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Non-pharmacological methods of labor pain relief

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Abstract

Birth of a child is an unique time in the life of every woman. Unfortunately, labor is often one of the most painful and traumatic experiences suffered in her life. In the modern obstetrics pain of labor and methods of its mitigation are the main problem for both, patients and medical staff. In this paper non-pharmacological methods of labor pain relief, including hypnosis, biofeedback, water immersion, aromatherapy, relaxation techniques, acupuncture, massage, reflexology and transcutaneous electrical nerve stimulation were described.

Key words: acupuncture, aromatherapy, biofeedback, hypnosis, labor analgesia, massage, reflexology, relaxation techniques, transcutaneous electrical nerve stimulation, water immersion

A feature that distinguishes non-pharmacological methods of combating labor pain from other methods of treating pain is the striving to accept by the women in labor the very fact of feeling pain.

One of the first non-pharmacological methods of dealing with labor pain was hypnosis method which was used for many centuries [1]. As a method of anesthesia, it has been known to menkind since ancient times, and the very term was created in 1843 by James Braid, who claimed that the basis of its effectiveness is the suggestion [2,3]. Hypnosis is described as a state of sharpened awareness with deep concentration, which results in a reduced intensity of feeling external stimuli, accompanied by an increased susceptibility to suggestion. The essence of hypnosis is the suggestion that allows a person in a trance to choose the inflow of sensory stimuli that she wants to feel [2-5]. During hypnosis the woman giving birth enters into a state of relaxation and deep concentration during which, thanks to suggestion, pleasant sensations are easier transmitted and strengthened. In contrast, unpleasant sensations including pain, are modified thanks to this mechanism, become easier to accept and in some cases are even pleasant. The acquisition of these skills requires however a lot of time and the complicity of an experienced hypnotist [2,3]. Thanks to the progress that has been made in recent years in the field of neuroimaging of the human brain it became possible to understand the changes occurring during hypnosis on the level of neurons. The use of positron emission tomography allowed to establish that the front corner of the rim of the limbic system is the

part of the human brain that is actively involved in the modulation of pain sensation. In addition, inhibition of neuronal activity during hypnosis between the sensory cortex, amygdala and limbic system has an inhibitory effect on the perception of painful stimuli [6].

Another method of non-pharmacological pain control is the biofeedback method, which is not an alternative to pharmacotherapy but rather serves to supplement it. Biofeedback provides patient feedback regarding the changes in the physiological state. This method has been used not only in medicine but also in sport, business and psychology. It is a method completely safe and free of side effects. The basis of its effectiveness is the right motivation, strong will of the patient and a sense of responsibility for the outcome of therapy. The main principle of biofeedback is the conviction that changes in thoughts and emotions can cause changes in the functioning of the body. Biofeedback is to gain control over the physiological responses of the body using a variety of measuring devices under the supervision of an expert. These physiological responses of the body may be monitored by measuring muscle tonus using electromyography and controlling of the heat emission from the skin surface, which reflects changes in blood flow in the test area. Skin-galvanic reaction enables measurement of the electrical resistance of the skin which corresponds to the amount of sweat produced in response to sympathetic stimulation and electroencephalography uses the brain's property to produce various types of electromagnetic waves depending on the type of activity. Moreover, the biofeedback method also uses electrocardiography for monitoring heart rate variability and also breathing feedback to measure the rhythm and length of the expiration, which is helpful in achieving a state of relaxation [1].

The methods of combating labor pain also include intra- or subcutaneous injection of sterile physiological saline solution in the area of the sacrum [7]. This technique is usually used in situations where other methods of analgesia are not available or when woman does not consent to the use of any drugs during labor. It is believed that this technique works through the release of endogenous opioids and their impact on the gating of pain [7].

One of the oldest methods of intrapartum analgesia is labor in the water immersion. The first mentions of the use of this method of birth dates back to the times of ancient Crete, where in the temples of contemporary gods deliveries in water took place [8]. The first written reference of the birth in water immersion comes from France from 1803 [8]. The main promoter of this method in the early 80 years of the twentieth century was Michael Odent

[9,10]. Labor in the water immersion is defined in the literature as the immersion of the woman in warm water to a level at which the abdomen is under its surface and a pool or tub, in which the delivery takes place are significantly larger than those commonly used at home. Immersion may refer to one or all labor stages and its duration is optional. Immersion of the body in the warm water improves blood flow in the utero-placental unit, reduces the perception of painful stimuli during uterine contractions, reduces the duration of labor and decreases the percentage of intrapartum interventions [11-13]. Labor in deep water immersion (up to the shoulder level) decreases arterial blood pressure by relaxation of peripheral blood vessels, thus affecting the redistribution of blood flow, increases the satisfaction of the laboring woman and gives her the feeling of greater control over her own body [14]. Furthermore, the reduction of anxiety in the laboring woman optimizes the release of oxytocin and its action on uterine muscle [15]. It is also suggested that there are numerous benefits of water immersion for the fetus, including those resulting from improved uterine-placental flow and the release of endogenous opioids.

Aromatherapy, as another drug-free method of treating pain of childbirth, is based on the use of plant essential oils. The mechanism of analgesic effect of this method is not clear. Studies on the changes of physiological processes occurring under the influence of the use of essential oils have not shown significant changes in the basic parameters of life, but there is no doubt that this method significantly improves mood and reduces the feeling of anxiety [16]. Essential oils increase the release of endogenous neurotransmitters of a calming and relaxing effect. They can be rubbed into the skin, inhaled directly or through the heater. Aromatherapy is still gaining popularity, especially among nurses and midwives [17].

The methods allowing to reduce labor pain are also relaxation techniques. The essence of the approach of these methods to the problem of labor pain is interference on the body-mind system, basing on conscious control of muscle tone, developing the ability to release tension and maintaining a sense of relaxation. This is accompanied by full breath control, meditation and support with visualization techniques [1]. One of the relatively well-known method of relaxation is a method of sequential muscle relaxation. It consists in the tensioning of the different muscle groups and maintain the contraction for about 15 seconds followed by them from loosening accompanied by exhaust air from the lungs. After a brief pause sequence is repeated with another group of muscles. These exercises should be performed in dark and

quiet room [18]. Visualization techniques are somewhat reminiscent of hypnosis, where the state of relaxation is evoked with the use of suggestion. The main difference, however, is the fact that here the suggestions are visual and generated by the patients themselves [18]. Another type of relaxation techniques is meditation, which involves using the state of calm and "emptying" of the mind. The most frequently meditators concentrate on the breath or on the sound that they constantly repeat. They may also alternatively try to achieve a state of so-called detached observation in which, being aware of their surroundings, they do not engage in thinking about it. In the time of meditation the body remains alert and is set in a vertical position [18]. Yoga is also included into relaxation techniques and there is a relatively large group of people promoting this way of relieving the pain of labor. The essence of yoga is based on the adoption of specific body postures, breathing exercises and meditation aimed at improving mental and physical functioning. Depending on the approach, yoga is understood in terms of traditional Indian medicine, where characteristic positions improve the flow of energy "prana" around the body or in the conventional approach as stretching of the muscles and mental relaxation [18]. Tai chi, in turn, is a subtle system of exercises from China. The best-known form is "a form of solo" which consists of performing a series of slow and graceful movements according to a fixed scheme. Its supporters argue that it improves strength, balance and provides mental peace. Qigong is another traditional Chinese system of therapeutic exercises. Instructors teach meditation, movements and breathing exercises in order to improve the flow of Qi - the Chinese term for body energy [18].

Acupuncture also has found application in the treatment of labor pain [19-21]. This method involves inserting small, sterile needles into well-defined parts of the human body. A similar technique is acupressure, in which the healing effect is achieved by stimulation of specific points of the human body, which in relation to labor pain are found on the hands, feet and ears. There are several theories attempting to explain the mechanism of how acupuncture contributes to relieve the sensation of painful stimuli. The main justification cited in clinical studies is the view that during the use of acupuncture, there is an increase in the concentration of a number of neurotransmitters, such as endomorphine-1, enkephalins, beta-endorphins, serotonin and dopamine, both in the brain and in the blood serum [22]. These substances act analgetically, calming and they improve the regeneration of motor functions [23]. Some authors emphasize, however, that the clinical effect of acupuncture is the stimulation of

sensory fibers that block the conduction of pain stimuli at the level of the spinal cord by initiating the phenomenon of gating pain [24].

Modes of alleviating labor pain include also manuals methods such as massage and reflexology. Massage is a physiotherapeutic procedure whose essence are the movements made by the masseur, leading to elastic deformation of tissues [25]. This procedure should be performed gently and steadily, without stretching the skin. It allows to relax tense muscles and helps to introduce the person subjected to massage into a state of relaxation and calm. This technique can reduce the perception of pain by supporting relaxation, by improving blood flow, and tissue oxygenation as well as by the partial inhibition of sensory conduction pathways of pain [25]. Massage therapy could include specific techniques such as deep tissue compression, Swedish massage, neuromuscular or Shiatsu massage [26]. Depending on the woman's preferences and the location of pain sensations, different massage techniques have greater or lesser effectiveness in reducing pain perception. Women experiencing severe pain in the lumbosacral region during labor respond better to the massage in this area. However, there is a group of women who are better relieved by the massage of the abdominal area. The mechanism of analgesic effect of massage is explained by the fact that stimuli produced during massaging of tissues are conducted faster than pain stimuli, because nerve fibers conducting sensory stimuli are more myelinated, and thus they transmit impulse to the brain more quickly. Probably the analgesic effect is also achieved by reducing muscle tone, turning away the attention of the laboring woman from pain, reduction of anxiety and introducing her into the state of relaxation [27,28]. Training programs for people dealing with this technique in a professional manner vary depending on the country and even its region. They can be treated as additional skills of a health care worker or as a separate profession, therefore masseurs in most countries of the world have certificates or licenses that allow them to practice this method [26].

Reflexologists believe that there are points on the feet whose location corresponds to the individual organs and structures of the body. The pain sensation can be reduced by properly pressing or manipulating certain parts of the foot. They use the thumb and index finger to deeply compress specific areas of the foot which, as they claim, correspond to the internal organs, glands and other parts of the body [29]. Proponents of this method argue that the mechanical pressure of special zones causes an energetic block and the elimination of

such harmful factors as excess calcium, lactates or uric acid crystals. This process is often described as a detoxification [29]. It is believed that one of the mechanisms of reflexology is to reduce stress and emotional tension. There are anecdotal evidence that reflexology can be used to reduce pre- and post-partum discomfort [25].

Two years after the publication of Melzac and Walla [27], an attempt was made to apply transcutaneous electrical nerve stimulation (TENS) as a stimulator of the posterior spinal column in the treatment of chronic pain. We refer to this date as the beginning of the recognition of this method as a supportive method of pain treatment. TENS relies on delivering a certain amount of low voltage electrical current to the peripheral nervous system via intact skin. According to the authors of this method, selective stimulation of larger diameter afferent fibers (Aβ fibers) within the peripheral nerve, should reduce the perception of nociceptive stimuli. This theory assumes that primary afferent fibers of a larger diameter exert an inhibitory effect on the neurons found in the posterior horns of the spinal cord. These nerve fibers have a lower threshold for exogenous electrical stimulation. On the contrary, unmyelinated afferent nerve fibers of smaller diameter (C fibers) and their myelinated varieties (Aδ fibers) have a much higher irritation threshold. The essence of application of TENS is fact that low-voltage current enables selective activation of larger diameter fibers [27]. The whole phenomena occurring during transcutaneous electrostimulation of nerves is described by the theory of gating pain. The effectiveness of TENS is also sought in the local increase in the concentration of endorphins and enkephalins, which increases the pain threshold. There is no doubt that this method is a useful way of combating pain in obstetrics [30,31]. Routinely during labor, proximal electrodes are placed at the level of the dermatomes of the posterior branches T11–L1 and the distal electrodes at the level of dermatomes S2 – S4. The frequency and amplitude of electrical stimuli are regulated as the labor progresses. At the beginning of the first stage of labor, mainly proximal electrodes are used, and as the labor action progresses, the distal electrodes are most responsible for the relief of suprapubic pain and lower back pain [32]. The undoubted advantage of this method of combating the pain is its non-invasive nature.

All described above methods of combating pain can be used independently during delivery, as well as they may be complementary to classic analgesia methods.

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