
- If you feel pain in the pelvic floor muscles, avoid performing the exercises and check a professional.

Ref: (2,30,31)

Page 6

Prevention of Perineal Laceration

During childbirth, laceration of the PFM can occur-stretching and tearing of the muscles, ligaments, and nerves.

(Illustration with the different levels of laceration)

The most common consequences of a perineal tear are perineal pain and dyspareunia, symptoms that can directly interfere with a woman's sexual function but also create discomfort during basic daily activities such as sitting and going to the bathroom. You may be thinking "Is there any possibility of decreasing the chance of something like this happening to me?" And the answer is yes! As a way to prevent tearing, there are some techniques that are recommended for preparing the PFM for delivery.

(Buttons for subpages: Perineal Massage, EPI-NO)

It is important to talk to your doctor, nurse, and physiotherapist about it! Episiotomy (a cut in that region to increase the space for the baby's passage) is considered a caused laceration. Remember, episiotomy is a procedure in disuse and without indication.

(Illustration showing the episiotomy region)

Ref: (32)

Page 7

Find a physiotherapist!

Prenatal care is generally conducted by the obstetrician and nurse, but it is very important to follow up with other professionals, if possible. The **physiotherapist specialized in women's health** enters the team with an eye toward assisting pregnant women:

(Buttons: Prevention of Dysfunctions, Preparation for Labor, Labor and Puerperium)

(33)

Subpage 7.1

Prevention of dysfunctions

A **physiotherapist** specialized in women's health can **assess PFM function and advise if you are not contracting in the right way, also ensuring effective training (PFMT)**, so that the risks of possible PFM dysfunction are lower!

Subpage 7.2

Preparation for labor

- **PFM**

Physiotherapeutic assistance **helps in the preparation of labor**, making it more efficient, whether vaginal or cesarean. **One of the most important conducts in this phase is PFMT**. Through this training, you strengthen the muscles of this region and gain body awareness, being able to contract and relax PFM at the right moments.

(Button returns to the PFMT page)

- **Perineal massage**

It can be performed by the physiotherapist, both to **stretch the perineum and to prevent perineal trauma** - for example, the laceration we mentioned earlier.

(Button: Perineal Massage)

Subpage 7.2.1

Perineal massage

Perineal massage helps to **lengthen the muscles and increase their flexibility**, reducing the risk of laceration. It is the procedure with the **greatest scientific basis**, and is performed from the **34th week of pregnancy**. This technique is performed in the vaginal region and can be done by the pregnant woman herself or by someone she trusts. It combines the use of **specific movements** with the fingers and **application of pressure** in the area.

Ref: (34)

(Gif illustrating perineal massage)

Remembering, massage must be explained and taught by a physical therapist before being performed by yourself or your partner.

- **Health Education**

One of the most important attitudes is to **educate** the pregnant woman and her partner about the **changes that will occur in the mother's body** in relation to the baby, and information about the **stages of labor** so that the pregnant woman can know what to expect during this time.

(Illustration of a pregnant woman receiving orientation from the physiotherapist)

Subpage 7.3

Labor and Delivery

In addition to acting in preparation for childbirth, the physical therapist can also act during labor. An example of this is the **use of non-pharmacological analgesic resources** (electrotherapy, massage in the lumbar region, use of water, among others), i.e. resources that can relieve the pain that the woman is feeling at this very important moment and the **positioning that can be adopted at the moment of delivery**.

(Illustration demonstrating electrotherapy, massage of the lumbar region, use of water and positioning)

Ref: (35)

Subpage 7.4

Puerperium (postpartum)

You may also experience some pain, swelling, and may need **guidance on what are the proper postures for breastfeeding**. Also, it's important to remember that you can (and should!) continue PFMT after delivery, to prevent and/or treat PFM dysfunction.

(Illustration mother holding newborn baby)

Ref: (30)

We know that it is a very dedicated time **for the baby**, but try, whenever possible, to **set aside a little time for you and your PFM**.

References

28. Haylen BT, de Ridder D, Freeman RM, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Int Urogynecol J* 2010;21:5-26.
29. Ashton-Miller JA, Delancey JO. On the biomechanics of vaginal birth and common sequelae. *Annu Rev Biomed Eng* 2009;11:163-76.
30. Woodley SJ, Lawrenson P, Boyle R, et al. Pelvic floor muscle training for preventing and treating urinary and faecal incontinence in antenatal and postnatal women. *Cochrane Database Syst Rev* 2020;5:CD007471.

31. Reilly ETC, Freeman RM, Waterfield MR, et al. Prevention of postpartum stress incontinence in primigravidae with increased bladder neck mobility: a randomised controlled trial of antenatal pelvic floor exercises. Available online: www.bjog-elsevier.com
32. Gomes Lopes L, Maia Dutra Balsells M, Teixeira Moreira Vasconcelos C, et al. Can pelvic floor muscle training prevent perineal laceration? A systematic review and meta-analysis. *Int J Gynaecol Obstet* 2022;157:248-54.
33. COFFITO. Resolução Coffito no 372, de 6 de novembro de 2009. Reconhece a Saúde da Mulher como especialidade do profissional Fisioterapeuta e dá outras providências. *Diário Oficial da União Brasília*. 2009;(228):101.
34. Mei-dan E, Walfisch A, Raz I, et al. Perineal massage during pregnancy: a prospective controlled trial. *Isr Med Assoc J* 2008;10:499-502.
35. Simkin PP, O'hara M. Nonpharmacologic relief of pain during labor: systematic reviews of five methods. *Am J Obstet Gynecol* 2002;186:S131-S159.