

SECTION 17.

MEDICAL SCIENCES AND PUBLIC HEALTH

Pecheriaha Svitlana 

PhD., assistant

Department of Obstetrics, Gynecology and Perinatology
Bukovinian State Medical University, Ukraine

Tsymmermann-Chukurenko Daniela

student of higher medical education

Bukovinian State Medical University, Ukraine

MODERN APPROACHES TO NON-PHARMACOLOGICAL LABOR PAIN RELIEF

Abstract. *The article summarizes current data on the effectiveness and mechanisms of action of non-pharmacological methods of labor pain relief in physiological obstetrics. Mobility, massage, transcutaneous electrical nerve stimulation (TENS), acupuncture, acupressure, water immersion, and self-regulation methods are considered. Their ability to reduce pain intensity, decrease the need for pharmacological analgesia, and improve the childbirth experience is demonstrated. The neurophysiological mechanisms of action are highlighted. The role of these methods in supporting the physiological course of labor and the need for further research are emphasized.*

Keywords: *labor, non-pharmacological pain relief, physiological obstetrics, pain, water immersion, TENS, massage, continuous support.*

Introduction. The contemporary concept of labor management is increasingly based on the principles of evidence-based medicine and the minimization of unnecessary medical interventions. According to the recommendations of the World Health Organization, childbirth should primarily be regarded as a natural physiological process that requires support rather than excessive medicalization in the absence of clinical indications [2]. In this context, particular importance is placed on creating conditions that ensure psychological comfort, promote the woman's active participation in labor, and preserve freedom of movement.

Pain is one of the central components of the labor process, characterized by a complex neurophysiological nature resulting from the interaction of peripheral and central mechanisms. Labor pain not only affects the physical condition of the woman but also significantly influences her emotional state, behavior, and overall perception of the childbirth experience. Historically, the management of labor pain has been a key focus in obstetric practice, leading to the development of various analgesic approaches.

In the 20th century, pharmacological methods became dominant in labor pain management, with epidural analgesia recognized as the “gold standard.” However, findings from contemporary studies, including Cochrane reviews, indicate that these approaches are not without limitations. These include the risk of arterial hypotension, potential interference with the physiological course of labor, an increased likelihood of instrumental delivery, and restricted maternal mobility [1].

Against the backdrop of a paradigm shift toward physiological childbirth, interest in non-pharmacological methods (NPMs) of labor pain relief has increased. These approaches align with the principles of physiological obstetrics and encompass a wide range of techniques that do not involve pharmacological agents but instead aim to activate the body’s intrinsic adaptive mechanisms. Their effects are associated with enhanced production of endogenous opioids, reduction of stress, induction of relaxation, distraction, and optimization of hemodynamic processes [3].

It is important to emphasize that the goal of NPMs is not the complete elimination of pain. Labor pain is a physiologically determined phenomenon that serves an important signaling function. Rather, these methods aim to help women develop effective coping strategies, reduce the subjective intensity of pain, and enhance their sense of confidence and control over the labor process.

In this regard, there is a need for systematic synthesis and critical evaluation of existing scientific evidence concerning the effectiveness, safety, and mechanisms of action of non-pharmacological approaches to labor pain relief.

The aim of this review is to provide a comprehensive analysis of contemporary international literature in order to evaluate the evidence base of non-pharmacological methods of labor analgesia and to determine their role in modern physiological obstetrics.

Presentation of the main material. Within this review, contemporary scientific sources addressing the effectiveness and safety of various non-pharmacological methods of labor pain relief were analyzed. Each approach is considered from the perspective of evidence-based medicine, taking into account mechanisms of action, clinical efficacy, and their impact on the course of labor as well as the woman’s subjective experience.

Among non-pharmacological approaches, the use of warm water during the first stage of labor occupies a prominent place. This method exerts a multifaceted effect, encompassing both physiological and psycho-emotional mechanisms. Immersion in water contributes to muscle relaxation, improves peripheral circulation, and reduces the levels of stress-related hormones, thereby creating favorable conditions for effective uterine contractility. In addition, the buoyancy effect decreases the load on the musculoskeletal system and alleviates pain,

particularly in the lumbosacral region [4].

The effectiveness of this method is supported by substantial scientific evidence. In particular, a Cochrane systematic review (2018), which included 15 randomized controlled trials involving more than 3,663 women, demonstrated that water immersion during labor is associated with a significant reduction in the need for pharmacological analgesia, including epidural analgesia. Furthermore, women who used hydrotherapy more frequently reported a positive childbirth experience and were less likely to report severe pain [5].

Safety is another important consideration. Available evidence does not indicate an increased risk of adverse outcomes for either the mother or the newborn, including infectious complications, provided that standard clinical protocols are followed.

The findings of individual clinical studies are consistent with these results. For example, Darsareh F. et al. (2018) showed that water immersion is associated not only with reduced pain intensity according to the visual analogue scale but also with a more favorable course of labor, including a shorter duration and higher levels of maternal satisfaction [6].

A fundamental principle of modern physiological obstetrics is ensuring that women are able to remain mobile and freely choose their body position during labor. This approach contrasts with the traditional practice of prolonged supine positioning. Accumulated clinical evidence indicates that the supine position is associated with several adverse effects, including increased pain intensity, slower labor progression, and the risk of inferior vena cava compression, which may negatively affect maternal hemodynamics [7].

In contrast, active behavior during labor, which involves changing positions and adopting upright postures (standing, squatting, sitting, or lateral positions), creates more favorable conditions for a physiological course of labor. This can be explained by the combined effects of gravity, improved pelvic dimensions, and enhanced uteroplacental blood flow, which in turn positively influences the efficiency of uterine contractile activity [7].

The benefits of this approach are supported by the findings of a systematic review conducted by Priddis H. et al. (2012). It was demonstrated that unrestricted mobility during labor is associated with shorter labor duration, reduced need for analgesia (regardless of type), and a lower rate of operative delivery [8].

It is also emphasized that effective implementation of this approach requires an appropriately organized birth environment. This includes creating conditions that facilitate maternal mobility and support a woman's right to choose her position, which is an essential component of modern perinatal care.

Among simple and accessible methods for alleviating labor pain, tactile stimulation - particularly massage of the lower back and sacral area - plays a significant role. These regions are especially sensitive during labor, and targeted stimulation can substantially reduce discomfort.

The analgesic effect of massage is explained by neurophysiological mechanisms related to the modulation of pain transmission within the central nervous system. According to the gate control theory, stimulation of mechanoreceptors through touch or pressure activates fast-conducting nerve fibers, which inhibit the transmission of nociceptive signals at the level of the spinal cord. As a result, pain perception is reduced even before it is consciously processed by the cerebral cortex [9].

The effectiveness of this approach is supported by data from systematic studies. In particular, a Cochrane review by Smith C. et al. (2022) demonstrated that massage during labor is associated with a reduction in pain intensity. Importantly, this technique can be performed not only by healthcare professionals but also by a trained partner or doula, thereby expanding its applicability in clinical practice [10].

In addition to its direct analgesic effect, massage exerts a pronounced psycho-emotional influence. It contributes to the reduction of anxiety levels, fosters a sense of support and safety, and enhances the woman's subjective sense of control over the labor process. Collectively, these effects improve the overall childbirth experience and promote a more harmonious course of labor.

One of the technology-based non-pharmacological approaches to labor pain relief is transcutaneous electrical nerve stimulation (TENS). This method involves the use of a portable device that delivers low-intensity electrical impulses through electrodes placed on the skin of the back in areas corresponding to the segmental innervation of the uterus (primarily Th10–L1 and S2–S4).

The analgesic effect of TENS is related to its influence on the processing of pain signals within the nervous system. Electrical stimulation activates large afferent fibers, which, according to the segmental “gate control” mechanism, reduces the transmission of nociceptive signals. In addition, prolonged use of TENS may promote the release of endogenous opioids, providing an additional central analgesic effect [11].

The practical value of TENS lies in its applicability at the early stages of labor. According to the study by Mello L. et al. (2011), this method can be conveniently used both at home and during the early hospital phase. An important advantage is that the woman can independently adjust the intensity of stimulation according to her own sensations, thereby enhancing her sense of control and autonomy [12].

Key features of TENS include its non-invasive nature, the absence of systemic

effects on both the mother and the fetus, and its compatibility with other pain relief methods. Although study findings vary regarding the degree of analgesic effectiveness, most authors consider TENS to be a useful adjunct within a multimodal strategy for labor pain management.

In contemporary obstetric practice, increasing attention is being paid to approaches derived from traditional Chinese medicine, which are used as complementary non-pharmacological methods of pain relief. These include acupuncture and acupressure - techniques based on the stimulation of specific biologically active points on the body. In the case of acupuncture, thin sterile needles are used, whereas acupressure involves mechanical stimulation through pressure or massage.

From the perspective of modern physiology, the analgesic effect of these methods is associated with the activation of neurochemical processes in the central nervous system. In particular, stimulation of specific points promotes the release of endogenous opioids, serotonin, and other neurotransmitters involved in the modulation of pain signals. Additionally, activation of descending antinociceptive pathways has been observed, which suppress pain transmission at the level of the spinal cord and brainstem [13].

Clinical evidence suggests the potential effectiveness of these approaches. In particular, a systematic review (2020), which included 28 studies, demonstrated that acupuncture is associated with reduced pain intensity during labor and a decreased need for pharmacological analgesia compared to standard care [14]. However, the authors highlight substantial heterogeneity among studies (including differences in selected points, duration, and techniques), which complicates interpretation of the findings, as well as the possible contribution of placebo effects due to the difficulty of implementing blinded study designs.

Similar findings have been reported in individual clinical trials. For example, Hjelmstedt A. et al. (2010) demonstrated a statistically significant reduction in pain intensity according to the visual analogue scale and a decreased need for pharmacological interventions in women receiving acupuncture compared to the control group [15].

Despite the need for further standardization of protocols and more homogeneous research designs, these methods are considered safe and promising adjuncts to modern non-pharmacological labor pain management strategies.

Among all non-pharmacological approaches, continuous support during labor occupies a particularly important place and is regarded as one of the most effective and well-evidenced methods. This involves the continuous presence of a trained support person - such as a midwife, doula, or other professional - who remains with

the woman throughout the entire labor process.

Strong evidence supporting this approach is provided by a large Cochrane meta-analysis (2017), which included 27 studies with a total sample of over 15,000 women. The results demonstrate that continuous support is associated with reduced use of pharmacological analgesia, increased rates of spontaneous vaginal birth without interventions, shorter labor duration, and significantly higher maternal satisfaction with the childbirth experience [18].

The beneficial effects of this method are explained by the combination of several complementary components. Emotional support reduces fear and anxiety, which are known to amplify pain perception. Informational support helps the woman better understand the labor process and enhances her confidence. At the same time, practical assistance - such as helping with position changes, providing massage, and meeting basic needs - directly improves physical comfort and reduces pain intensity. These findings are further supported by the study of Çankaya, S., et al. (2019), which demonstrated a positive impact of continuous support on labor outcomes and the psycho-emotional state of women [19].

An important complement to this approach is the use of self-regulation techniques, particularly controlled breathing. Rhythmic and conscious breathing during contractions способствует reducing muscle tension, prevents breath-holding, and ensures adequate oxygenation for both the mother and the fetus. In addition, it serves as a mechanism of attentional focus, helping women better cope with pain.

Methods aimed at cognitive modulation of pain also include visualization, music therapy, and aromatherapy. These approaches act through distraction and the creation of a positive psycho-emotional environment, thereby influencing central mechanisms of pain processing [10, 20].

The importance of antenatal preparation has been confirmed in a study by Bergström M., et al. (2009), which demonstrated that women who participated in specialized training programs focused on breathing and relaxation techniques exhibited better coping skills for managing labor pain. This was associated with a reduced need for pharmacological interventions during labor [21].

Thus, the combination of continuous support with self-regulation techniques and psycho-emotional interventions constitutes an effective non-pharmacological strategy for labor pain relief that aligns with the principles of physiological obstetrics.

Analysis of contemporary scientific data indicates that non-pharmacological methods of labor pain relief are effective and evidence-based approaches rather than merely auxiliary alternatives to pharmacological analgesia. For several methods,

including continuous support, water immersion, and intracutaneous sterile water injections, a high level of effectiveness (evidence level A) has been demonstrated and is supported by recommendations from the WHO and NICE [3-6, 22].

A key advantage of non-pharmacological methods is their compatibility with the physiological processes of labor. Unlike some pharmacological interventions, they do not disrupt the natural course of labor but instead contribute to its optimization, improve cervical dilation dynamics, and reduce the likelihood of interventions.

Another important aspect is their psycho-emotional impact: the use of these methods enhances the woman's sense of control, contributes to a more positive childbirth experience, and may have long-term beneficial effects on mental health and breastfeeding outcomes [17, 23].

At the same time, the effectiveness of certain methods may depend on individual characteristics of the woman and the level of training of healthcare providers. Some approaches require further standardization and additional research. Significant barriers to wider implementation include limited awareness among healthcare professionals and insufficient integration of these methods into routine clinical practice.

Therefore, the integration of non-pharmacological methods into standard obstetric care, along with proper patient education, represents an important step toward improving the quality of perinatal care and patient satisfaction.

Conclusions. Non-pharmacological methods of labor pain relief represent an effective and evidence-based component of modern physiological obstetrics, allowing for a reduction in pain intensity without disrupting the natural course of labor. The strongest evidence supports approaches such as continuous support, water immersion, active maternal behavior, and freedom of movement and positioning, which not only provide analgesia but also improve labor dynamics and reduce the frequency of medical interventions.

The mechanisms underlying these methods are multifactorial and include activation of endogenous analgesic systems, neurophysiological modulation of pain transmission, and beneficial effects on the woman's psycho-emotional state. An important advantage of these approaches is the enhancement of the woman's active role during labor, fostering a sense of control and contributing to a more positive childbirth experience, which may have long-term benefits for mental health and postpartum adaptation.

At the same time, the widespread implementation of non-pharmacological approaches in clinical practice requires improved training of healthcare professionals, the development of educational programs, and further standardization

of individual methods. The integration of these approaches into perinatal care systems is consistent with current international recommendations and represents a перспективний напрям for improving the quality of obstetric care.

References:

1. Anim-Somuah, M., Smyth, R. M., Cyna, A. M., & Cuthbert, A. (2018). Epidural versus non-epidural or no analgesia for pain management in labour. *The Cochrane database of systematic reviews*, 5(5), CD000331. <https://doi.org/10.1002/14651858.CD000331.pub4>
2. World Health Organization (WHO). (2018). *WHO recommendations: intrapartum care for a positive childbirth experience*. Geneva: World Health Organization.
3. Jones, L., Othman, M., Dowswell, T., Alfirevic, Z., Gates, S., Newburn, M., Jordan, S., Lavender, T., & Neilson, J. P. (2012). Pain management for women in labour: an overview of systematic reviews. *The Cochrane database of systematic reviews*, 2012(3), CD009234. <https://doi.org/10.1002/14651858.CD009234.pub2>
4. Dado, M., Smith, V., & Barry, P. (2022). Women's experiences of water immersion during labour and childbirth in a hospital setting in Ireland: A qualitative study. *Midwifery*, 108, 103278. <https://doi.org/10.1016/j.midw.2022.103278>
5. Cluett, E. R., Burns, E., & Cuthbert, A. (2018). Immersion in water during labour and birth. *The Cochrane database of systematic reviews*, 5(5), CD000111. <https://doi.org/10.1002/14651858.CD000111.pub4>
6. Darsareh F., Nourbakhsh S., & Dabiri F. (2018). Effect of water immersion on labor outcomes: A randomized clinical trial. *Nurs Midwifery Stud*;7,111-115.
7. Simkin, P., & Ancheta, R. (2019). *The labor progress handbook: early interventions to prevent and treat dystocia*. 4th ed. Wiley-Blackwell.
8. Priddis, H., Dahlen, H., & Schmied, V. (2012). What are the facilitators, inhibitors, and implications of birth positioning? A review of the literature. *Women and birth: journal of the Australian College of Midwives*, 25(3), 100–106. <https://doi.org/10.1016/j.wombi.2011.05.001>
9. Suarez-Easton, S., Erez, O., Zafran, N., Carmeli, J., Garmi, G., & Salim, R. (2023). Pharmacologic and nonpharmacologic options for pain relief during labor: an expert review. *American journal of obstetrics and gynecology*, 228(5S), S1246–S1259. <https://doi.org/10.1016/j.ajog.2023.03.003>
10. Smith, C. A., Levett, K. M., Collins, C. T., Armour, M., Dahlen, H. G., & Suganuma, M. (2018). Massage, reflexology and other manual methods for pain management in labour. *Cochrane Database of Systematic Reviews*, (3), CD009290.
11. Thuvarakan, K., Zimmermann, H., Mikkelsen, M.K. and Gazerani, P. (2020), Transcutaneous Electrical Nerve Stimulation As A Pain-Relieving Approach in Labor Pain: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Neuromodulation: Technology at the Neural Interface*, 23: 732-746. <https://doi.org/10.1111/ner.13221>
12. Mello, L. F., Nóbrega, L. F., & Lemos, A. (2011). Transcutaneous electrical stimulation for pain relief during labor: a systematic review and meta-analysis. *Revista brasileira de fisioterapia (Sao Carlos (Sao Paulo, Brazil))*, 15(3), 175–184.
13. Zamora-Brito, M., Fernández-Jané, C., Pérez-Guervós, R., Solans-Oliva, R., Arranz-Betegón, A., & Palacio, M. (2024). The role of acupuncture in the present approach to labor induction: a systematic review and meta-analysis. *American journal of obstetrics & gynecology MFM*, 6(2), 101272. <https://doi.org/10.1016/j.ajogmf.2023.101272>
14. Smith, C. A., Collins, C. T., Levett, K. M., Armour, M., Dahlen, H. G., Tan, A. L., & Mesgarpour, B. (2020). Acupuncture or acupressure for pain management during labour. *The Cochrane database of systematic reviews*, 2(2), CD009232. <https://doi.org/10.1002/14651858.CD009232.pub2>
15. Hjelmstedt, A., Shenoy, S. T., Stener-Victorin, E., Lekander, M., Bhat, M., Balakumaran, L., & Waldenström, U. (2010). Acupressure to reduce labor pain: a randomized controlled trial. *Acta obstetrica et gynecologica Scandinavica*, 89(11), 1453–1459. <https://doi.org/10.3109/00016349.2010.514323>
16. Zhu, R., Pan, Q., & Cao, X. (2023). Comparisons of nonpharmaceutical analgesia and pharmaceutical analgesia on the labor analgesia effect of parturient women. *Immun Inflamm Dis*, 11, e869. <https://doi.org/10.1002/iid3.869>
17. Bonarska, M., Adasik, D., Szymczyk, S., Łocik, G., & Stanirowski, P. (2025). A Systematic Review of Contemporary and Emerging Analgesia Techniques for Natural Labor-Patient-Centered Approaches and Technological Advances. *Journal of clinical medicine*, 14(11), 3977. <https://doi.org/10.3390/jcm14113977>
18. Bohren, M. A., Hofmeyr, G. J., Sakala, C., Fukuzawa, R. K., & Cuthbert, A. (2017). Continuous support for women during childbirth. *The Cochrane database of systematic reviews*, 7(7), CD003766. <https://doi.org/10.1002/14651858.CD003766.pub6>
19. Çankaya, S., & Can, R. (2021). The effect of continuous supportive care on birth pain, birth fear, midwifery care perception, oxytocin use, and delivery time during the intrapartum period: An experimental study. *Nigerian*

- Journal of Clinical Practice, 24(11), 1624-1632. https://doi.org/10.4103/njcp.njcp_147_20
20. Smith, C. A., Levett, K. M., Collins, C. T., Armour, M., Dahlen, H. G., & Sukanuma, M. (2018). Relaxation techniques for pain management in labour. *The Cochrane database of systematic reviews*, 3(3), CD009514. <https://doi.org/10.1002/14651858.CD009514.pub2>
 21. Bergström, M., Kieler, H., & Waldenström, U. (2009). Effects of natural childbirth preparation versus standard antenatal education on epidural rates, experience of childbirth and parental stress in mothers and fathers: a randomised controlled multicentre trial. *BJOG: an international journal of obstetrics and gynaecology*, 116(9), 1167–1176. <https://doi.org/10.1111/j.1471-0528.2009.02144.x>
 22. National Institute for Health and Care Excellence (NICE). (2023). *Intrapartum care for healthy women and babies*. Clinical guideline [CG190].
 23. Hodnett E. D. (2002). Pain and women's satisfaction with the experience of childbirth: a systematic review. *American journal of obstetrics and gynecology*, 186(5 Suppl Nature), S160–S172. <https://doi.org/10.1067/mob.2002.121141>