

Yoga Methods for Pain Management

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Abstract: *Pain is perceived as an unpleasant experience that significantly reduces the quality of life. Yoga represents a multidimensional practice which can be adapted to suit the needs of each individual. Yoga methods can contribute to pain relief. During pratyahara and yoga meditation, an individual learns how to become a neutral observer of all subjective phenomena, including pain. In this manner, the framework of painful experience is changed. Yoga methods such as pratyahara, meditation, pranayama, relaxation and certain asanas can provide a different approach to pain, constituting a specific set of non-pharmacological methods which can be used to supplement conventional pain therapy.*

Key words: *pain, yoga, meditation*

Introduction

The presence of pain affects the entire organism. Pain is defined as: “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Chou,2016). Pain can be defined both as individual and subjective experience, modulated by physiological, psychological and other factors, such as past experiences, culture, fear and anxiety. In a broader sense, pain includes all that the patient presents as pain. Furthermore, alongside body temperature, heart rate, respiratory rate and blood pressure, pain is marked as the fifth vital sign (Lynch,2001). In addition to this, pain is considered to be a protection mechanism, the primary function of which is to warn the organism when danger is present, forcing it to react in order to remove the painful sensation. Nevertheless, if the painful sensation cannot be removed, then the protective function is negated and chronic pain appears, additionally hampering the individual affected. As such, it demands absolute attention from both the people close to the individual experiencing pain, as well as medical staff. Whether the pain is acute or chronic in nature, if not treated it can reduce the overall quality of

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life. Inadequate pain management can result in mortality and morbidity increase (Corke, 2013; Egbert 1964).

Efficient postoperative pain management is a crucial parameter in treating patients after surgical intervention. The advances in pharmacology, the development of new techniques accompanying various non-pharmacological techniques, as well as medical staff education, put pain therapy on a good path, while at the same time ensuring that the patient is taken care of more efficiently by reducing pain after surgical interventions.

Yoga is a holistic system with an all-encompassing health improving approach. It directs the individual to adopt humane values and virtues (*yama* and *niyama*). Yoga entails daily nurture by introducing: physical exercise and movement; breathing exercises; relaxation and meditation. Yoga practice nurtures a healthy lifestyle, as well as the “cleanliness” of body, mind and psyche. Yoga represents a multidimensional practice which can be adapted to suit the needs of each individual (Wahbeh et al,2008). The potential benefits yoga can bring to many areas of medicine are causing ever-growing interest. Yoga meditation can be a reliable instrument for reducing stress in both men and women – a kind of “gym for the mind”. During yoga practice, key changes unfold within areas of the brain responsible for attention, learning and regulating emotions. Yoga meditation was proven to be successful in reducing depression and anxiety, as well as in treating pain experienced by specific clinical population. There is an increase in the number of studies pointing to the significant contribution yoga practice has made when dealing with various chronic medical conditions, including chronic lumbar pain, osteoarthritis, rheumatoid arthritis, hypertension and asthma (Vallath,2010).

Pain

According to the definition of the *International Association for the Study of Pain* (IASP) pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage (*International Association for the Study of Pain*, 2001). The definition points put the subjectivity of pain, being that pain can be a physiological phenomenon and/or an emotional-cognitive reaction. Furthermore, this definition presents pain as a unique experience created in the brain of an individual as the final result of peripheral motor neuron information processing. Whether the sensation will be perceived as painful or not does not solely depend on the nature of the sensation, but also on experience, memories and emotions (Guyton,1999).

Pain Receptors

Pain receptors or *nociceptors* are located within the skin as free nerve endings; they can also be found in bones, muscles, connective tissue and internal organs. There are three types of nociceptors: mechanoreceptors, thermoreceptors and “silent” or “sleeping” nociceptors. Any kind of skin damage causes nerve impulses

to be transmitted from the pain receptors to the spinal cord, where secondary and tertiary neurons are activated in order to transfer the information to the somatosensory cortex in the brain. Painful sensations are transmitted via A δ and C fibres. Nociceptors do not show spontaneous activity, but a unique ability defined as “sensitisation” distincts them from other kinds of receptors (Guyton,1999).

Sensitisation

There are two kinds of sensitisation: peripheral and central. Peripheral sensitisation occurs when the nociceptors become increasingly sensitive as they decrease sensitivity threshold, increase response strength to the painful sensation by increasing the action-potential discharge, while exhibiting spontaneous activity at the same time. Sensitisation occurs a few minutes after skin damage and can last hours. The mechanism of nociceptor sensitisation is not yet completely explained, but it can be said that in all probability sensitisation is a product of chemical substances released from damaged tissue during the course of inflammation (K, ATP, bradykinin, prostaglandins, tachykinins and other peptides). Central sensitisation is the result of A δ and C fibre activity increasing the activation frequency of the posterior horn spinal cord neurons. The NMDA receptor activation (N-methyl-D-aspartate) plays an important role in this process. Repeated or continuous nociceptor activity leads to long-term increase in posterior horn neuron excitability, which can exceed the duration of the sensation. Central sensitisation is one of the significant reasons behind painful over-sensitivity following injury (Guyton,1999).

Pain Signal Transmission

Nociception, i.e., the pain transmission process is realised through four physiological processes: transduction – the process of converting mechanical or thermal energy, as well as chemical pain sensation into pain receptor electrical signal; transmission – the process of nociceptor generated action potential to the spinal cord and cortex; perception – the cerebral cortex processes and integrates all received information, creating unpleasant sensation perception in certain area/s of the body, followed by negative emotions; modulation – the descending inhibitory pathway affects the spinal cord posterior horn neurons (Guyton,1999). Depending on the duration of the symptoms, pain can be divided into two categories: acute pain and chronic pain.

Acute Pain

Acute pain can be considered as a symptom of an acute disease, while chronic pain represents a unique health issue – a disease unto itself. Acute pain emerges as the result of nociceptor activation within the damaged tissue, most often caused by injury or inflammation. It involves a relatively short period of time, including

recovery stage. The purpose is clearly one of adaptation and protection, thus the injured or inflamed area and surrounding tissue are sensitive to all external stimuli. As such, its role is reparative (restorative). It is often described as sudden, sharp or stabbing pain. It is created within 0.1 seconds after the injury. It is strong in intensity. The role of this kind of pain is defensive.

Chronic Pain

Chronic pain is often characterised as: slow pain, slow burning pain, blunt pain, dull pain. It continues to be experienced after the recuperation phase and is the result of a permanent pathological disorder. It can exist independently of the state which has initiated the pain. Chronic pain can be spontaneous or provoked. Spontaneous chronic pain occurs more often and is usually the result of axonal denervation. Provoked pain occurs as a result of peripheral irritation, but the response is exaggerated concerning amplitude and continuity. The starting point of the pain is a second or more after the irritation; the intensity of the pain then escalates in time, within following minutes, hours and days. The nature of chronic pain does not contain the defensive function of warning. Sometimes this type of pain, due to receptor sensibilisation, can occur spontaneously, without external cause. When looking at acute pain, only certain pain receptors within the damaged area are irritated. When dealing with chronic pain, in time the number of irritated receptors increases due to new receptors being continuously activated. Furthermore, the receptor activation threshold is lowered, i.e., pain is felt with the slightest or no provocation, thus leading to receptors spontaneously activating and sending signals which go to the brain and are then converted into the feeling of pain. This can complicate everyday life and can cause anxiety and depression (Hadson,1989).

Pain Management and Therapy

Why is it important to treat pain? Along with the sensor component, pain also contains an emotional component – together they comprise the “experience of pain”. Optimal pain control is important in order to prevent negative outcomes such as hypertension, myocardial ischemia, arrhythmia, respiratory insufficiency, ileus, wound healing insufficiency, as well as acute to chronic pain conversion, depression and anxiety.

Pharmacological Methods

Multimodal approach to pain therapy includes using opiates and analgesics with various mechanisms of action, aiming at adjuvant and synergistic effects, with the goal of reducing the intake of opiate prescription drugs (Corke,2013). Combining specific non-pharmacological methods leads to a more efficient, comprehensive analgesia.

Yoga as Non-pharmacological Method

The well-known non-pharmacological methods are: doctor - patient interaction, yoga meditation, yoga relaxation techniques, musicotherapy, reading books and magazines, saying prayers, massage, various cooling treatments, TENS and non-invasive brain stimulation. The *National Center for Complementary and Integrative Health* (NCCIH) in the United States includes guided imagery and yoga meditation in “mind-body interventions”, which are not part of conventional medicine (National Institutes of Health Collection Development Manual,2003). According to the definition they put forward, mind-body interventions entail various techniques designed to “help the brain influence bodily functions and symptoms”. The above mentioned interventions include guided imagery and yoga meditation, hypnotherapy, art therapy, musicotherapy, play therapy (Straus, 2000).

All mentioned methods focus on the interaction between the brain, body and behavior, and are applied with the intention to use the mind to change physical functions, as well as to promote health and overall well-being (Ernest et al 2007,Rutlege et al 1999) Many benefits that have resulted from these methods have been documented. Research has shown that they contribute significantly to treating headache, coronary artery disease and many other conditions characterised by chronic pain. Yoga and other methods (techniques) have a positive impact on the quality of life, especially with patients experiencing ailments which are result of chemotherapy, such as nausea and vomiting. Individuals that practice one of the suggested methods have shown greater ability to overcome daily challenges. Research results point out the noticeable influence of the central nervous system on the immune system, enabling these kinds of intervention to boost the immune system (Wahbeh i sar 2008, Rutlege i sar 1999,Mundy i sar , Astin i sar 2003, Irwin i sar 2008, Hockenberry 1989).

Results also show that guided imagery is good preparation for surgical intervention for both children and adults, which results in a faster postoperative recovery (Hockenberry 1989, Holdenlund ,1988, Manyande 1995)

Postoperative pain treatment entails a multidisciplinary approach combining pharmacological, as well as non-pharmacological methods. One must take into account medical diagnosis, physical and psychological state of the patient, age, fear and anxiety levels, as well as the invasiveness of the surgical procedure (Vallath, 2010).

Yoga methods actively introduce the patient into the recovery process – by focusing attention on the area in question, recovery improves.

Yoga and Pain Management

The eight steps of Patanjali: *Yama* – adopting humane values; *Niyama* – adopting certain virtues; *Asana* – body poses; *Pranayama* – managing breathing technique

energies; *Pratyahara* – managing senses; *Dharana* – concentration; *Dhyana* – meditation and contemplation and *Samadhi* – can be a strong support to patients in overcoming pain. Research concerning the adequate application of yoga methods with the goal of producing positive influence on the level of pain perception and modulation is yet to be undertaken. What is needed is an investigation dealing with the potential of yoga methods to enable an individual to lead a fulfilled life, without pain. Deducing from the fact that the organism tries to isolate the area affected by pain (most commonly by creating spasms in the surrounding musculature), applying yoga techniques can help to remove this blockage in order for the vital energy to arrive to the afflicted area, leading to a faster and more complete healing process and recovery. Managing vital energy in a conscious manner intensifies the blood flow, increases the oxygen intake and improves reparation, i.e., tissue renewal.

Having in mind the unpleasant, subjective, sensory and emotional components of pain, it becomes clear that it is necessary to perceive pain in the mind-body context. Yoga provides various relaxation, energy boosting and remodelling methods, as well as body and mind strengthening techniques. Although in the beginning of the process the impact on body vitality is most prominent, the yoga practitioner soon notices other aspects of influence: vital, mental, emotional, intellectual and spiritual.

Yoga Asanas (Yoga Postures)

When dealing with most states of chronic pain, whether they are musculoskeletal in nature (tension headaches, fibromyalgia...) or not, a kind of tension is present which affects the microcirculation within muscles, as well as surrounding structures and organs. The condition further deteriorates owing to the individual becoming static, physical inactivity, bad posture, living indoors (bone demineralisation due to lack of physical activity and lack of exposure to sunlight) (Vallath 2010). Yoga asanas enable stability, health, the feeling of ease and optimal tissue function. Asanas are useful as an addition to the phase of maintaining body renewal, as well as skeletal and posture correction. Having all this in mind, the flow of vital energies through the body is enabled, which is perceived as the state of well being, on a subjective level. Adequately chosen and combined asanas strengthen, lengthen and relax the muscles, thus ending the causes of persistent pain. During yoga asana practice compression and decompression occur within certain areas of the body, influencing blood and lymph flow. In the course or acute deterioration, consciousness and progressive relaxation remove a significant amount of pain. An individual can thus have control over the pain, improving the course of remission (Vallath 2010).

Effects of Yoga Asanas on Neuroendocrine Function

Asanas stabilise the autonomous nervous system. Similarly, they bring balance to the processes of the endocrine system (Vallath 2010). Regular practice contributes to cortisol and cholinesterase level decrease, which dampens stress responses. Research results indicate that stretching exercises during yoga practice release endogenous opioids, which regulate pain intensity ((Raub , 2002)

Yoga Pranayama Effects¹

Pranayam – managing vital energy (*prana*) is conducted by applying various breathing techniques. Breathing is an expression of vitality. Pain changes the frequency, as well as the depth and pattern of breathing. This is due to the emotional component of pain, but also due to the tendency to immobilise the affected area, to isolate it in order to avoid further injury. When an individual is experiencing chronic pain, breathing is shallow. Deep yoga breathing with extended exhale relaxes most of the skeletal muscles. Some indirect evidence can be found that practicing yoga increases parasympathetic tone (Nespor ,1989, Patel 1975, Wernitz DA1983).

Pranayama and Influencing Conscious Processes

It is known that thoughts and emotions influence the breathing pattern - the opposite is also true... Slow breathing can help overcome stress. Diaphragmatic breathing is of great value to patients experiencing chronic pain. Slow, deep breath increases alpha wave brain activity, while sound intonation leads to an even greater increase in activity observed in EEG, which points to the fact that the state of consciousness can manage breathing activity (Hardt ,1972; Timmons et al 1972)

Relaxation Response

Asanas and pranayamas put relaxation speech into motion (Benson , 1996), thus harmonising the entire organism through the neuroendocrine system. The process includes metabolic and frequency slowdown (Beary, 1974), blood pressure regulation, decreasing muscle tension and heart rate frequency, while at the same time slow alpha wave activity is being increased (Lazar, 2000).

Yoga Meditation and Pain

Pranayama and meditation techniques exhibit central and peripheral effects at the same time. Research shows that different kinds of meditation practice (yoga meditation, guided imagery meditation, progressive relaxation, etc.) can help patients overcome pain (Morone 2007).

Effects of Yoga Meditation on Physiology and Cognition

¹*Pranayama* – managing vital energy via breathing

Neurobiological studies have determined that during the course of yoga meditation a deeper level of relaxation is reached. Yoga meditative state is a state of conscious hypo-metabolism. O₂ intake, as well as CO₂ outtake, is minimal – the state achieved resembles deep sleep, but the EEG pattern is similar to that of being wide awake. Cortisol levels decrease, while prolactin and acetylcholine levels increase. During yoga meditation, the practitioner takes the role of neutral observer of all subjective phenomena, including pain. In this manner, the framework of painful experience is changed (Vallath, 2010).

Conclusion

Life is a series of experiences constructed by means of perception, thought and behavior. Yoga is a science which is primarily concerned with reaching self-realisation and freedom (*moksha*). It teaches an individual how to find balance and to perceive all aspects of life equally. Yoga methods strive to reach balance and harmony through all aspects of existence. Enriching both body and mind through yoga practice improves perception as a whole, thus classical approach to pain therapy (opioids) becomes more efficient. The quality of life is described in the “gap theory”, according to which the quality of life is divided by the difference between expectations and situation perception – the smaller the gap, the better the quality of life (Calman 1984). Yoga can be used to narrow the gap by influencing both components. Yoga can be successfully implemented in situations when pain is present; its methods are available to all whose quality of life is affected by pain. Yoga practice can bring about “freedom” from pain, i.e., life without pain.

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