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Postnatal recovery and physiotherapy

A GUIDE FOR RECOVERING FROM CHILDBIRTH

DEGREE PROGRAMME IN PHYSIOTHERAPY
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Title of Publication Postnatal recovery and physiotherapy – a guide for recovering from childbirth		
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<p>Abstract</p> <p>Various changes occur in the body of a mother during and after a pregnancy. There are multiple factors influencing on how the mother recovers from the childbirth, and every mother has an individual experience. The purpose of this thesis was to offer current information concerning the postnatal recovery process and physiotherapy, and essential knowledge about the anatomy of the female pelvis.</p> <p>This thesis process included gathering of the evidence-based information from recent years concerning postnatal recovery and physiotherapy. Information was found from various medical and academic sources: scientific articles, books, and websites from official authorities. As the relevant evidence and sources were selected, the thesis process continued by the written theory part.</p> <p>The objective of this thesis was to produce a printable guidebook for the client, Women's wellness center Olennainen in Pori. The guide was made based on the theoretical knowledge presented in the thesis.</p> <p>According to the literature research made, it can be said the demand and need for postnatal physiotherapy is acute, and there is a necessity for future research and studies of this topic. Furthermore, it would be vital to pay more attention to the physiotherapy of the pelvic floor already during the physiotherapy studies.</p> <p>Further studies concerning prevention of postnatal disorders and advancement of postnatal recovery are needed. Now the majority of the resources and emphasis seem to be placed on intrapartum and antenatal care.</p>		
<p><u>Key words</u> Postnatal, Postpartum, Recovery, Childbirth, Pelvic floor muscles, Pelvic floor dysfunctions, Pelvic floor muscle training</p>		

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1 INTRODUCTION

This thesis serves as a theoretical base for a guidebook created for the client Women's wellness center Olennainen.

The theory is of postnatal recovery and physiotherapy with a focus on vaginal delivery and the functioning of the pelvic floor. In this thesis the female body is given the main focus, and the theory includes the anatomy and functioning of the pelvic area, the musculature of the lower abdominal area, and the processes of childbirth and recovering from it. It also includes possible issues that may occur during or after the pregnancy and how they may be treated in the field of physiotherapy, as well as how physical activity and proper rest may aid in the recovery process.

The guidebook is composed to be a giveaway to support the information given in the first physiotherapy session a new mother has in Olennainen. It has the same information that is discussed and instructed in the session, but it serves as more of an easily available reminder for the mother, instead of being an entire book of new knowledge.

This thesis topic is highly current and important, since quality guides available in the Finnish language are needed, as well as they are needed in any other language. Being able to access proven information and guidance in a new and sometimes frightening situation is every woman's right, and the information should be available and easily understandable. The information available should be explained by a professional to avoid misinformation and possible harmful consequences.

2 AIM AND OBJECTIVES

The aim of the thesis is to offer current information and advice concerning postnatal recovery and physiotherapy, and give a basic knowledge of the female pelvic anatomy.

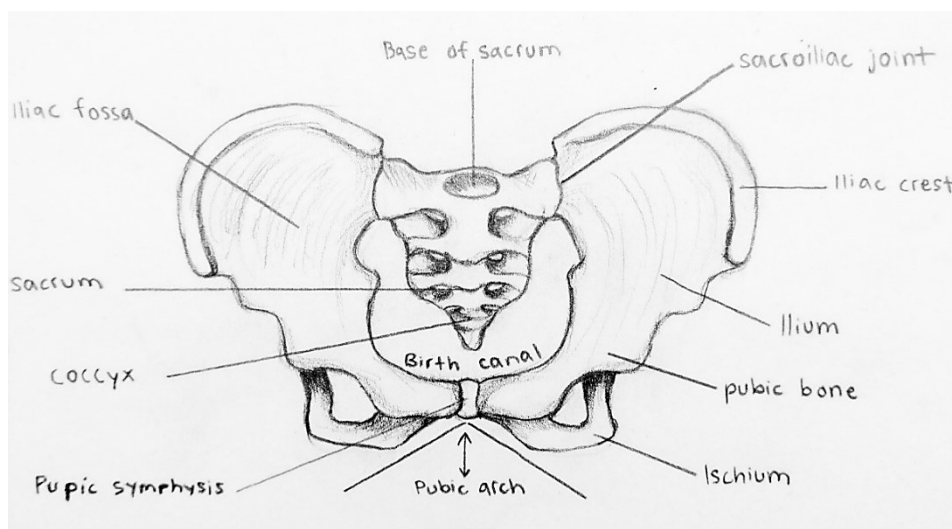
The objective of this thesis is to produce a guidebook containing said information, to be utilised in postnatal physiotherapy sessions in the Women's wellness center Olennainen.

3 ANATOMY OF THE FEMALE PELVIS

The female pelvis differs anatomically from the male pelvis. These differentiations can be seen in the bony structures as well as in the order of organs sited at the pelvic area. The pelvis of a female is wider and shallower compared to the male pelvis, whereas the male pelvis has generally larger and heavier bones. These structural differences are mainly due to adaptations to the requirements of pregnancy and childbirth. The differences on an organ level are due to the biological differences between the female and male reproductive organs. (Tortora & Derrickson 2011, 271.)

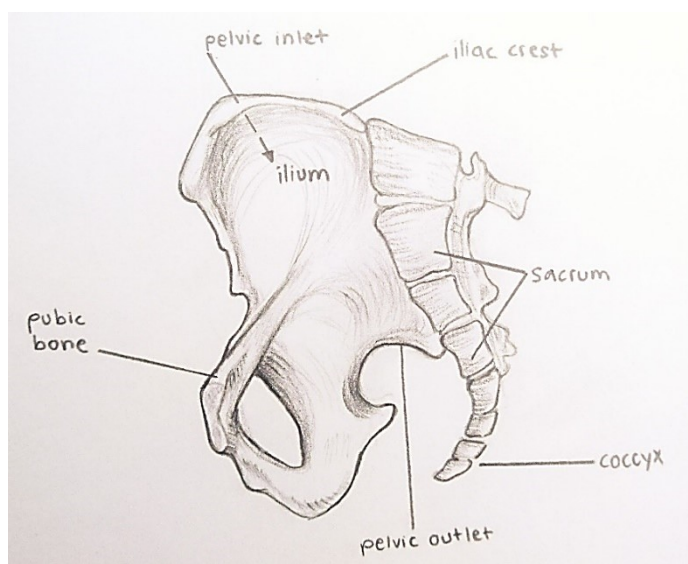
3.1 The pelvic girdle

The pelvic girdle is a ring-like bony structure in the human body, and it provides a stable and strong support for the vertebrae (via sacrum) as well as for the pelvic and lower abdominal muscles (Tortora & Derrickson 2011, 267). As can be observed in the Picture 1. below, it is composed by the two hip bones (os coxa) that are anteriorly united by the joint pubic symphysis, and posteriorly united by the sacrum at the sacroiliac joints. These parts together compose a deep basin-like structure called the bony pelvis, that also connects the lower limbs to the axial skeleton. (Tortora & Derrickson 2011, 267.)



Picture 1. The bony structures of the pelvic girdle, anterior view. (Anniina Ojala 2020)

On a new-born, both coxal bones consist of three parts: ilium (superior), pubis (inferior and anterior), and ischium (inferior and posterior). These parts are separated by cartilage, and by the age of 23, they fuse together. Though the parts are fused together in an adult body, they are still often discussed separately. (Tortora & Derrickson 2011, 267.)



Picture 2. Medial view of the pelvic bone. (Anniina Ojala 2020)

Ilium (Picture 1. and 2.) is the largest of the three parts, and it is composed of a superior ala and an inferior body. The body is one of the components that form the acetabulum (the socket for the head of the femur). The ala is bordered by the spines of the ilium,

iliac spines: anteriorly superior and inferior spines, and posteriorly superior and inferior spines. These spines act as attachment points for the tendons of the muscles of the thighs, hip, and trunk. Along the ala are the attachment points for the gluteal muscles. Below the posterior inferior spine is the greater sciatic notch, through which the sciatic nerve passes. On the medial surface of the ilium is the iliac fossa, where the tendon of the iliacus muscle attaches to. Posterior to this is the iliac tuberosity, that provides the attachment point for the sacroiliac ligament. The sacroiliac joint is formed by the mentioned ligament and the auricular surface of the ilium articulating with the sacrum. (Tortora & Derrickson 2011, 269.)

Ischium is composed of the superior body, and inferior ramus, and the latter part is the one to fuse with the pubis. It also features the ischial spine, the lesser sciatic notch, and the ischial tuberosity. With the pubis, the ramus part forms the obturator foramen, through which nerves and blood vessels pass. (Tortora & Derrickson 2011, 269.)

Pubis is the anterior inferior part of the coxa, meaning the pubic bone. It is made up of a superior ramus, an inferior ramus, and a body between the rami. The pubic crest and a projection called pubic tubercle are situated at the anterior superior border of said body. The tubercle is the beginning of a raised pectineal line, which extends along the superior ramus and merges to the arcuate line of the ilium. These lines are essential for distinguishing the superior and inferior portions of the bony pelvis. (Tortora & Derrickson 2011, 269.)

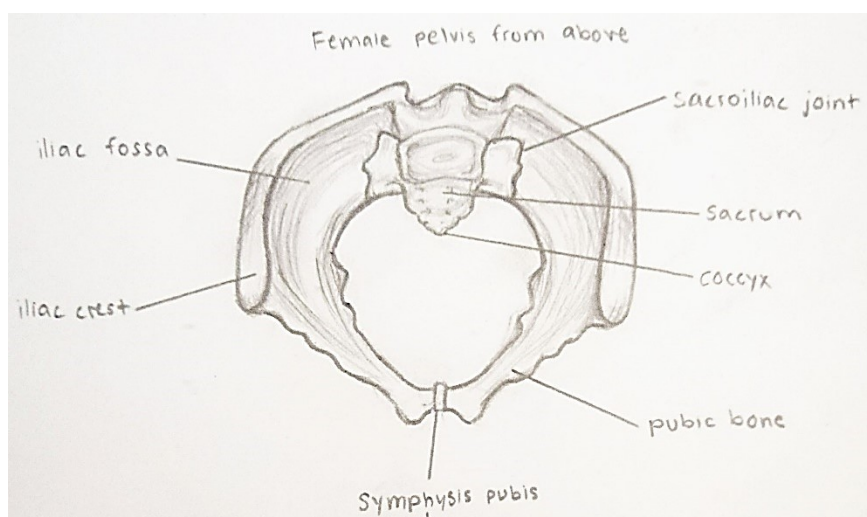
Medially, between the two pubes of the hip bones, is the pubic symphysis (Picture 1.). It is a joint consisting of a disc of fibrocartilage, and inferior to it, the inferior rami of the two pubic bones converge and form the pubic arch. (Tortora & Derrickson 2011, 269.)

The bony pelvis is divided into two parts: a superior false or greater pelvis, and an inferior true or lesser pelvis. The portions are divided by a line called the pelvic brim or inlet. This brim can be traced from an anterior view of the pelvic girdle by starting posteriorly at the sacral promontory of the sacrum, then tracing laterally down along the arcuate lines of the ilium, continuing inferiorly along the pectineal lines of the

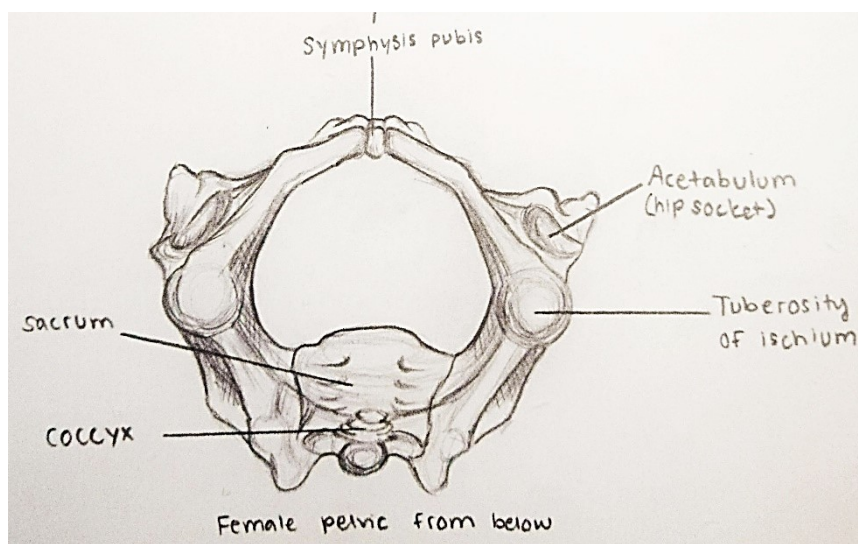
pubis, and lastly along the pubic crest to the superior portion of the pubic symphysis. The portion superior to the pelvic brim is the greater pelvis, as the inferior is the lesser pelvis. (Tortora & Derrickson 2011, 270-271.)

The greater pelvis is bordered posteriorly by the lumbar vertebrae, laterally by the upper part of the hip bones (ilium), and anteriorly by the abdominal wall. The space it encloses is part of the lower abdomen, and it contains the superior portion of the urinary bladder (full), the lower intestines, and the uterus, ovaries, and uterine tubes. (Tortora & Derrickson 2011, 271.)

The lesser pelvis is also referred as the true pelvis, and it is located below the false (greater) pelvis. The lesser pelvis has an inlet, an outlet, and it surrounds the pelvic cavity. It is lined posteriorly by the sacrum and coccyx, laterally by the inferior parts of the ilium and ischium, and anteriorly by the pubic bones. It holds the rectum, urinary bladder, the vagina and cervix of the uterus. The pelvic inlet is the superior opening, as can be observed below in the Picture 3. “above”, and the pelvic outlet is the inferior opening, Picture 4. “below”. During childbirth the head of the descending fetus follows through an imaginary line called the pelvic axis, which curves from the central point of the plane of inlet through the central point of the plane of outlet. (Tortora & Derrickson 2011, 271.)



Picture 3. Superior view of the os coxa. (Anniina Ojala 2020)



Picture 4. Inferior view of the os coxa. (Anniina Ojala 2020)

3.2 Functions of the bony pelvis

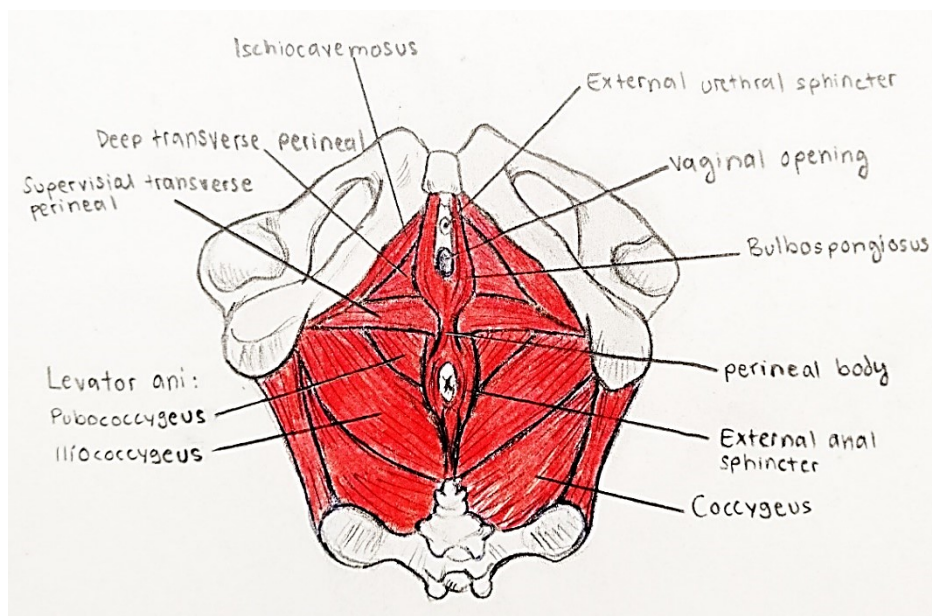
As mentioned above, the iliac spines, the crest, and the ala are attachment points for lower limb and core muscles. The iliac fossa also works as an origin point for muscles, but the essential role of the ilium is to support the lower part of the abdominal cavity. (Heiskanen et al. 2020, 54.)

The ischium bears the weight of the upper body as we sit down, and the ischial tuberosity has the attachment points for the hamstring muscles. The pubis connects the pelvic girdle together anteriorly via the symphysis pubis, and the sacrum connects the girdle together posteriorly via the sacroiliac joint. The sacrum also transfers the load coming from the upper body via the vertebrae to the lower limbs through the pelvic girdle. (Heiskanen et al. 2020, 55.)

3.3 Muscles of the pelvic floor

The muscles of the pelvic floor can be observed in various different ways: they can be discussed in three layers, in two layers, and these layers can be defined differently as well, depending on the source material in hand (Calais-Germaine 2003, 35; Tortora & Derrickson 2011, 396-398; Heiskanen et al. 2020, 60-61). These three levels are the

superior deep layer (pelvic diaphragm), the medial urogenital diaphragm, and the inferior superficial level. The latter two levels can also be referred as the perineum, as they are inferior to the pelvic diaphragm. (Tortora & Derrickson 2011, 396-398; Heiskanen et al. 2020, 60.)



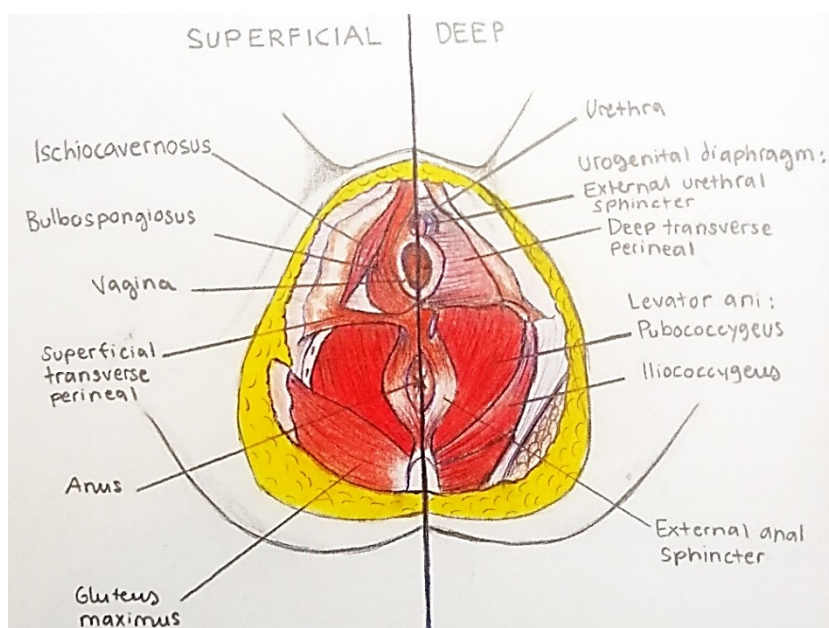
Picture 5. Musculature and structures of the pelvic floor. (Anniina Ojala 2020)

The superior deep level (pelvic diaphragm) is situated halfway up the lesser pelvis. It is composed by the muscle levator ani, and its three parts: iliococcygeus, pubococcygeus, and puborectalis (Picture 5. above). The levator ani is tripartite, and it stretches from the pubic bone to the rectum and coccyx. The part iliococcygeus originates from the pubis and inserts to the coccyx; the part pubococcygeus originates from the pubis and inserts to the rectum; the part puborectalis (Heiskanen et al. 2020, 60-61.)

The urogenital diaphragm is composed by the muscle transversus perinei profundus (originates from the ischium and inserts to the perineum), m. sphincter urethrovaginalis (situated around the urethra/vagina), and m. compressor urethrae (situated around the urethra). It is an area situated between the m. transversus perinei profundus and the rectum, and together with the fascial layer the area functions similarly to a sphincter. (Heiskanen et al. 2020, 60-61.)

The inferior surface level is composed by the external sphincters m. sphincter ani externus (o: perineum, i: coccyx) and m. sphincter urethrae externus (o: ischium and pubis, i: perineal raphe), the m. transversus perinei superficialis (o: ischium, i: perineum), and the muscles related to sexual functions: m. ischiocavernosus (o: ischium, i: base of clitoris) and m. bulbocavernosus (o: perineal area, i: base of clitoris). (Heiskanen et al. 2020, 60-61.)

As mentioned above, the urogenital diaphragm and the inferior surface level can also be observed and discussed as the perineum, which is divided into an anterior urogenital triangle containing the external genitals, and a posterior anal triangle containing the anus. This division can be observed in the Picture 6. below. The perineum is a diamond-shaped area inferior to the pelvic diaphragm, and it extends anteriorly from the pubic symphysis, to the coccyx posteriorly, and laterally to the ischial tuberosities. This division shows the muscles divided into superficial and deep perineal muscles. (Tortora & Derrickson 2011, 398.)



Picture 6. Urogenital diaphragm, superficial and deep layers. (Anniina Ojala 2020)

3.4 Ante- and perinatal changes in the pelvic area

The female body goes through major anatomical and physiological changes during the pregnancy. Towards the end of the first trimester the uterus occupies most of the pelvic cavity, and as the pregnancy progresses further, the uterus extends higher into the abdominal cavity moving the inner organs and intestines out of its way. As the fetus grows, so do the uterus, the placenta, and the amniotic fluid. This additional weight is supported by the pelvic floor, in addition to the intestines. In the pelvic cavity the pressure causes compression to the ureter and the urinary bladder, and may cause urinary symptoms such as increase in the frequency, urgency of urination, and stress incontinence. The growth of the fetus also increases the lordosis of the spine, and low back pain can be experienced. (Tortora & Derrickson 2011, 1205.) During the pregnancy, the joint pubic symphysis usually becomes more instable due to the increased level of the hormone relaxin. The same hormone may also affect the SI-joint and its stability (Heiskanen et al. 2020, 56).

During labour, the estrogen levels in the mother's body rise sharply. This high level of estrogen causes the uterine muscles to contract, due to the increase of receptors for oxytocin in said muscles. The hormone relaxin softens the pubic symphysis, and helps to dilate the cervix of the uterus to allow the fetus to pass through. (Tortora & Derrickson 2011, 1207.)

The first stage of delivery begins usually as the water breaks, and cause the uterine contractions to begin (Dresang & Yonke 2015, 203). These contractions appear approximately every ten minutes, become gradually more frequent, and feel painful. Concurrently, the uterus feels hardened, and during these contractions, the cervix shortens and dilates. Gradually by these contractions, the cervix dilates to approximately 10 cm (Website of Terveyskirjasto 2020.) The progressive descent of the head of the fetus through the completely dilated cervix characterises the second stage of the delivery, and it as well is achieved by the uterine contractions. These contractions cause the intrauterine pressure to rise significantly. (Memon & Handa 2013, 5.)

As the fetus descends through the pelvic axis, a middle opening, it comes to contact with the deep perineal muscles of the perineum. These muscles will be responsible for aligning the head of the fetus for rotating through the lesser pelvis, prior to the delivery reaching its final phases. (Calais-Germaine 2003, 23.)

An empty bladder and urethra give way to the fetus to descend and become compressed. If the bladder is full, it may stall the descend. As the perineal side of the vagina dilates, the sphincter of the urethra is elongated. Due to this, the orientation of the bladder may alter posteriorly thus causing future urinary incontinence. (Calais-Germaine 2003, 51.)

During the final phase of the delivery, the mucous membrane of the vagina stretches to allow the fetus a passage, and this stretching reduces the tearing of the tissues (Calais-Germaine 2003, 53).

As discussed above, the soft tissues and organs shift and stretch when in labour, and the bony structures shift and move as well. Firstly, in preparation for the delivery, the ischial spines are at a distance of approximately 10 centimetres. As the fetus starts its descent via the superior opening of the pelvis (inlet), through the pelvic axis from the greater pelvis to the lesser pelvis (outlet). As this descent continues, the fetus becomes engaged with the pelvis, and passing through the lesser pelvis causes the fetus to rotate on its way to fit through the passage. (Calais-Germaine 2003, 19.) The inferior opening (outlet) is the final structure the fetus passes through, and for a vaginal delivery, it has to be measured to ensure the success and safety. In great importance are the measured distances of the ischial tuberosities (approx. 11 cm), and the distance between the pubis and the coccyx (approx. 9-9,5 cm). The opening of the pubic arch is the final bony cavity for the fetus to pass through, and it's where the head of the baby is first observed. The shape of the opening of the arch may be more or less open and wide, or closed as in high and narrow. Too closed opening is an indicator for a caesarean section. (Calais-Germaine 2003, 24.)

4 POSTNATAL PHYSIOLOGICAL RECOVERY

After the delivery, the mother will stay in the delivery ward, until her vital signs and overall status become stable. The role of mothering begins, and the changes of the early puerperium are recognised in the maternity unit, where the mother and child will be moved. The mother will stay there under the supervision of the team of carers to help her recover and rest. (Sapsford et al. 1998, 220.)

The process of returning home after the delivery is individual and depends on the well-being of the mother and the baby. After the vaginal delivery, the mother and the baby return home usually the day after the delivery. A mother who has undergone surgery will usually return home on the fourth day after the delivery. (The website of Tays 2020.)

4.1 Postnatal phase: puerperium

WHO has defined the postnatal phase, puerperium, to begin right after the birth of the baby, and it extends for up to six weeks (42 days) after giving birth. The postnatal phase is commonly divided into the immediate (first 24h), early (days 2–7) and late (days 8–42) periods. (Finlayson et al. 2020, 2.) According to a more loose definition, the postnatal phase lasts eight weeks and during this time most of the pregnancy related anatomical and physiological changes will have returned to the antenatal state, and the mother has adapted to the child's care as well as to the new life situation. (Paananen et al. 2015, 290.)

The most common mode of delivery is the vaginal delivery, which has been associated with the increased incidence of pelvic floor disorders later in life. The term ‘pelvic floor disorders’ (PFDs) refers to overactive bladder syndrome, stress urinary incontinence, pelvic organ prolapse, and fecal incontinence. The exact mechanism of injury associating the vaginal delivery with the pelvic floor disorders is unknown, but presumably it is multifactorial, and possibly contains neurovascular and mechanical injury to the pelvic floor. (Memon and Handa 2013, 1.)

Deufel and Montonen (2016, 23) mention, that in the puerperium phase the mother experiences promotive and restorative changes. The promotive changes are e.g. the increase in gland tissues in the breasts and the excretion of breast milk. The restoring change is the contraction of the uterus to its pre-pregnancy state, a process called involution. According to Ylikorkala and Tapanainen (2011, 474), the aim of this involution is to achieve the readiness for a new pregnancy as soon as possible.

The recovery of the uterus back to its pre-pregnancy state can be felt as afterpains, i.e. contractions (Website of Terveyskylä, 2019). A mother who has given birth before feels the afterpains for approximately a week after the childbirth, whereas a mother giving birth for the first time may feel the afterpains for a shorter period of time. When contracted, the uterus becomes more solid. Breastfeeding increases the secretion of the hormone oxytocin, which promotes the contractions of the uterus. Reduction of the uterus is monitored in the days after childbirth in hospital and postnatal assessment. After the childbirth, the bottom of the uterus lands around the navel level. After a week, it can be felt halfway between the navel and pubic bone. After two weeks, it can no longer be felt on the top of the stomach covers. (Sariola et al. 2014, 330–347.) The uterus slings loosened during pregnancy tighten and restore the uterus back to its natural position (Deufel and Montonen 2016, 23).

Paananen et al. (2015, 297) point out, that after the delivery, as the mother has a great need for rest, she should often change the position while lying down and avoid being in a constant lateral position towards the baby's bed, in order to aid the uterine slings to contract evenly.

According to Aukee and Tihtonen (2010, 2386), the pregnancy and the vaginal delivery affect the pelvic floor by increasing direct muscle trauma, intra-abdominal pressure, connective tissue damage, and nerve injury. To follow, the pregnancy and vaginal delivery affect the functions of the pelvic floor as well, due to mechanical pressure and tissue damage. Pelvic floor dysfunctions occur more after the vaginal delivery compared to a caesarean section, but the differences will become more moderate along age. (Aukee and Tihtonen 2010, 2381.) For pelvic floor impairments, the childbirth is clearly the most significant risk factor. The process of labour,

especially with vaginal delivery and current medical management, can produce notable trauma to the pelvic floor structures. (Kisner and Colby 2012, 937.)

The area between the vulva and anus, the perineum, can tear during the vaginal delivery, or the doctor may perform an incision. Furthermore, a woman can feel soreness in the area during postnatal recovery and urination may be painful. After two weeks of the delivery the mother can still feel soreness in the vagina, as the area is still recovering. If the mother had to be stitched during the delivery, these may still feel uncomfortable. There may be less pain and tenderness after six weeks of the delivery, but the mother may still feel soreness in the area. (Website of Medical News Today 2020.)

4.2 Pelvic organ prolapse in relation to postnatal recovery

The pelvic organ prolapse (POP) is described as a long-term effect of an injury caused by vaginal delivery (Reimers et al. 2015, 281). The term pelvic organ prolapse is used when the pelvic supportive systems become loose or weak, and the pelvic organs aim to descent to an abnormal position through the vaginal canal (Huang & Chang 2020, 4). Bo et al. (2007, 105) describe the female pelvic organ prolapse as an anatomical condition which causes downward displacement of the pelvic organs from their general anatomical location. Pelvic organ prolapse usually results in functional deficits of the organs involved, and can therefore impact overall quality of the woman's life.

4.3 Assessing the physiological recovery process

Postnatal assessment will be carried out about 5 to 12 weeks after the childbirth. In this assessment, attention is paid to the recovery from the pregnancy and childbirth, the healing of the childbirth damages, and the anatomical changes of the genitals. (Deufel & Montonen 2016, 30.) A health nurse and a doctor conduct a gynecological examination to assess the recovery, the condition of the mucous membranes of the vagina, and the rupture or healing of wounds (Sariola et al. 2014, 351). Kellie (2017, 4) reports, how the postnatal examination is a decent opportunity to recognise and

manage maternal health issues and provide information for mothers to become better prepared for the potential issues they may experience after the childbirth.

Several mothers can suffer from various physical ailments still six months or a year after giving birth, and the ailments can be diverse. Common ailments include lower abdominal pains, uterine deposition, difficulty during intercourse, prolonged lochia, and dryness of the mucous membranes. In addition, many have haemorrhoids, constipation, breast infection, back pain, and various gynecological inflammations. In addition, urine and air escapism can occur. (Paananen et al. 2015, 301.)

It has been estimated that approximately one third of women will suffer from urinary incontinence, and up to a tenth from a fecal incontinence after childbirth. Stress urinary incontinence (SUI) is most commonly associated with pregnancy and the postnatal phase. (Hay-Smith et al. 2008, 1-3.) Heiskanen et al. (2020, 28) explain, how urinary incontinence is common in the immediate postnatal phase and, and will occur more likely on women who had prolonged childbirth, in combination with operative vaginal birth.

To reach the aim of both flourishing and surviving, it is vital that mothers and families are supported and enabled to experience the optimal start in life with their new-born. However, the postnatal period is often a neglected phase of maternity care, and more resources and emphasis are being placed on intrapartum and antenatal care. Postnatal services have the lowest median national coverage of interventions on the continuum of maternal and child healthcare according to the recent 'Countdown to 2030' report. (Finlayson et al. 2020, 2.)

4.4 Pelvic floor and its functions

The pelvic floor has an important role in the functions of the lower limb functional anatomy. The muscles of the pelvic area combined with the fascial system connect both structurally and functionally to the breathing and the movements of the core, hip, and pelvis, thus being at the center point of the postural and functional routines, and physical ability and performance. (Heiskanen et al. 2020, 58.) Among the full body

functionality, the pelvic floor musculature generally offers stabilisation for the spine, supports the organs of the pelvic area, withstands the fluctuations of the intra-abdominal pressure, aids in maintaining continence at the urethral and anal sphincters, and holds an essential role in sexual response and reproductive functions. (Kisner & Colby 2012, 935.)

The pelvis is supported mechanically by the pelvic floor, by the muscles of the pelvic diaphragm, the endopelvic fascia, and the bony attachments. The levator ani muscle complex provides support to the structures of the urethra, the distal vagina, the distal rectum, and it can be observed as a U-shaped sling around said structures. Usually, the regular baseline activity of the m. levator ani holds the urogenital hiatus closed against the opening force and action of intra-abdominal pressure. (Memon & Handa 2013, 7.)

Possible issues and functional disturbance affect the whole body and demeanour of the person. (Heiskanen et al. 2020, 58). A vaginal delivery raises the risks of injury and dysfunctions in the pelvic floor area, and together with pregnancy they affect the pelvic floor by increasing the possibilities of direct muscle trauma and connective tissue damage, by elevating the intra-abdominal and mechanical pressures. The possibility for nerve injuries is also present. (Aukee & Tihtonen, 2010, 2386; Kisner & Colby 2012, 937). E.g., during the second stage of the delivery, if the risen pelvic pressure continues extendedly, the acute risk of onset ischemic necrosis of the pelvic tissues, including the nerves and muscles, is high. This can lead to permanent denervation of said tissues. Prolonged second state increases the risks as well. (Memon & Handa 2013, 5.)

Other pelvic floor dysfunctions, also discussed earlier, include over-active bladder syndrome (OAB), overstretched bladder syndrome (OSB), pelvic organ prolapse (POP), urinary and anal incontinence, retention urinae, constipation, and issues with defecation (Heiskanen et al. 2020, 4).

5 POSTNATAL PHYSIOTHERAPY

The immediate aim of the physiotherapist is to aid the new mother to orientate to her new role, both emotionally and physically. Assistance and advice of the physiotherapist should be available immediately following delivery. (Sapsford et al. 1998, 221.) According to Sapsford et al. (1998, 220), the objectives of the physiotherapy in the postnatal phase consist of assisting the new mother's physical recovery following the pregnancy and the birth process. These objectives will be met by executing an effective, safe, and enjoyable exercise programme, including relaxation exercises. Addressing the specific individual needs related to the physical changes in the postnatal phase is essential.

Postnatal physiotherapy assessments and treatments must be carried out in a private room, where questions from the therapist cannot be overheard. Additionally, the client should not be disrupted by other staff. (Sapsford et al. 1998, 383.)

Methods for evaluating the pelvic floor muscle strength and function can be categorised into the methods to measure the ability to contract, and the measures to quantify the strength. These methods aim to measure the different point of views of the activity of the pelvic floor muscles: contraction pressure, cephalad movement, and electrical activity. Clinical observation, ultrasound, vaginal palpation, MRI, and electro-myography (EMG) are the methods to measure the ability to contract. Manual muscle test by vaginal palpation, dynamometry, manometry and cones are the measures to quantify strength. (Bø & Sherburn 2005, 272).

Ultrasound imaging is used for functional and morphological assessment of the pelvic floor muscles. With ultrasound imaging the anatomical and functional evaluation of the middle, anterior, and posterior pelvic floor components is possible. Perineal ultrasound is performed by placing a transducer on the perineum. Transducer must be covered e.g. with a glove for hygiene reasons. Ultrasound imaging will be performed in a dorsal lithotomy position, where the client's hips are flexed and slightly abducted, or in a standing position. (Bo et al. 2007, 81; Hainsworth et al. 2017, 2.) The ultrasound

imaging is a safe, painless, fast, and reliable method to research the function of the pelvic floor. Additionally, it can aid the client in motor learning by the visual feedback it gives. (Heiskanen et al. 2020, 105.)

Electromyography (EMG) is an accurate method for objectively recording the muscle activity. Data in the electromyography is collected by needle electrodes or fine wire. External electrodes will be placed on the perineum and they records the superficial muscle activity. Surface electrodes are used intra-anally or intravaginally. (Sapsford, Bullock-Saxton & Markwell 1998, 387.)

According to Bo et al (2007, 127), the vaginal-weighted cones are invented to create a progression of overload to the pelvic floor muscles. There are different types of vaginal cones in different shapes and weights. Cones will be places above the m. levator ani. The client will be advised to start with a weight she can hold for 1 minute while standing. During the exercise the client aims to stay in an upright position for 20 minutes with the weight in place. Pelvic floor muscle strength of the client can be developed by using heavier weights with few repetitions, and pelvic floor muscle endurance by using lighter weights with a greater number of repetitions. However, holding the contraction for a long time may cause pain and reduce the oxygen consumption.

Grimes and Stratton (2020, 11) define the biofeedback as a neuromuscular technique for exercising the suitable contraction and relaxation for pelvic floor. Intra-vaginal, intra-anal or surface electrodes are included with relaxation and strengthening exercises to serve clients with auditory and/or visual responses to their efforts. Biofeedback works as a mainstay to aid the clients to manage with the pelvic floor disorders. Biofeedback can improve symptoms of POP, improve urine/stool continence, and enhance the relaxation for evacuation urine /stool.

If the appropriate motor patterns are already learned, the exercised muscle might be less predisposed to trauma and previously exercised muscle might be easier to retrain after damage. It is possible that previously exercised muscle has a greater reserve of strength so the trauma to the muscle, or to the nerve supply of the muscle, will not

cause adequate muscle function loss to reach the threshold where the reduced urethral closure pressure results in leakage. (Woodley et al. 2017, 28.)

Kegel exercise is a common exercise mode to improve pelvic function. Good outcomes are commonly achieved with 45 to 60 exercises per day. Exercises can be divided into two to three sets. (Iglesia & Smithling 2017, 181-182.) Kegel exercises are the most popular exercises as the client can implement them as a daily routine. Kegel exercises are generally custom-made and the number of contractions, sets, and the duration of holding time varies among the clients. Kegel exercises help the client with identifying the proper muscles which play a role in slowing or stopping the urination. In addition, Kegel exercises help the client to contract the muscles as mentioned earlier in a correct manner and to repeat the cycle for several times. Many clients may contract the hip adductors, gluteal muscles, or abdominal muscles instead of the pelvic floor muscles during the exercises. Moreover, alternating slow and fast contractions serve as the key elements of the exercises. (Huang & Chang 2020, 2.)

5.1 Pelvic floor and deep support activation

Bø et al. (2007, 113) explain, that before starting an exercising programme of the pelvic floor muscles the physiotherapist must ensure the client's ability to correctly perform the pelvic floor muscle contraction. Henderson et al. (2013, 1) mention, how according to the suggestions, only a trained medical professional can assist in the learning and evaluation of proper contraction technique. According to the article of Bø and Sherburn (2005, 269), the pelvic floor muscle function and strength evaluation is essential for the ability to teach and give feedback about of a woman's ability to contract the pelvic floor muscles, and to document changes in pelvic floor muscle function and strength throughout the intervention. In addition, Bø and Sherburn (2005, 272) state, that without proper instruction, many women are not able to volitionally perform a correct pelvic floor muscle contraction on demand, as the pelvic floor muscles are rarely used consciously and are situated at the floor of the pelvis.

It has been described that the correct action of the pelvic floor muscles is a squeeze around the pelvic openings and an inward lift. Any visible pelvic movement should

not occur during the true pelvic floor muscle contraction. Submaximal contractions of the pelvic floor muscles can be performed as an isolated contraction. However, a maximum contraction of the pelvic floor muscles seems to be quite impossible without a co-contraction of the abdominal muscles, specifically the internal oblique and transversus abdominis muscles. This contraction of the abdominals can be seen as a small inward lower abdominal movement. (Bø & Sherburn 2005, 271.) According to Martinez et al (2014, 497), simultaneous contraction of all muscles of the pelvic floor can be called a voluntary pelvic contraction.

According to Bø et al. (2007, 115), the steps to learn the correct muscle contraction can be separated into five levels. The client needs to understand where the pelvic floor muscles are located and how they work, as in cognitive function (1st level). The client requires time to understand her body, such as where my pelvic floor is located (2nd level). In addition, the client needs to locate the pelvic floor muscles, but she may need reassurance from the physiotherapist (3rd level). After the client has found the pelvic floor muscles, she must learn how to correctly contract them (4th level), and here the physiotherapist's feedback is mandatory. Even if the client has learned to contract, they may still have difficulties to execute coordinated and controlled contractions, and they are recruiting as many motor units as possible during each contraction (5th level).

To teach the clients, the physiotherapist can use anatomical models and drawings of the pelvic floor to show where the muscles are located anatomically. It is recommended to demonstrate the correct pelvic floor muscle contraction in a standing position, showing how the visible movement of the thighs or pelvis should not occur. Describing the contraction as a lift, starting with closure of the doors (squeeze) and from there the elevator is moving upstairs (lift), can help the client to understand the pelvic floor muscle action. To teach the correct pelvic floor muscle contraction, an efficient position is to ask the client to sit on an armrest with legs in abduction, straight back and hip flexed, and feet on the floor. (Bø et al. 2007, 115.)

The manual evaluation of the pelvic floor muscles can be performed through transvaginal palpation, assessing the functionality and strength of these muscles. For grading the strength, the Ortiz scale (Table 1.) can be used. The assessment can begin

by following the external genitalia and checking the presence or absence of visually voluntary contraction force. The physiotherapist introduces the middle and second index fingers into the vagina of the client, and asks the client to sustainably contract the pelvic floor muscles for 5 seconds. The strength is graded in the Ortiz Scale varying from 0 to 5 points, as shown in Table 1. below. (Martinez et al. 2014, 498.)

Table 1. Ortiz grading scale for assessing pelvic floor muscle strength.

<i>Grade 0</i>	No perineal function evaluated even by palpation.
<i>Grade 1</i>	Perineal function absent and only recognized by palpation.
<i>Grade 2</i>	Perineal function is weak and recognized by palpation.
<i>Grade 3</i>	Perineal function occurs, and opposition resistance will maintain for less than 5s.
<i>Grade 4</i>	Perineal function and opposition resistance maintained for less than 5s.
<i>Grade 5</i>	Perineal function occurs, and opposition resistance will maintain during palpation for more than 5s.

During the measurement the client is lying on a supine position with hips and knees flexed, maintaining the neutral position of the lumbar spine. Before the assessment the client will get a brief information about pelvic floor muscles location, their function and how to perform the correct muscle contraction. (Martinez et al. 2014, 498.)

Kiljunen and Vesa (2018, 22) mention, that the physiotherapist can instruct the client also to perform a finger test as a recognition exercise of the pelvic floor muscles. In the finger test the client inserts her finger in the vaginal canal and squeezes the anus and vagina up- and inwards. The client should feel a slight upward squeeze. If the client has difficulties in recognising her pelvic floor muscles, she can measure the pelvic floor muscle strength at the reception of physiotherapist who is specialised in the pelvic floor. Muscle strength measurement is based on EMG measurement where the information of the pelvic floor activity is obtained through a vaginal electrode inserted into the vagina.

5.1.1 Pelvic floor exercises

Muscle tonus of the pelvic girdle recovers after the childbirth. It is important to strengthen the pelvic floor muscles and maintain a good posture during the first weeks after the childbirth. Pelvic floor muscle rehabilitation reduces air and urine leakage. (Deufel and Montonen 2016, 23.) Pelvic floor muscle exercises have been shown to have some effect on sex-life variables and quality of life (Bo et al. 2000, 1), and according to the website of Terveyskylä (2018), the mother can start the pelvic floor muscle exercises 24 hours after giving birth.

Postnatal pelvic floor exercising aims to speed the recovery and prevent subsequent pelvic floor dysfunction. It is a useful form of treatment during the pregnancy and after childbirth, as it is drug-free, and surgery is not an option in these situations. Most commonly, pelvic floor exercising is used to treat urinary exertion, but it is also suitable for the treatment of mixed urinary and fecal incontinence. (Hay-Smith et al. 2008, 3.)

Pelvic floor muscle exercising is the act of repeated voluntary contractions of the pelvic floor muscles, according to a protocol that outlines the intensity, frequency, and progression of exercises, in addition of the duration of the period of exercising. Pelvic floor muscle exercises usually comprise one or more sets of exercises per day. Exercises should be performed on at least several days of the week, for at least eight weeks. (Woodley et al. 2017, 25-28.)

According to the recommendations, early exercising followed by maintaining the pelvic floor muscle exercises ensure the duration of effect in the longer term. Pelvic floor muscle exercising programme can be set for women to co-ordinate muscle activity (such as the pelvic floor muscle precontraction prior to suppress urgency, or to a rise in intra-abdominal pressure), increase strength (the maximum force originated by a muscle in a single contraction), increase endurance (capability to hold a single contraction over time, or to contract repetitively), and address a combination of these. (Woodley et al. 2017, 25-28.)

Kiljunen and Vesa (2018, 27) explain, that once the pelvic floor muscles have been found, it is time to start exercising them. Endurance, speed, and maximum strength are needed for the pelvic floor muscles, which means that different areas of strength are needed in different daily activities. Endurance strength is needed especially for urinary retention. Bø & Sherburn (2005, 272) mention, that a measurement of function and strength of the pelvic floor muscles before and after exercising is vital to specify if the intervention has made changes.

Endurance strength (Picture 7.) is exercised by tensing the pelvic floor muscles for about 10-15 seconds and relaxing for the same amount of time. Pelvic floor muscles need to be tensed with approximately 50% force of the maximum hold. Adequate number of repetitions is eight times. An example of an endurance exercise (Picture 7. below) for pelvic floor muscles according to Kiljjunen and Vesa (2018, 28) is as follows: the client is laying on her back with hips and knees flexed to 90°. Client tightens her pelvic floor muscles and gently presses her thighs and knees together for 10 seconds, followed by relaxation of the muscles for 10 seconds while opening her knees in a way that feet still stay together. Exercise will be repeated 8 times.



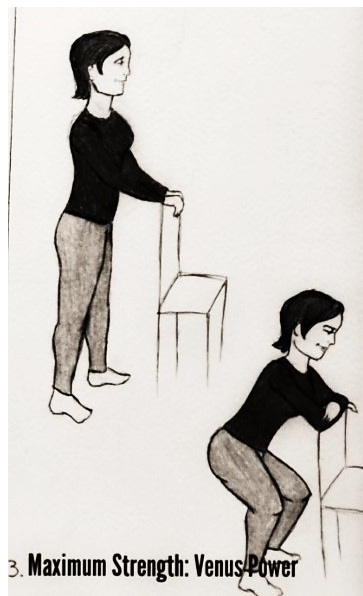
Picture 7. Endurance strength exercise for pelvic floor training (PFT). (Anniina Ojala 2020)

Speed strength is needed as the pressure in the abdominal cavity increases, e.g. when sneezing. Speed strength (Picture 8.) is exercised in a way that the pelvic floor muscles tense at a fast tempo 10 times, with a 1-2 second break in between the tensions, holding the tension for 2 seconds and relaxing for 2 seconds. An example of a speed strength exercise (Picture 8. below) for pelvic floor muscles according to Kiljunen and Vesa (2018, 29): the client is on all fours leaning on her elbows and places her feet together to get the pressure off her knees. The client tightens her pelvic floor muscles by blowing sharply out, and relaxes her pelvic floor muscles. Exercise will be repeated 10 times. After the exercise client rounds her back. This position will relax client's pelvic floor.



Picture 8. Speed strength exercise for PFT. (Anniina Ojala 2020)

Maximum strength (Picture 9.) is practiced by tensing the pelvic floor muscles for 5 seconds with 100 percent force and relaxing in between the tension for 15 seconds, repeating five times. Maximum strength is needed e.g. to lift a child. (Kiljunen and Vesa 2018, 27.) An example of a maximum strength exercise (Picture 9. below) for pelvic floor muscles according to Kiljunen and Vesa (2018, 30): The client is in a standing position facing the back of the chair. While lightly holding on to the chair she squats. The client tightens her pelvic floor muscles and comes back up while relaxing the pelvic floor muscles. Exercise will be repeated 5 times.



Picture 9. Maximum Strength exercise for PFT. (Anniina Ojala 2020)

When planning an exercise programme with special emphasis on pelvic floor muscle rehabilitation, care for the back, and abdominal muscle recovery, the anatomical and physiological changes should be considered (Ainslie 2012, 272). As with many muscles the pelvic floor muscles do not work in isolation, but there is a debate as to the benefit of actively co-contracting the m. transversus abdominis (TRA). According to the evidence, a co-contraction of the TRA appears during the contraction of the pelvic floor muscles. If the client has symptoms of pelvic floor dysfunction, the co-contraction of the pelvic floor muscles during TRA contraction may be weakened or lost. (Ainslie 2012, 257-258.)

After an uncomplicated vaginal delivery, exercising can be initiated as soon as the woman feels able to exercise and has a permission by her physician or midwife. It is vital to restart the pelvic floor strengthening exercises as soon after the delivery as possible. Pelvic floor strengthening exercises may increase the circulation and improve the healing of episiotomy or lacerations. Combining the pelvic floor contractions with activities done with the baby (feeding etc.) may aid the mother to make them more integrated into the daily routine. (Kisner & Colby 2012, 951-952.)

When treating a postnatal mother in the clinic, it is important to emphasise life-long need for pelvic floor exercises, particularly when lifting or with significant exertion,

so the pelvic floor muscles can provide the additional trunk support. Pelvic floor rehabilitation may be required also after a caesarean delivery. Before the caesarean section is reckoned to be necessary, many women experience a lengthy labour, including the prolonged second stage (pushing). Therefore, the musculature of the pelvic floor and the pudendal and levator ani nerves may still be injured. (Kisner & Colby 2012, 951-952.)

According to a survey by Hay-Smith et al. (2008, 2), postnatal women suffering from ongoing urinary incontinence three months after giving birth and who had exercised their pelvic floor muscles, were less likely to report urinary incontinence 12 months after delivery, compared to women who did not exercise or had general postnatal care. The more intensive the programme, the greater the treatment result seemed to be. Furthermore, the fecal incontinence also reduced at 12 months after giving birth: mothers who exercised their pelvic floor muscles were approximately half as likely to report fecal incontinence. (Hay-Smith et al.2008, 2.)

5.1.2 Sexuality

Sexuality is a wide and complex concept, and it has various different variables: the whole life situation of a person has an effect on it. It is not just about the actual act of sexual intercourse, it also includes all the moments of intimacy, displays of affection, and closeness. For recent parents, combining the parenthood and intimate relationship can be difficult. The mother is staying close to the new-born, and this may cause the father to feel left outside. The baby controls the daily schedules as well with the feeding and sleeping cycles, so planning the day ahead as usual is not possible. Open communication and frequent discussions between the parents is necessary, and it eases the dealing with the new situation. (Deufel & Montonen, 2016, 39.)

Every mother recover from the delivery at their own pace. For some, the feeling of being ready for sexual intercourse may be present after a short while, and for some it may be months. Regardless of the recovery time, there should not be any pressuring from neither of the parents, and the return to these activities should feel natural for both. Physically, the sexual intercourse should be avoided until the lochia is clear of

any blood, and until the pain and soreness of the vagina and the perineum have passed. The return of the sexual desires will take time, and is personal for each individual. Generally, anything between 7-12 weeks is normal, and another marker is the postnatal assessment. In this assessment, the mother is usually motivated to acquire information about the recovery of her pelvic floor muscles, and about the appearance and tightness of the vagina. The mother may need assurance, that her body and the recovery process is, or is going towards normal, and the topic may be sensitive. (Deufel & Montonen, 2016, 39.)

Pelvic floor musculature has an important role in the sexual functions: to achieve satisfactory arousal and orgasm, strong pelvic muscles are essential (e.g. ischiocavernosus). In addition to strength, the tone and the ability to contract and relax are important factors for vaginal responsiveness, sensation, and tightness. (Tennfjord et al. 2015, 634; Huang & Chang 2020, 5.) Weak muscles cannot provide the sufficient blood flow e.g. to the clitoris to achieve an orgasm. In addition, weakness of the pelvic floor muscles is a risk factor for pelvic floor dysfunctions as discussed before, including pain and sexual disorders. Therefore, strengthening the pelvic floor muscles may increase the sexual enjoyment and satisfaction. Multiple studies have also shown that pelvic floor muscle training can prevent postnatal sexual dysfunction and pelvic floor muscle impairment, and said training is a common method of treatment for pelvic floor dysfunctions. (Martinez et al. 2014, 497-498; Hadizadeh-Talasaz et al. 2019, 737-738.)

Sexual dysfunction has a major impact on a woman's life, as it usually affects the self-esteem and -image, both physical and mental health, and the overall quality of the relationships with others. Sexual dysfunctions are rather common ailments, as according to prevalent studies, approximately 40–45% of women experience some form of them during their lives. (Martinez et al. 2014, 497.)

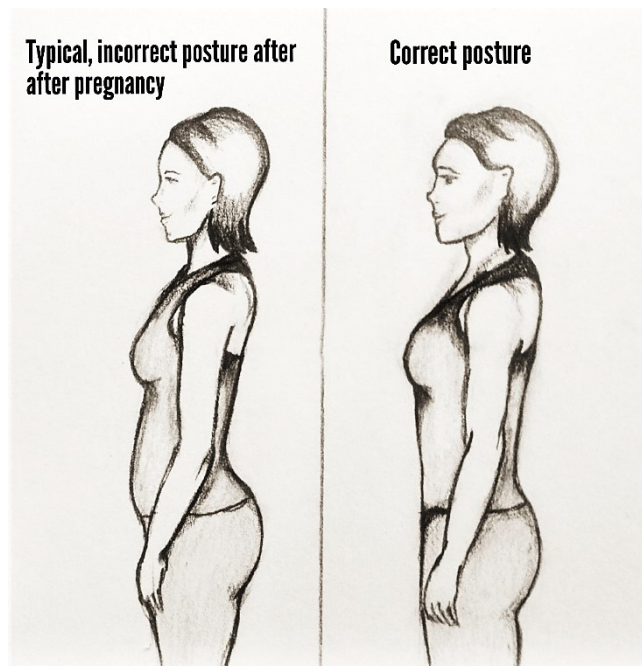
5.2 Posture

Holding a good posture is ergonomic and less strenuous for the body and its structures. During the pregnancy, the lordosis of the lower back is easily emphasised,

accompanied with an anterior tilt of the pelvis, and the shoulders may round forward (Picture 10.). As the fetus grows, the whole body has to participate harder in maintaining a balanced stance, and this leads to straining the musculature that does not have a major role in supporting the posture. The growth and increase of the weight of the fetus alter the mother's posture by causing adaptive changes in the spinal curves in response to an anteriorly altered centre of gravity. (Rönnberg 2013, 16; Bivia'-Roig et al. 2018, 1-2.)

There are several factors effecting the posture of the mother before, during, and after the pregnancy. Possible muscle imbalances, daily exercise routines or sedentary lifestyle, the overall changes in the body due to the pregnancy as well as the size of the fetus, and possible weight gain during the pregnancy. (Rönnberg 2013, 16).

After giving birth, the body of the mother is under constant movement and strain. Therefore, it is important to give thought to the ergonomics and postural alignments, in order to not cause additional musculoskeletal issues. Activating the support from the pelvic floor muscle complex together with the core aids in maintaining a better posture. (Rönnberg 2013, 16).



Picture 10. Correct and ergonomic posture. (Anniina Ojala 2020)

5.3 Ergonomics in breastfeeding

Paananen et al. (2020, 298) mention, that when the mother and the baby are sufficiently rested after the childbirth, the baby usually indicates that he/ she is ready to suck. The midwife instructs and, if necessary, helps with the breastfeeding.

According to Deufel and Montonen (2010, 110), the posture of the nursing mother should be comfortable and relaxed. Breastfeeding can be strenuous if the mother's neck, shoulders or back are tense, and the mother's arms get tired. To ensure comfortable and satisfactory breastfeeding, it is helpful if the midwife helps the mother with finding a comfortable posture. The good and relaxed posture of the baby is also important for the success of breastfeeding (Botha & Ryttyläinen-Korhonen 2016, 165).

There are many different methods recommended for breastfeeding for the mothers to assume, including the cross-cradle, side-lying, under-arm and supine. For breastfeeding premature babies, the under-arm posture, football hold, is a convenient position as it enables the mother to see the baby's face better. In addition, this position allows the mother to have more control over the baby's head. To support the baby and raise him/her to the same level as the breast, using a pillow in the cross-cradle position can be helpful. In the supine position, the baby and mother both lie down tummy-to-tummy and the mother puts her arm above the baby's head and bends it under her own head. To pull the baby closer, she wraps her hand around the baby. The cross-cradle position is the most common breastfeeding method among the others. The mother holds the baby close to her in this position: the ear, shoulder, and hip of the baby are aligned. In addition, the baby's nose faces the breast opposite the nipple and the head and shoulder of the baby will be supported. (Afshariani et al. 2019, 3-4.)

The breastfeeding pillow is a good tool for finding a comfortable position for breastfeeding. Especially the pillow is beneficial for a mother who is breastfeeding twins. The breastfeeding pillow allows the breastfeeding positions to be varied. The wide position of the breastfeeding pillow ensures that the baby is firmly on the pillow at the right height. Additionally, it enables the mother to relax her arms and shoulders. (Deufel and Montonen (2010, 412.)

5.4 Ergonomics in lifting and carrying the child

Caring for the new-born is demanding for the muscles of the trunk, as it involves plenty of lifting, bending forwards, and carrying. After giving birth, the abdominal muscles are stretched and weakened. Therefore, taking care of the mother's positioning and ergonomics is essential, and it is suggested not to carry the baby only on one side, nor supporting the baby to hip. Excessive rotational movements during the lifts and carrying are strenuous for the body, as well as leaning and bending forwards while changing the clothes or cleaning the baby. To help maintain sufficient ergonomics, it is suggested the mother carries the child close to the body in a sling, and that the changing table is adjusted to match the height of the mother. (Deufel & Montonen 2016, 214-215.)

6 PHYSICAL RECOVERY

The physical recovery from the pregnancy and delivery is an individual process. It is affected by the pre-pregnancy and antenatal fitness levels of the mother, nutrition, hydration, proper rest, stress levels, and multiple other factors that compose the human life. It is important to be merciful to oneself and trust the process, as too much activities or vigorous dieting will hinder the recovery and possibly cause reversion. In addition, the possibility of postnatal depression has to be taken into consideration, as it affects greatly the mother's ability to take care of herself and the baby. (Website of Terveyskylä 2018.)

6.1 Nutrition and hydration

A sufficient nutrition of the mother promotes the postnatal recovery and successful breastfeeding. In addition, it affects the quality of the breast milk. Breastfeeding does not consume nutrient stores if the mother eats enough and the diet is versatile. However, it is a good idea to ensure the adequate calcium and vitamin D intake to

avoid the breastfeeding process to weaken the mother's bones. Vitamin D is recommended for use during breastfeeding throughout the year and the amount should be 10 µg per day. Multivitamins and minerals are only recommended if the diet is not versatile enough, the mother is breastfeeding siblings or alienates from breast milk, or a new pregnancy begins immediately after the previous one. (The Website of Terveyskylä 2018.) Mothers who breastfeed their babies need approximately 500 additional kcal/day (Kominiarek & Rajan 2016, 15).

According to Stenman (2016, 161), the need for protein in the postnatal phase is 10-20% of the total energy intake. Additional need during the first 6 months is 19g per day and from then on 13g per day. The total amount of fats is 25-40% of the total energy intake. The need for fiber and carbohydrates during breastfeeding is 45-60% of the total energy intake, so at least 25-35g per day.

Vegans may need vitamin B12 and iodine supplementation. The need for other supplements such as calcium, vitamin B2, iron and zinc will be assessed individually. Nutritionally complete protein intake is obtained by combining meals with plant protein sources such as whole grains, beans, lentils, soy in its various forms, as well as almonds and seeds. The adequate intake of essential fatty acids is ensured by daily consumption of rapeseed oil and rapeseed oil-based (at least 60% fat) spread. (Website of THL 2020.)

Adequate water intake is important for the proper performance of the bodily functions. Among other things, water-soluble vitamins need water to be properly absorbed. A breastfeeding mother's need for fluid is increased, so it is important to take care of adequate drinking. (Stenman 2016, 163.)

6.2 Physical activity

After giving birth, it is safe to be physically active when the mother feels ready. Usually the mother is being motivated by the health care professionals to increase the level of activity, as early mobilisation reduces the risk for e.g. deep vein thrombosis. (Deufel & Montonen 2016, 209.)

It is important to return to physical activity within the limits of the postnatal body, gradually. Walking is a safe choice of exercise for improving the overall condition and stamina, and it does not direct acute strong pressure to the pelvic floor muscles. The increase of pelvic floor pressure should be avoided, therefore running and jumping are not ideal activities to begin with. Training of the abdominal muscles, such as sit-ups, should be held off as well, due to the strain and stretch followed by the pregnancy. (Deufel & Montonen 2016, 182.)

Continuing the physical activities after the delivery improves the overall condition and physical performance. Improvements in the physical condition correlate straight to improved ability to recover from physical strain. In addition, studies have shown that physical activity decreases the fat percentage of the body (increase of muscle mass, weight loss), improves the responsiveness to insulin, and increases the HDL-cholesterol levels in the blood. (Deufel & Montonen 2010, 82.)

Other effect the studies have shown is the correlation to mental health and postnatal depression. Physical activity may reduce the risk of postnatal depression, and improve the mental health of the mother. As the postnatal depression is associated with a poorer physical health of the mother, there is an association with the mother's reduced capacity to work, undertake household chores, and look after the baby. Increased infant crying and sleeping issues are associated with the discussed themes, and they might eventually have a negative effect to the health, development, and the well-being of the baby. As a summary it can be stated that healthy exercise and eating habits together assist the maintenance of good physical health and condition, and aid in the process of recovering back to the status of before the pregnancy. (Deufel & Montonen 2010, 82; Kellie 2017, 2-3.)

6.3 Rest

The birth of the baby often causes intermittent sleeping patterns and changes the usual sleeping rhythm of the mother. A small baby needs care and nutrition around the clock. In the beginning, the baby has no rhythm, but fortunately the mother's body is already

prepared in advance for night awakenings and nocturnal breastfeeding. Oxytocin excreted during the breastfeeding relaxes and calms the mother, making it easier to fall asleep again after waking up. After giving birth, the mother should also sleep during the day while the baby is sleeping. (Website of Terveyskylä 2018.) Prolonged lack of sleep, sleep deprivation, can result in exhaustion, mood swings such as impatience, lower ability to concentrate, and an overall poor quality of life. As these all are shown to contribute to an increased risk for postnatal depression, ensuring proper rest and sleep is essential for the wellbeing of the family. (Lewis et al. 2018, 3).

The mother should have a possibility to discuss with the health care professionals about strategies for improving sleep. Potential prevention strategies would be feeding the baby more often during the day, keeping the baby close in the evening to encourage cluster feeding before bed, going to bed immediately after feeding the baby at night, and behavioural sleep intervention for the baby. There are also environmental and other health-related factors that may influence mother's sleep, such as uncomfortable sleeping arrangements, caffeine consumption, physical symptoms such as frequent urination need during the night, and use of electronic media before bed. (Levis et al. 2018, 15.)

7 THESIS PROCESS

7.1 Schedule of the thesis process progression

The process of writing this thesis started in November 2019, as the topic was chosen through a collaboration with the client Olennainen. After choosing the topic, ideas were drawn on the mind map to get the clear picture of the thesis and how it would be done.

In December 2019 the plan for the thesis was presented, and in exception from the plan of actions (Table 2. below), in January 2020 the main body of the theory was not ready.

During the spring and fall semesters of 2020 the authors were in several practical placements, which hindered the writing processes. The then (and still) rising worldwide pandemic of Covid-19 brought its demands and hindrances on the practical field of the physiotherapy field, and that had its effect on the thesis progression as well.

After the changes and issues in the field were overcome, the authors finished and presented their thesis on December 2020.

Table 2. General planned timeline of the thesis process.

<i>Date, month</i>	Planned action
<i>Nov. 2019</i>	Topic and ideas on paper: clear picture of the thesis and what is going to be done.
<i>Dec. 2019</i>	Draft of the theory; thesis plan and presentation, aims and objectives, draft of contents; agreements; presentation of the plan
<i>Jan. 2020</i>	Main body of theory
<i>Feb. 2020</i>	Main body of theory; draft of the guidebook
<i>March-May 2020</i>	Practice, continuing with the theory
<i>Aug.- Dec. 2020</i>	Finishing theory & booklet
<i>Dec. 2020</i>	Presentation

7.2 Composing the guidebook

The product, short guidebook, will include current information based on the theory in this thesis: postnatal physiotherapy and recovery, user-friendly activation exercises for pelvic floor muscles and deep support, essential points in posture, physical education and starting physical activities, and suitable nutrition and hydration. Information of ergonomics in breast-feeding and lifting and carrying the baby will be included as well. A paragraph concerning self-treatment of scar tissue from a caesarean section will be included, this information provided by the client Olennainen.

The guidebook will be given to a physiotherapy client as they are having their first maternal physiotherapy session in Olennainen. It is supposed to be a reminder of the

themes discussed in the physiotherapy session, rather than all new information for the client to study at home.

The layout used will follow the general style of Olennainen guides and brochures, including colour codes and fonts. Size of the guidebook will be one A4, folded into three parts.

8 DISCUSSION

This thesis was written from the physiotherapy point of view with a concentration on the pelvic floor area and its functions. As every woman is an individual, their overall physical and physiological recovery is connected to their mental wellbeing and recovery as well. Even as it was not completely covered here, taking the person into consideration as a whole, will bring the best results. Future developmental ideas concerning the preventions of postnatal disorders will be on demand, as according to the current literature, multiple mothers suffer from various postnatal issues worldwide.

The topic for this thesis was found when the authors had contact with the Women's wellness center Olennainen. Olennainen had a demand for a guidebook to support the information given in the first postnatal physiotherapy session with a new client. A guidebook containing information about antenatal physiotherapy was already composed for them, so composing a guidebook concerning postnatal recovery and physiotherapy was current.

As young women, and one of the authors being a mother herself, the topic was interesting and important. During the physiotherapy studies of the authors the topic of maternal physiotherapy is addressed quite superficially, so dwelling into the world of postnatal physiotherapy literature functioned as a great learning experience to become more acquainted with the anatomy and physiotherapy concerning the female pelvic floor. Both authors could imagine themselves working in the field of maternal or pelvic floor physiotherapy in the future.

The thesis process as a whole was an instructive experience and it widened the authors' theoretical knowledge concerning the postnatal recovery and physiotherapy, as well as it widened the authors' literature research skills. Although searching for relevant and current literature was demanding and time-consuming, the authors perceived it as an educational challenge.

The authors searched information from various databases, such as PubMed, CINAHL, Pedro and Google Scholar using MeSH terms “postpartum recovery”, “postnatal recovery”, and “childbirth recovery”, as well as “postnatal physiotherapy” and “postpartum physiotherapy”. Additionally, the authors found information from websites of official authorities, and published books on the field in question. The timeline limit defined for the literature search was 10 years, nevertheless in the lack of proper sources, older literature was applied as well. Deciding between the most relevant information supporting the topic of the thesis transpired to be demanding, and concluding the appropriate number of sources utilised had its challenges as well. There was an adequate number of information available especially focused on the physiotherapy in urinary incontinence and pelvic organ prolapse.

Due to the worldwide events and pandemic affecting the process, the authors begun writing the theory base with a proper focus during the fall semester of 2020. During said semester, both of the authors completed two mandatory clinical practice placements, and some course work in the Satakunta University of Applied Sciences. The original plan for the thesis process was to be finished by the end of November 2020. However, as finding the sufficient time and energy to work on the thesis became challenging due to on-going studies and personal life situations, the presentation date of the thesis was moved to December. The feedback and support, as well as the fluent and well-organised co-operation between the authors, were a major aid in finishing the thesis still during the year 2020.

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APPENDIX 1

The guidebook produced as a part of this thesis process for the client Olennainen.

Lantionpohjan ja poikittaisen vatsalihaksen harjoittelu

Lantionpohjan lihakset hyvin toimiessaan ylläpitävät pidätkykyä, tukevat lantion elimiä ja lanneselkää, sekä lisäävät seksuaalista mielihyvää. Syvä poikittainen vatsalihas tukee lannerankaa ja lantiota aktivoituen juuri ennen liikettä.

Lantionpohjan lihasten kevyet tunnistamisharjoitukset olisi hyvä aloittaa heti synnytyksen jälkeen, vaikka lihassupistusta voikin olla vaikea aluksi tunnistaa välilihan alueen mahdollisen kivun ja turvotuksen vuoksi.

Tästä lehtisestä löydät aktivointiharjoitteet em. lihaksille.

Mahdolliset arvet

Muista arpien käsittely. Synnytyksen jälkeen erityisesti sektio- ja lantionpohjan alueella olevia arpia olisi hyvä hieroa. Arvet voivat muun muassa tuoda mukanaan kireyksiä, kipuja, liikerajoituksia, ryhti muutoksia, sekä häiritä lihasten aktivoitumista.

Lantionpohjan ja poikittaisen vatsalihaksen aktiivaatioharjoite

Seiso mukavassa asennossa jalat noin lantion etäisyydellä toisistaan. Hengitä normaalisti. Yritä rentouttaa vatsan, takapuolen, ja reisien alueet.

Yritä miettiä, kuinka pidättäisit virtsaa, ja hengitä sisään. Uloshengityksen aikana purista ja "nosta" lantionpohjaasi.

Voit kuvitella puristuksen olevan kuin hissien ovien sulkeminen, ja noston kuin hissien matka seuraavaan kerrokseen.

Kevyt kiristymisen tunne alavatsan alueella on normaalia, mutta yritä olla jännittämättä kokonaan vain vatsalihaksillasi.

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Opas palautumiseen synnytyksen jälkeen

Opaslehtinen koostettu osana opinnäytetyötä
Kuvat © Anniina Ojala

Palautumisen perusteet

Synnytyksen jälkeen keho alkaa palautumaan normaaliin tilaansa. Palautuminen on yksilöllistä, niin kuin raskauskin. Ole siis itsellesi armollinen, kuuntele kehoasi, ja anna prosessille aikaa.

Kehon palautuminen

Vauvan syntymän jälkeen alkaa kehon palautuminen. Käytännössä tämä tarkoittaa sitä, että kohtu palautuu hiljalleen normaaliin kokoonsa, synnytyksessä tulleet pehmytkudosaauriot ja haavaumat parantuvat, ja lantionpohjan lihakset palautuvat.

Paluu liikunnan pariin

Kevyt harjoittelu edistää synnytyksestä palautumista, ja liikkumisen voi aloittaa heti, kun se hyvältä tuntuu. Liikunnasta on myös apua vauva-arjessa jaksamiseen.

Kehon kudokset ovat raskaudesta johtuen löystyneet, ja niiden palautumiseen voi mennä puolikin vuotta. Siksi olisi hyvä aluksi välttää lajeja, joissa lantionpohjaan kohdistuu kovaa painetta, kuten esimerkiksi juokseminen ja erilaiset hyppyt. Jos harjoittelun aikana esiintyy virtsankarkailua, on harjoite liian raskas. Esimerkiksi vauvulenkit kävellään ovat hyvä aloitus harjoittelulle.



Imetys ja ergonomia

Imetysasennolla on väliä, sillä imetys on raskasta, jos niska, hartiat, ja selkä ovat jännityksessä, kädet väsyvät, tai istuminen tekee kipeää.

Ideaali asento on sellainen, jossa molemmilla on hyvä olla. Äiti jaksaa olla asennossa tarpeeksi kauan, ja vauva pystyy olemaan mahdollisimman rentona.

Vauva voi olla äidin kanssa lähelläkin napa napaa vasten, niska hieman takakenossa ja selkäranka suorassa.

Hyvä ryhti

Ryhtiin tulee kiinnittää huomiota, sillä hyvä ryhti edistää kehon oikeanlaista toimintaa. Seistessä olisi hyvä, jos hartiat ovat rennot, rinta niin sanotusti rottingilla, lapaluiden alueelta kevyt tuki, alaselän natko neutraali, ja polvet kevyesti koukussa ylöjennuksen välttämiseksi.

Vauvaa, tarvikkeita, ja leluja nostaessa ja kantaessa tulisi ryhdin pysyä hyvänä, ja liiallisia selän kiertoliikkeitä nostoliikkeiden aikana olisi hyvä välttää. Kantaessa vartalon tulisi olla suorassa, eikä vauvan kannatteleminen jatkuvasti toisella puolella lantiota ole suositeltavaa.

Lepo ja ravitsemus

Riittävä lepo ja oikeanlainen ravinto hyvän nesteytyksen ohella edistävät palautumista ja jaksamista.

Päivittäiset toiminnot ja puuhastelu vauvan kanssa kuluttavat energiaa, ja imettävän äidin kaloritarve on noin 500 kcal normaalia korkeampi. Muista siis huolehtia riittävästä ravinnonsaannosta ja veden juomisesta.

Riittävä lepo auttaa jaksamaan. Rento keho toimii optimaalisesti, ja palautuu paremmin. Lyhyetkin lepo- ja rentoutushetket tekevät hyvää, joten yritä panostaa niihin arjessasi.