

Professional paper

## THE ROLE OF KINESITHERAPY IN PSYCHOPHYSICAL PREPARATION OF EXPECTANT MOTHERS FOR GIVING BIRTH

UDK 615.825-055.26

**Miladin Radisavljević<sup>1</sup>**

College of Sports and Health, Belgrade, Serbia

**Ljiljana Antić**

College of Medicine, Čuprija, Serbia

**Snežana Milićev**

College of Sports and Health, Belgrade, Serbia

---

**Abstract:** It is well known that pregnancy after the fourth month entails certain changes related to additional burden. This burden (weight gain, protruding belly, reduced movement and similar) also causes changes of conditions for establishing and maintaining the balance of the ventral and dorsal sides of the body. For the purpose of maintaining and securing normal stability and good balance during various movements and positions of the body, it is necessary to engage the deep muscles of the back. Along with the mentioned, the torso flexors should also be strengthened, and stretching exercises for the spinal–pelvic–femoral muscles, the adductor muscles and the hamstrings used to provide pelvis with free balancing. Exercises for strengthening thigh extensors and calf muscles, as well as the plantar and dorsal flexors of the feet enable the expectant mother to maintain good posture and good feet status. Breathing exercises can help to establish and maintain normal lung ventilation which at the same time prevents the obstruction of pulmonary circulation in the lower part of the lungs. Thus, like every natural process, giving birth, as a physiological function of a woman's organism, should be pain free. Psychoprophylaxis is one of the contemporary attainments of the medical science which tends to achieve the removal of painful components of birth contractions. This method of initiating birth consists of a psychological and somatic preparation of the expectant mother for delivery.

**Keywords:** *kinesitherapy, psychophysical preparations, pregnancy, natural childbirth*

---

<sup>1</sup> ✉ skola@vss.edu.rs

## INTRODUCTION

By reviewing the available literature related to the effects of movement (physical exercise) on human body, it may be concluded that a man has, at an early stage, noticed and confirmed its positive effects.

Studies of the effects of performed exercises on specific organs and organic systems, including their impact on the locomotor system, show that exercising may be recommended and used in practice as a means i.e. a natural remedy serving to prevent, improve and enhance human health.

Depending on the level of development of certain medical disciplines, exercise as a means of prevention, therapy and rehabilitation has gained its proper importance. Accordingly, it was allocated various titles, and the most comprehensive one is included in the word kinesitherapy, which means movement therapy (Radisavljević, 2001).

Various forms of muscular activity used in kinesitherapy have their impact on body systems including the cardiovascular, respiratory, osteoarticular, central nervous system etc., all of which is objectively proven by numerous laboratory and clinical studies. It was thus determined that application of kinesitherapy in a defined manner may positively affect the psychophysical preparation of expectant mothers for childbirth (Jevtić, 2006).

The systematic application of kinesitherapy in pre-birth period may result in raising functional capacities to a higher level. This is particularly significant as scientific studies and specific professional experiences have confirmed that for expectant mothers having normal and healthy pregnancy, the application of a certain kinesitherapy program in the pre-birth preparation contributes to better birth outcomes (Anthony, 2002).

A favourable birth outcome means faster and easier childbirth, shorter stay in a healthcare institution, less frequent execution of unnatural birth and faster recovery of the mother after the delivery. At the same time, some experiences from practice show that kinesitherapy programs positively affect the psychological state of an expectant mother. Some papers point to the fact that pregnant women who were preparing themselves for childbirth and remained physically active were less prone to postnatal depression compared to the ones who ignored and overlooked the pre-birth preparation (Blair, 2000).

Kinesitherapy enables better cardio-vascular adaptation of new mothers and the consequent improvement of physical abilities due to the improved blood circulation in the active musculature. Similar positive effects are felt in the respiratory system due to the increased lungs ventilation.

The effects of kinesitherapy are also felt in the osteoarticular system in terms of capability for enduring increasing burden and related pressures. Kinesitherapy also increases and maintains muscle strength, prevents the trophic process caused by a certain level of inactivity and maintains the elasticity of joint ligaments which is rather important during pregnancy.

Owing to the systematic implementation of kinesitherapy, the central nervous system adapts to faster reactions and to stimulations of proprioceptors from the periphery. In addition, certain new motoric habits are established as a result of the application of kinesitherapeutic activities.

Even though pregnancy is a normal physiological process, it involves a number of rapid and various changes in the expectant mother's organism. The changes encompass all vital systems, including the cardio-vascular, haematological, respiratory, gastrointestinal, endocrinal systems, the CNS, as well as specific anatomic changes. In addition to the above, after the fourth month, the changes related to the additional burden are starting to be visible. This additional burden (protruding belly) causes changes in the conditions for establishing and maintaining balance. Depending on the stage of pregnancy, the centre of gravity moves forward thus increasing the torque. In order to prevent the forward body movement, the torso extensors activation enables compensatory backward body movement. For establishing balance, at the beginning, it is sufficient to move head backwards, i.e. the head needs to be permanently positioned in the extension of the spine. At later stages of pregnancy, it is necessary to increase the engagement of the torso extensor muscles. Their increased engagement enables decreased thoracic kyphosis at the same time increasing lumbar and cervical lordosis (Lothian, 2000; Lothian 2007; Milašinović, 2005).

For the purpose of maintaining and securing normal stability and good balance during various movements and positions of the body, it is necessary to engage the deep muscles of the back, in particular m. erector spinae, m. splenius, m. longissimus, m. iliocostalis and m. transversospinalis. This is particularly important as the mentioned muscles act opposite to the external forces of gravity and burden. This time, the additional burden is the baby in the belly of the expectant mother (Budin, 2014).

In view of the above, it is necessary to treat the muscles of the back and shoulder-blade with a kinesitherapy program (Picture 1, Picture 2).

**Picture 1.** *The strengthening of the shoulder-blade and spine extensor muscles*



The starting position is a cross-legged sitting position. The expectant mother performs the movement by elevating her arms with semi-flexed elbows, at the same time pressing hands to each other. The maintenance of the mentioned position requires increased engagement of the spine extensors and shoulder-blade musculature. In parallel, this posture enables good pelvic position, as well as the good position for the entire spine. Apart from strengthening the mentioned musculature, the effect is also visible in the decrease of thoracic curve, lifted chest and more favourable position for breathing.

**Picture 2.** *The strengthening of torso extensors, the shoulder-blade, abdominal, gluteal muscles, as well as the muscles of anterior and posterior thighs*



The exercise starts in a standing position and slightly flexed and abducted legs. The expectant mother performs torso ante-flexion while the arms are elevated. The torso and pelvic extensors take over the control of the lowering torso. Following the destabilization of the upright position, they are activated by a muscle contraction and then by a static contraction with a parallel activation of the torso flexors while maintaining the presented movement and position. Apart from the torso extensors, shoulder-blade muscles and abdomen muscles, the exercise also engages the lower extremities, particularly gluteal muscles as well as anterior and posterior thigh muscles.

With the growing belly, the front abdominal wall gets extended resulting in the increased inclination of pelvis and increased lumbar lordosis. In case hyper lordosis occurs due to more prominent forwarding of the centre of gravity, it may lead to the irritation of the lumbar-sacral nerves and the consequent back pain. An increased lumbar curve negatively affects posterior kinetic chain bringing the knee joint into hyperextension which may cause foot pain, especially in the heels.

In order to maintain the best possible posture of the expectant mother and prevent the mentioned unpleasant effects, the therapist should include the exercises for firming abdominal musculature (Picture 3, Picture 4).

**Picture 3.** *Firming torso flexor muscles*



The expectant mother is in a supine starting position with legs flexed at the hip and knee joints, while the hands are entwined at the back of the head. By using her arms, the expectant mother should flex her head and neck simultaneously performing voluntary contracting of the abdominal muscles. This exercise engages flexor muscles of the head and neck, abdominal muscles and partially the flexors at the hip joints as the pelvic fixators.

**Picture 4.** *The strengthening of the front abdominal wall*



The same starting position as in the previous exercise with the arms placed straight next to the body. The expectant mother contracts the abdomen by a voluntary contraction thus preventing the increase of the lumbar curve, and then performs lifting of the upper part of the body only up to the point of separating the shoulder area from the surface. The exercise primarily strengthens the front abdominal wall.

Following the exercises for torso extensor and flexor muscle strengthening, a kinesitherapy program should also include exercises for stretching spino-pelvi-femoral muscles, posterior thigh muscles and adductor muscles so as to enable free balancing for pelvis. The mobility i.e. the flexibility of the expectant mother is rather important from the aspect of biological and health effects. Stretching exercises lead to an improved mobility of spinal column, shoulders and hips (Picture 5, Picture 6 and Picture 7).

These exercises reduce the discomfort caused by the increased burden during pregnancy. Exercising reduces muscular tension, providing relaxation for the expectant mother as well as improving blood circulation. When performing these exercises, no sudden movements or too big an amplitude

should be made. Following a proper training at a healthcare institution, the expectant mother may perform these exercises at home.

**Picture 5.** *Improved mobility (flexibility) of the joints of the spinal column, shoulders and hips*



The exercise starts with a sitting starting position and legs flexed at the hip and knee joints. The inversion of the feet is performed so that the soles are leaning on each other. The expectant mother elevates her arms thus performing axial extension of the spine simultaneously abducting the thighs. While elevating arms, the expectant mother is inhaling; and during the process of ante-flexing arms, she is exhaling. In regards to breathing, the expectant mother should bear in mind that when the diaphragm is moving down caudally, and the chest is lifting, it should be complemented by inhaling and vice versa.

**Picture 6.** *The strengthening of the hip and lumbar extensor muscles and the stretching of the m.iliopsoasa of the extended leg*



In a quadruplegic starting position, the expectant mother performs the hyperextension of one leg at a time. The exercise has manifold beneficial effects. It strengthens the hip joint extensors and lumbar extensors simultaneously stretching the hip joint flexor muscles of the extended leg, in particular m.iliopsoas.

**Picture 7.** *Stretching posterior thigh muscles and the strengthening of the m. quadriceps femoris of the extended leg and abdominal musculature*



The exercise starts in a sitting starting position and legs flexed at the hip and knee joints and arms placed straight next to the body. The expectant mother extends her calf while the foot is in dorsal flexion. The exercise also has manifold beneficial effects. It enables simultaneous stretching of the posterior thigh muscles and the strengthening of anterior thigh muscles (m. quadriceps femoris) of the extended leg. The abdominal muscles, especially their lower parts and the lumbar extensor muscles fixate the pelvis with their static contraction.

In later stages of pregnancy and with the further growth of the baby in the belly, the expectant mother is also gaining more weight. Due to the gained weight, the feet are exposed to higher pressure and there may happen lowering of both longitudinal and transverse arches of feet that return to their normal position after the delivery. However, even such temporary lowering may cause certain unpleasant feelings such as veins expansion, peripheral circulation stasis, swelling, the feeling of heaviness and tiredness, as well as the feet pain.

In order to prevent all these sufferings and reduce negative effects as much as possible, it is necessary to perform the exercises for strengthening dorsal and plantar foot flexors (Picture 8, Picture 9).

**Picture 8.** *The strengthening of dorsal foot flexors*



The expectant mother is in the sitting starting position with straight legs. The loops attached to an elastic band are placed onto the metatarsal part of each foot. The expectant mother performs the foot dorsiflexion against the resistance.

**Picture 9.** *The strengthening of the dorsal and plantar flexor muscles using resistance*



On a bench or mattress, the expectant mother is in a supine position with legs flexed at the hip and knee joints. The therapist holds the metatarsal part of the feet creating resistance while the expectant mother performs first dorsiflexion and then plantarflexion, followed by inversion and eversion of feet, flexion and extension of the great toe and other toes, circumduction of feet etc.

In addition, the expectant mother should implement various types of walking, such as walking on toes, on heels, on the outer side of feet, as well as collecting small items from the floor by using toes to additionally engage the foot and calf muscles.

In order to prevent the stasis of blood and improve peripheral blood circulation, all with the aim of faster elimination of waste products, reduced swelling, improved subjective feeling, it is necessary that the expectant mother undergo massages as well as to practice self-massage, and specific hydro-kinesitherapeutic procedures.

The mentioned procedure includes the following: the expectant mother soaks her feet in warm water poured into a relatively deep vessel. While in the water, she performs flexion, extension and abduction of toes and great toes. Then, she flexes great toes and strongly presses the bottom of the vessel and simultaneously lifts the middle part of the sole. In the water, she performs dorsiflexion and plantarflexion and circumduction of feet. After exercising, while still in the water, she should use an ordinary plastic brush to perform massage by pulling the brush from the tips of toes toward dorsum and plantum of her feet, and then to outer and inner side of the feet towards calf. Upon completing the massage, she uses a rough towel to dry her feet and then lay down with her feet elevated above the heart level.

One of the most important segments that need to be encompassed in a kinesitherapeutical program is the perineum, i.e. the pelvic floor muscles. The following muscles are particularly important: m. transversus perinei profundus which has a mainly static effect and its tonus stretches the front part of the floor of pelvis minor, and m. sphincter urethrae which contracts the membranous part of the urinary tract and by means of voluntary contraction interrupts urination. Its activation during pushing of urine is assisted by the



previous muscle. Also, *m. transversus perinei superficialis* is worth mentioning as it contracts the central tendon of perineum (Izegel, 1948).

Apart from the above mentioned, it is particularly important to mention *m. transversus perinei profundus* as it has a key role in intra-abdominal pressure when lifting weight, jumping, performing some physiological acts, especially a delivery.

The mentioned muscles provide support by their permanent tonus and maintain good position of organs located in the pelvis minor opposing the pressure in abdomen.

By contracting the perineum muscles, the perineum lifts. In addition to the pressure of the abdominal organs, through the diaphragm the perineum also feels the pressure of lungs that transfers to stomach organs increasing intra-abdominal pressure. Due to the above, pelvic floor muscles may act in synergy or opposition to the abdominal pressure and in this manner change the position of organs (Bošković, 2005; Domnić-Stošić, 1998).

Insufficient abdominal wall and superficial weak breathing put pressure on the perineum muscles. Should perineum muscles become extremely insufficient, the pelvic organs may descend or even prolapse through the natural holes in the perineum.

It is important to stress that pelvic floor muscles suffer great pressure during pregnancy and delivery. Therefore, kinesitherapeutic program should focus also on the perineum muscles.

The strengthening of the pelvic muscles makes natural birth easier and simultaneously prevents the descensus and prolapse of pelvic organs. In addition to the well-known Kegel exercises based on the isometric contractions of the pelvic floor muscles, it is also necessary to include exercises that will effectively strengthen the pelvic floor muscles (Picture 10-15).

**Picture 10.** *The strengthening of the pelvic floor*



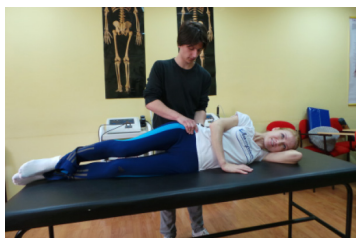
The exercise starts by sitting on an exercise ball or a chair with hands below the lateral edge of the gluteal region. The expectant mother performs

lateral forward inclination transferring weight first to the left and then to the right side. The movement is performed in turns to one side and then to the other for at least 6 seconds per side.

By using the exercise ball (not presented in the picture), the expectant mother performs the rolling of pelvis forward and then backward by moving her feet while sitting on the ball. When the pelvis moves forward, the feet are in plantarflexion, and when the pelvis moves backward, they are in dorsiflexion. The expectant mother remains in the final position for 6 seconds.

Also, the efficient exercises for strengthening pelvic floor muscles may be performed with the ball leaning onto the ripstol (Swedish ladder) or a wall, whereby the expectant mother pushes the ball, first by the gluteal region and then by the pars lateralis of pelvis.

**Picture 11.** *The strengthening of the pelvic floor using resistance*



The expectant mother is in the position of lateral decubitus. The therapist holds SIAS from dorsal side with one hand, and presses tuber osis ishi with the other hand. The expectant mother first moves pelvis forward, overpowering the resistance made by the therapist, and then backward in the intervals of 6 seconds.

**Picture 12.** *The strengthening of the thigh adductor muscles and the pelvic floor muscles*



The expectant mother is in a supine starting position with legs flexed at the hip and knee joints holding a ball between her knees. The expectant mother performs strong adduction of thighs and maintains the position for 6 seconds. While maintaining the same starting position, the expectant mother first performs adduction and then abduction of knees while the therapist provides resistance by positioning hands onto the inner and outer knee sides.

**Picture 13.** *The strengthening of the pelvic floor muscles using resistance*



The expectant mother is in a dog position. The therapist holds the pelvis from both sides at the SIAS height, providing resistance while the woman performs rotating movements of pelvis and torso to the left and right side maintaining the final position for 6 seconds.

**Picture 14.** *The strengthening of the adductor muscles of the extended leg*



The starting position is lying on the hip with the upper leg flexed at the hip and knee joints and the foot placed on the surface of the exercise table.

The expectant mother performs adduction of the lower extended leg. She repeats the movements taking turns with both legs for several times, ensuring that the extended leg is in the final position for up to 6 seconds. In view of the fact that the hip muscles indirectly participate in the delivery, it is necessary to treat them with exercises.

**Picture 15.** *The strengthening of the muscles of hip joints, abdomen and lumbar extensors*



The expectant mother is in a supine starting position with legs flexed at the hip and knee joints. Arms are extended next to the body with both hands resting on the surface as support. The expectant mother performs extension of the hips and torso, i.e. performs lifting of pelvis from the surface and keeps it in the final position up to 6 seconds.

The breathing technique is rather important for the delivery so these exercises should also be included in the kinesitherapeutic program. The expectant mother should exhale the maximal amount of air, so that the maximal amount of air could be inhaled at the next breathing stage. Breathing exercises should engage intercostal and abdominal muscles especially m.transversus abdominis and diaphragm.

The exercises done at the final stages of pregnancy should focus on practising synchronised voluntary squeezing of the perineum and abdominal musculature and breathing activity. A special attention should be paid to the inhaling phase with the simultaneous squeezing of the perineum and abdominal wall, as this improves the mechanism of pushing baby out due to the fact that in this way intraabdominal pressure transfers to the uterus and birth canal (Romano, Lothian, 2008).

## CONCLUSION

The therapist, working hand in hand with the obstetrician-gynaecologist, should prepare such a kinesitherapeutic program that must be complied with at all times and adjusted to the changes occurring in the vital systems and organs of the expectant mother.

In addition, the therapist must be familiar with the current symptoms related to the physiological adaptations to pregnancy and monitor them permanently in order to be able to carry out the previously designed kinesitherapeutic program. This particularly refers to the exercise dosage aspect.

The dosage includes defining starting position, the number of repetitions of each exercise, the movement performance rhythm, the break intervals between the exercises, the frequency of exercising during the week, the pulse control, pressure, breathing and fatigue of the expectant mother.

Therefore, like any other natural process, childbirth – as one of the physiological functions of the female organism - should be pain free. Psychoprophylaxis is one of the contemporary attainments of the medical science which aims at removing the painful component of delivery contractions. This method of conducting childbirth encompasses, as was presented above, a psychological and somatic preparation of the expectant mother for the delivery.

## REFERENCES

1. Anthony, L. (2002). *Pre and post – natal fitness*. London: Ace.
2. Blair, S. (2000). Benefits of physical activity and fitness in high risk populations, *Journal of American Medical Association*, 273: 1093-1098.
3. Bošković, M. S. (2005). *Anatomija čoveka*. Beograd: Naučna KMD.
4. Budin, W. C. (2014). What to teach?, *J Perinat Educ*, 23 (2): 59-61.
5. Domnić-Stošić, T. (1998). *Anatomija male karlice*. Beograd: Savremena administracija.
6. Izegel, A. H. (1948). Progressive presentance exersises in the funkcional restoration of the perineal muscles, *Am. J. Ostet. Gynecol.* 56: 238-248.
7. Jevtić, R. M. (2006). *Klinička kineziterapija*. Kragujevac: Medicinski fakultet.
8. Lothian, J. A. (2007). The Lamze certified childbirth educator: standards of practice, *J Perinat Educ*, 16 (1): 29-31.
9. Lothian, J. A. (2000). Why natural childbirth?, *J Perinat Educ*, 9 (4): 44-46.
10. Milašinović, Lj. (2005). *Klinička fiziologija trudnice*. Beograd: Kosmos.
11. Radisavljević, M. (2001). *Korektivna gimnastika sa osnovama kineziterapije*. Beograd: Univerzitet u Beogradu, Fakultet za fizičko vaspitanje.
12. Romano, A. M., Lothian, J. A. (2008). Promoting, protecting and supporting normal birth: a look at the evidence, *J Obstet Gynecol Neonatal Nurs*, 37 (1): 94-104; quiz 104-5.

