
A Review of Pain Management: An Interdisciplinary approach

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Abstract

Pain is an inevitable and universal human experience. Pain is uncomfortable and exacerbates unpleasant physical sensation. It is of vital importance for the body. It signals that something is not working as it should within the human body. These can be life-saving by the person to take to reduce the impact of any physical damage incurred. While medical interventions play a crucial role in alleviating pain, they have their limitations including unpleasant side effects tolerance and physical dependence. Chronic pain is of concern to physical and mental health of individual, society, and negatively impacts on well being and quality of life (QoL). This study discussed chronic pain and its relation to psychological intervention which impact on individual's QoL, unveiling current pain treatment practices, and levels of satisfaction with treatment. Authors suggest that an integrative holistic

model will strengthen the rationalistic approach to treatment of pain relief. These findings revolutionized the field of pain research and helped advance and develop a number of theories of pain.

Key Word: Pain management, Psychological Intervention, Pharmacological and physical interventions.

“There’s nothing like a little physical pain to keep your mind off your emotional problems.”

Dr. John E. Sarno

Chronic pain is of concern to physical and mental health of individual, society, and negatively impacts on well being and quality of life (QoL). This study discussed about chronic pain and its relation to psychological intervention which impact on individual's QoL, unveiling current pain treatment practices, and levels of satisfaction with treatment.

Pain is uncomfortable and exacerbates unpleasant physical sensation. It is of vital importance for the body. It signals that something is not working as it should within the human body. These can be life-saving by the person to take to reduce the impact of any physical damage incurred. Pain is an inevitable and universal human experience. The international Association for the study of Pain defines pain as “an unpleasant sensory and experience associated with actual or damage or described in terms of such damage”. Chronic pain has been defined as the most common somatic complaint that prompts individuals to seek medical help. Persistent pain can also be a source of challenge for health care professionals and the individuals. Living with pain on a day-to-day basis can

be arduous. Pharmacological and physical interventions are the first line of treatment for managing pain. These include corrective surgery, over-the-counter or prescription drugs, local anesthetics physical therapy such as counter irritation or acupuncture, transcutaneous electrical nerve stimulation (TENS) and massage therapy. Since symptoms of depression, mood disturbance, insomnia and anxiety often co-exist with chronic pain condition; psychotropic drugs are popularly prescribed. Opioids are very powerful in relieving pain. Doubtlessly, while medical interventions play a crucial role in alleviating pain, they have their limitation including unpleasant side effects tolerance and physical dependence. Apart from that, some chronic pain problems are difficult to diagnose and medicine may only provide temporary relief. Despite advances in medical pharmacology, the treatment of unrelieved pain remains a challenge. Chronic pain management is also expensive, mostly due to the need for long-term treatment. The accepted gold standard treatment for the management of chronic pain in most health centre relies on a multidisciplinary approach consisting of feedback from diverse health care professionals working closely with the patient to ensure a holistic treatment plan.

A number of theories have been postulated to describe mechanisms underlying pain perception. These theories date back several centuries and even millennia (Kenins 1988; Perl 2007; Rey 1995). This research paper mainly focuses on theories postulated since the 17th century and then provides an overview of current thinking. The four

most influential theories of pain perception include the Specificity (or Labeled Line), Intensity, Pattern, and Gate Control Theories of Pain.

Specificity Theory In the 16th century, the French philosopher and mathematician Rene Descartes proposed one of the original theories of pain. His theory proposed that the intensity of pain is directly related to the amount of associated tissue injury. For instance, pricking one's finger with a needle would produce minimal pain, whereas cutting one's hand with a knife would cause more tissue injury and be more painful. This theory, the "specificity theory," is generally accurate when applied to certain types of injuries and the acute pain associated with them.

The Specificity Theory refers to the presence of dedicated pathways for each somatosensory modality. The fundamental tenet of the Specificity Theory is that each modality has a specific receptor and associated sensory fiber (primary afferent) that is sensitive to one specific stimulus (Dubner et al. 1978).

Pattern Theory Pattern Theory of Pain In an attempt to overhaul theories of somaesthesia (including pain), J. P. Nafe postulated a "quantitative theory of feeling" (1929). This theory ignored findings of specialized nerve endings and many of the observations supporting the specificity and/or intensive theories of pain. The theory stated that any somaesthetic sensation occurred by a specific and particular pattern of neural firing and that the spatial and temporal profile of firing of the peripheral nerves encoded the stimulus

type and intensity . Lele et al. (1954) championed this theory and added that cutaneous sensory nerve fibers, with the exception of those innervating hair cells, are the same. To support this claim, they cited work that had shown that distorting a nerve fiber would cause action potentials to discharge in any nerve fiber, whether encapsulated or not. Furthermore, intense stimulation of any of these nerve fibers would cause the percept of pain (Sinclair 1955; Weddell 1955).

Intensive theory

In the first volume of his 1794 *Zoonomia; or the Laws of Organic Life*, Erasmus Darwin supported the idea advanced in Plato's *Timaeus*, that pain is not a unique sensory modality, but an emotional state produced by stronger than normal stimuli such as intense light, pressure or temperature. Wilhelm Erb, in 1874, also argued that pain can be generated by any sensory stimulus, provided it is intense enough, and his formulation of the hypothesis became known as the intensive theory [cited in Dallenbach (1939)]. Alfred Goldscheider (1884) confirmed the existence of distinct heat and cold sensors, by evoking heat and cold sensations using a fine needle to penetrate to and electrically stimulate different nerve trunks, bypassing their receptors. Though he failed to find specific pain sensitive spots on the skin, Goldscheider concluded in 1895 that the available evidence supported pain specificity, and held the view until a series of experiments were conducted in 1889 by Bernhard Naunyn Naunyn had rapidly (60–600 times/second) prodded the skin of tabs

dorsalis patients, below their touch threshold (e.g., with a hair), and in 6–20 seconds produced unbearable pain. He obtained similar results using other stimuli including electricity to produce rapid, sub-threshold stimulation, and concluded pain is the product of summation. In 1894 Goldscheider extended the intensive theory, proposing that each tactile nerve fiber can evoke three distinct qualities of sensation – tickle, touch and pain – the quality depending on the intensity of stimulation; and extended Naunyn's summation idea, proposing that, over time, activity from peripheral fibers may accumulate in the dorsal horn of the spinal cord, and "spill over" from the peripheral fiber to a pain-signalling spinal cord fiber once a threshold of activity has been crossed. The British psychologist, Edward Titchener, pronounced in his 1896 textbook, "excessive stimulation of any sense organ or direct injury to any sensory nerve occasions the common sensation of pain".

Gate control theory According to the gate control theory, pain signals are not free to reach the brain as soon as they are generated at the injured tissues or sites. They need to encounter certain 'neurological gates' at the spinal cord level and these gates determine whether the pain signals should reach the brain or not. In other words, pain is perceived when the gate gives way to the pain signals and it is less intense or not at all perceived when the gate closes for the signals to pass through.

One of the tremendous advances in pain management research is the advent of Transcutaneous

Electrical Nerve Stimulation (TENS). The gate control theory forms the basis of TENS. In this technique, the selective stimulation of the large diameter nerve fibers carrying non-pain sensory stimuli from a specific region nullifies or reduces the effect of pain signals from the region. TENS is a non-invasive and inexpensive pain management approach that has been widely used for the treatment of chronic and intractable pain that are otherwise non-responsive to analgesics and surgical treatments. TENS is highly advantageous over pain medications in the aspect that it does not have the problem of drug interactions and toxicity.

Emotions and thoughts determine the way how pain is perceived

The theory also proposed that the pain signal transmission can be influenced by emotions and thoughts. It is well known that people do not feel chronic pain or, to be more appropriate, the pain does not disturb them when they concentrate on other activities that interest them. Whereas, people who are anxious or depressed feel intense pain and find it difficult to cope up with it. This is because the brain sends messages through descending fibers that stop, reduce or amplify the transmission of pain signals through the gate, depending on the thoughts and emotions of a person.

Treatment options for pain.

There are a variety of options for the treatment of chronic pain. Under the general category of medications, there are both oral and topical therapies for the treatment of chronic pain. Oral medications include those that can be

taken by mouth, such as nonsteroidal anti-inflammatory drugs, acetaminophen, and opioids . Also available are medications that can be applied to the skin, whether as an ointment or cream or by a patch that is applied to the skin. Some of these patches work by being placed directly on top of the painful area where the active drug, such as lidocaine, is released. Others, such as fentanyl patches, may be placed at a location far from the painful area.

Nerve Block Procedures for the Treatment of Chronic Pain

The vast majority of injections done for the diagnosis or treatment of chronic pain are performed on an outpatient basis. Some of the more commonly performed nerve blocks by pain management specialists.

Epidural Steroid injection: Epidural steroid injection is an injection performed in the back or neck in an attempt to place some anti-inflammatory steroid with or without a local anesthetic into the epidural space close to the inflamed area that is causing the pain. These injections are generally done for pain involving the back and leg or the neck and arm/hand.

Facet Joint Injection : The facet joints assist with movement of the spine both in the neck and back. Injection into these joints can provide relief of neck and back pain; these injections are always performed under x-ray guidance. Common side effects include soreness in the neck or back when the needle was inserted.

Lumbar Sympathetic Block: A lumbar sympathetic nerve block is performed for pain in the leg that is thought to

be caused by complex regional pain syndrome type I (or CRPS I). These injections are often performed under fluoroscopic (x-ray) guidance. Local anesthetic is placed near to the lumbar sympathetic chain in order to relieve the pain.

Celiac Plexus Block A celiac plexus block is generally performed to relieve pain in patients with cancer of the pancreas or other chronic abdominal pains. A needle is placed via your back that deposits numbing medicine to the area of a group of nerves called the celiac plexus. This injection is often performed as a diagnostic injection to see whether a more permanent injection may help with the pain. If it provides significant pain relief then the more long lasting injection may be done. This injection is usually performed under x-ray guidance.

Stellate Ganglion Block: A stellate ganglion block is an injection that can be performed for the diagnosis of complex regional pain syndrome of the arm or hand or for treatment of pain to that area. It can also be used to help to improve blood flow to the hand or arm in certain conditions that result in poor circulation of the hand. Side effects may include soreness in the neck where the needle was placed. This injection is performed with or without x-ray guidance.

Psychosocial Intervention for the Treatment of Chronic Pain

Psychological intervention incorporated alongside medical treatments play a crucial role in helping patient adjust to pain, adapt to new changing roles, cope with feelings of distress, sadness or depression and ensure adherence to

medication. They are also effective in reducing fear and distress during painful medical procedures such as needle-related intervention lumbar punctures and bone marrow aspirations.. As well as the neural interactions and links the brain goes through when a person is in pain, there are multiple layers of complex abstract thoughts and feelings a person goes through which culminates how much pain a person feels and how they deal with pain. Their cognitive constructs, behavioral: constructs and environmental influences are all intertwined in a complex web of individuality which needs to be considered and incorporated into any treatments for them to be effective and are found out during an initial assessment. It is these personal, individual and holistic areas which make it a psychological approach sitting within the biopsychosocial model of patient treatment the most commonly used psychological intervention include behavioral treatments and activation, cognitive therapies, cognitive behavior therapy, hypnosis, biofeedback, relaxation and distraction. Other approaches that are gaining increased popularity include Acceptance and Commitment Therapy, emotional Freedom Techniques, motivational Interviewing and dialectical Behavior Therapy. Researcher discussed some of the therapies.

Relationship of spirituality and pain relief

Spiritual psychology (Positive Psychology) helps individuals explore their spiritual path. It offers transformational healing to help individuals to make the changes which they are seeking. It provides an action plan to

live. With increasing acceptance of complementary and integrative health practices, there has been a surge of interest in using positive psychological interventions to improve the well-being of patients with chronic illness. Such interventions include activities that increase positive affect and cultivate qualities such as gratitude and kindness. The potential of positive psychological interventions to relieve chronic pain is supported by work demonstrating that positive affect can promote pain resiliency through neurobiological and cognitive pathways. Although some evidence suggests that participating in a positive psychological intervention decreases pain, reviews of extant research have concluded that large, well-controlled randomized trials are needed to delineate the benefits and limitations of positive psychological interventions for use in clinical care.

Yoga: Yoga has been found to be an effective tool in reducing stress levels. Mind sound resonance technique (MSRT) is one of the advanced guided yoga relaxation techniques that can be practiced in supine or sitting posture for achieving the goal of positive health, will power, concentration and deep relaxation.

This tool was developed using the concepts from traditional texts that talk about the power of Om (Mandukya Upanishad) and Nadanusandhana (Hatha Yoga Pradipika) for achieving internal mastery over the modifications of the mind (Patanjali's definition of yoga). MSRT opens up the secret of traditional chants called Mantras. MSRT was one of the components of the intensive integrated yoga program that

was used as the intervention for low back pain study. Although MSRT has been used routinely as a component of the integrated approach to yoga therapy for treatment of neck pain and back pain at our yoga therapy health home and the orthopedic center with encouraging results, the results of these studies were not published. Hence, this study was planned with an aim to evaluate the efficacy of an add-on program of this yoga-based relaxation technique and compare it with the conventional physiotherapy technique. The hypothesis was that the yoga group would show better improvement than the control group in measures of pain, tenderness, disability, flexibility and state anxiety.

‘OM’ chanting: The neurohemodynamic correlates of ‘OM’ chanting indicate limbic deactivation. As similar observations have been recorded with vagus nerve stimulation treatment used in depression and epilepsy. The use of ‘OM’ chanting for meditation is well known. Effective ‘OM’ chanting is associated with the experience of vibration sensation around the ears. It is expected that such a sensation is also transmitted through the auricular branch of the vagus nerve, therefore hypothesized that like transcutaneous VNS, ‘OM’ chanting too produces limbic deactivation. Specifically, predicted that ‘OM’ chanting would evoke similar neurohemodynamic correlates, deactivation of the limbic brain regions, amygdala, hippocampus, parahippocampal gyrus, insula, orbitofrontal and anterior cingulate cortices and thalamus) as were found in the study. As well as the neural interactions and links the brain goes

through when a person is in pain, there are multiple layers of complex abstract thoughts and feelings a person goes through which culminates how much pain a person feels and how they deal with pain. Their cognitive constructs, behavioral constructs and environmental influences are all intertwined in a complex web of individuality which needs to be considered and incorporated into any treatments for them to be effective and are found out during an initial assessment. It is these personal, individual and holistic areas which make it a psychological approach sitting within the biopsychosocial model of patient treatment.

Conclusion

Medicine is usually the first port of call to manage pain, however, when pain is not responsive to medication, or resistant to treatment, or persists after healing has occurred and an exact cause of the pain has not been found the alternative treatment or a combined approach can be used. In the concluding lines authors suggests that an integrative holistic model will strengthen the rationalistic approach to treatment of pain relief. These findings revolutionized the field of pain research and helped advance and develop a number of theories of pain. This study also lack of empirical data to determine how pain is perceived. Therefore, future work is required to be done in this area. So, a clear understanding of the emergence of the current ideas in pain research and the data that have built the models is essential for us to progress in understanding pain and to develop effective treatments to alleviate this most common of ailments.

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