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**PAIN MANAGEMENT CONCEPT OF PATIENT WITH LUMBAR
SPINE INTERVERTEBRAL DISC PROLAPSE DISORDER**

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Introduction:

Pain management can be simple or complex, according to its cause. An example of pain that is typically less complex would be nerve root irritation from a herniated prolapsed disc with pain radiating down to the leg. This condition can often be alleviated with an epidural steroid injection and physical therapy. Sometimes, however, the pain does not go away. This can require a wide variety of skills and techniques to treat the pain. These skills and techniques include: interventional procedures, Medication management, Physical therapy, Psychological counseling and support, Acupuncture and other alternative therapies; and Referral to other medical specialists. All of these skills and services are necessary because pain can involve many aspects of a person's daily life.

In this research paper; I will try to provide a basic framework of the concept of pain management, history of pain relief and how mankind undoubtedly experienced pain since the beginning of time. Pain is a common experience to all of us. Its complexities go well beyond the mere transmission of a signal from periphery to the brain; pathophysiology of pain has been also described in this research paper with consideration of different types and classification of pain. Interplay from society, upbringing, culture, past experiences, and motivations all play a critical factor in the way pain expressed to the outside world. Pain is a much more objective phenomenon as it is a subjective one, something that can not be measured independent of the person experiencing it.

Lumbar spine pain is one of the most common reasons why patients visit physicians, one of the most common reasons for secondary referral, and both operative and non-operative treatment of lumbar spine pain ranks high in terms of total expenditures of health care. Different types of risk factors categories associated with lumbar spine pain shall be discussed here with the general management strategies of lumbar spine pain which should be always direct to the patient's specific diagnosis.

Pain management generally benefits from a multidisciplinary approach that includes pharmacologic measures, non-pharmacologic measures such as interventional procedures, physical therapy, and psychological measures. Pain management practitioners come from all fields of medicine. Over the last several years the number of interventional procedures done for pain has grown to a very large number. As well as medical practitioners, the area of pain management may often benefit from the input of Physical therapists, Clinical Psychologists & Occupational therapists, amongst others.

Together the multidisciplinary team can help create a package of care suitable to the patient. Both the health care provider and patient are affected by their own culture, age, sex, personal pain history, beliefs, and expectations. The cultural aspects of pain management will be discussed at the end of this research paper with physical therapists attitudes and beliefs.

History of Pain Relief:

Mankind has undoubtedly experienced pain since the beginning of time. From prehistoric bones to artifacts of ancient civilizations, evidence of pain and attempts at its relief has been found throughout history. Present day agents and technicians have been modified from and improved upon those of the past. Wine, the opium poppy, the coca plant, and the willow tree all have modern day pharmaceutical counterparts. Further development upon the needle and syringe, along with innovative regional anesthetic techniques; have allowed us to deliver those drugs in new and promising ways. The discovery of x-rays and MRI have led to their applications in the diagnosis and treatment of pain, as well as an adjunct to increasingly invasive pain treatment procedures.

Early man attributed pain to demons, evil humors, and dead spirits. Accordingly, treatment of pain entailed discouraging their entrance into the body, blocking their entry, or once inside, drawing transferring, or removing them from the body. Later, pain was felt to be punishment from the gods. The word "pain" comes from Latin "poena", for punishment. Modern pain management, while moving forward, recognizes and embraces older therapies such as treating psyche, distraction and relaxation techniques, biofeedback, acupuncture, and physical therapy.

Finding the source of pain is ongoing mystery that is still challenging us today; David Lai (2002), in Manual of Pain Management mentioned, Aristotle (378 to 322 B.C) coined the term "sensorium commune" for this elusive seat of pain. Even by 18th century, there still were two schools of thought on the location of pain perception: heart versus brain. Ancient Egyptians had no knowledge of nervous system during the embalming process in preparation for the afterlife, the brain was the one organ destroyed or discarded. On the other hand, the heart was the most exalted organ, and in it rested the center of pain.

People of ancient India had knowledge of nervous system, but it was mistakenly centered on the heart. Hindus believed the heart was the seat of all pain. Going away from a specific anatomical location, Buddhism in the fifth century B.C. linked pain to the frustration of desires.

In ancient China, pain involved an imbalance between the Yin and the Yang. The heart was the most important organ, while the brain was simply the marrow of the skull. Acupuncture practice today still strives to adjust the balance of these energies in one's Chi. Primitive man understood pain when it was visible, like a cut or scrape, but didn't understand it as well when it was internal," In some cultures, rattles, gongs and other devices were believed to frighten painful devils out of a person's body". Amerindian healers sucked on pain pipes held against a person's skin to "pull" out pain or illness. Many ancient doctors apparently figured their patients needed a hole in the head. Hundreds of skulls with small holes that have partially healed over have been found worldwide, but especially in Incan archaeological sites in South America. "A lot of cultures would cut holes to let the pain out," Cope said. Even Hippocrates, the ancient Greek physician considered the father of Western medicine, wrote about the practice,

called trepanation. Hippocrates also heard about the pain-relieving benefits of willow bark and leaves from earlier cultures, and he prescribed chewing willow leaves to women in childbirth. His prescription was not without merit -- willow trees, members of the plant genus *Salix*, contain a form of salicylic acid, the active ingredient in aspirin.

Dr. Carol A. Warfield, professor of anesthesiology at Harvard Medical School (2008) mentioned other medical practices from the ancient world have been updated for use by modern physicians. "The Egyptians used to take electric eels out of the Nile and lay them over the wounds of patients," Though using electric eels to ease pain sounds crude, even dangerous, a similar technique is used today to relieve pain. Transcutaneous electrical nerve stimulation, or TENS, is a popular treatment for lumbar spine pain and other musculoskeletal conditions. "We do it in a much more controlled fashion".

Marcia Meldrum, Co-director of the John C. Liebeskind History of Pain collection at the UCLA Biomedical Library (2008) mentioned the medieval era, pain relief came mainly from a wide variety of herbs, used liberally. The Middle Ages was big on poly-pharmacy "The more drugs the better."

On especially popular concoction was known as *theriac*. "*Theriac*" was considered to be a truly effective compound. It was usually prepared in a honey base with about 64 different compounds in it. Most European cultures would have used some kind of herbs along with some kind of incantation. Because some of those herbs contain opiates, the patient could enter a trancelike state. That could have a profound effect on pain. In addition to plant-based remedies, minerals were also used in the medieval pharmacopoeia. Among the most popular ingredients were bits of gold, ivory and, from a time when magical creatures were believed to roam wild, pieces of purported unicorn horn.

Even as recently as the early 1900s, "some physicians used gold salts injected into limbs to treat arthritis," the American contribution to the history of pain relief is as colorful as a patchwork quilt. Quilts from Appalachia incorporated images of medicinal plants in "medicine squares," said Cope. The quilts were then used by those suffering from pain or other ailments.

In the 1800s and early 1900s, as magnets and electricity became widely available, medical quacks were quick to exploit these exciting and mysterious forces for their purported healing properties. Both electricity and magnetism have been used for as long as people have been able to produce them," said Meldrum. In addition to belts and trusses containing magnets, a range of balms and liniments said to contain magnetic properties were available to gullible sufferers.

Another popular approach to pain relief called for the preparation of a wet plaster made from hot mustard. The plaster was applied directly to the skin, or on a cloth that was then laid on the skin. The heat from the mustard plaster worked on the principle of "counter stimulation," the idea that one kind of pain or sensation could cancel out another, more

severe pain. "There are scientific reasons we know about now that has shown why they worked," said Warfield.

The first new significant treatment for pain occurred in 1846 with the use of anesthesia for surgery," said Meldrum. Prior to that, doctors and dentists used some bizarre techniques before operating. An Old Italian technique involved putting a wooden bowl over a patient's head, then hammering on the bowl until the patient passed out, according to Warfield. "They used to hold kids over a gas stove so [the kids] would breathe gas until they lost consciousness," Warfield said. "They would also choke people with carotid compression until they passed out," said Warfield. "In those days, the best surgeons were the fastest surgeons."

It took a British royal to popularize the concept of relieving the pain of childbirth, previously thought to be an unavoidable or necessary part of motherhood. Queen Victoria was really the first one to have anesthesia for childbirth she had chloroform," said Warfield. "She made it fashionable."

In spite of a dazzling array of modern treatments for pain, some experts wonder if ancient and primitive cultures still have much to teach us about pain and human health. "People now like to think of science and pain treatment as being very objective," said Cope. Now we're very rigid and almost literal. We just want a quick fix. The suffering and the emotional context that defines what the patient is actually experiencing. The next frontier for pain relief, then, may lie in the past. Ancient people saw pain more accurately pain not only as a physical condition but as an emotional and a spiritual condition; they would work with the entire patient.

Definition of Pain:

Pain is a complex, subjective, perceptual phenomenon with uniquely personal dimensions. McCaffery and Beebe (1989) defined pain as "whatever the experiencing person says it is, existing whenever he says it does". Merskey and Bugduck (1994) mentioned the consensus definition of pain developed by the International Association for the Study of Pain is "unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage". Both of these definitions emphasize that pain does not have to be seen on an x-ray, by MRI, or in lab tests to be considered a true experience of pain.

MedicineNet (2000) defined the pain as: an unpleasant sensation that can range from mild, localized discomfort to agony. Pain has both physical and emotional components. The physical part of pain results from nerve stimulation. Pain may be contained to a discrete area, as in an injury, or it can be more diffuse, as in disorders like fibromyalgia. Pain is mediated by specific nerve fibers that carry the pain impulses to the brain where their conscious appreciation may be modified by many factors. Pain is also a term specifically used to denote a painful uterine contraction occurring in childbirth.

Julia Barret (2008) in answer.com website defined pain as an unpleasant feeling that is conveyed to the brain by sensory neurons. The discomfort signals actual or potential injury to the body. However, pain is more than a sensation, or the physical awareness of pain; it also includes perception, the subjective interpretation of the discomfort. Perception gives information on the pain's location, intensity, and something about its nature. The various conscious and unconscious responses to both sensation and perception, including the emotional response, add further definition to the overall concept of pain.

At the same time that pain is a universal experience, however, it is also a complex one. While the physical sensations involved in pain may be constant throughout history, the ways in which humans express and treat pain are shaped by their respective cultures and societies. Since the 1980s, research in the neurobiology of pain has been accompanied by studies of the psychological and socio-cultural factors that influence people's experience of pain, their use of health care systems, and their compliance with various treatments for pain. As of 2003, the World Health Organization (WHO) emphasizes the importance of an interdisciplinary approach to pain treatment that takes this complexity into account.

Pain management refers to a set of skills and techniques for coping with chronic pain. The goal of pain management is not complete elimination of pain; rather, the patient learns to keep the pain at a level that he or she can tolerate, and to make the most of life in spite of the pain.

The American Chronic Pain Association (ACPA) lists seven coping skills that help in managing pain:

- not dwelling on physical pain symptoms
- emphasizing abilities rather than disabilities
- recognizing one's feelings about the pain and discussing them freely
- using relaxation exercises to ease the emotional tension that makes pain worse.
- doing mild stretching exercises every day (with medical approval)
- setting realistic goals for improvement and evaluating them on a weekly basis
- affirming one's basic rights: the right to make mistakes, the right to say no, and the right to ask questions

An important part of pain management is participation in a multidisciplinary pain program. Many hospitals and rehabilitation centers in the United States and Canada offer pain management program. Ideally, the program will have its own unit apart from patient care areas. Good pain management programs offer comprehensive treatment that includes relaxation training and stress management techniques; group therapy, family therapy, personal counseling, and job retraining; physical therapy, including exercise and body mechanics; patient education regarding medications and other aspects of pain management; and aftercare or follow-up support. The treatment team in a pain management program is usually headed by a neurologist, psychiatrist, or anesthesiologist with specialized training in pain management. Other members of the team include registered nurses, psychiatrists or psychologists, physical and occupational therapists, massage therapists, family therapists, and vocational counselors.

Classification of Pain:

Pain can be classified as either *acute or chronic*.

Acute pain is a direct biological response to disease, inflammation, or tissue damage, and usually lasts less than one month. It may be either continuous or recurrent (e.g., sickle cell disease). Acute pain serves the long-term well-being of humans and the higher animals by alerting them to an injury or condition that needs treatment. In humans, acute pain is often accompanied by anxiety and emotional distress; however, its cause can usually be successfully diagnosed and treated. Some researchers use the term "eudynia" to refer to acute pain.

Praveen K. (2002), in Manual of Pain Management mentioned acute pain is one of the basic adaptations that most species have to warn the organism of internal and external stimuli potentially harmful to the well-being of that organism. It usually increases as the severity of the injury or diseases increases, although the painful sensation may be present after the injury. Continued noxious stimulation also can lead to increased sensitivity, sensitization, and severe pain even to weak, painful stimuli. Acute pain promotes healing by telling the organism to seek shelter, and in the case humans, seek medical care. The sensitization process can take place in both the peripheral as well as the central nervous system. As the healing process take place, acute pain tends to subside.

Chronic Pain: In contrast, chronic pain has no useful biological function. It can be defined broadly as pain that lasts longer than a month following the healing of a tissue injury; pain that recurs or persists over a period of three months or longer; or pain related to a tissue injury that is expected to continue or get worse. Chronic pain may be either continuous or intermittent; in either case, however, it frequently leads to weight loss, sleep disturbances, fatigue, and other symptoms of depression. According to an article in the *New York Times*, chronic pain is the most common under-lying cause of suicide. Unlike acute pain, chronic pain is resistant to most medical treatments. It is sometimes called "maldynia," and is considered a disorder in its own right.

Chronic pain exists when pain symptoms are prolonged past the natural course of the disease process is protracted over the course of many months to years. In most instances, chronic pain serves no vital importance to the organism suffering from it, and in fact can become a detriment to the organism survival and well-being.

Multiple physiological theories exist as to why this state develops. These theories include sensitization both in the periphery and central nervous system; spontaneous activity and discharges in axons subject to injury; demyelination resulting from chronic irritation and development of interactions between bare neurons; and balances between the lateral and medial thalamus and the influences of deep brain structures such as reticular formation, which influences emotional states of people in stress. Emotional, social, cultural, financial, and motivational immensely influence those who suffer from chronic pain.

Pain that is caused by organic diseases and disorders is known as somatogenic pain. *Somatogenic pain* in turn can be subdivided into nociceptive pain and neuropathic pain. Nociceptive pain occurs when pain-sensitive nerve endings called nociceptors are activated or stimulated. Most nociceptors in the human body are located in the skin, joints and muscles, and the walls of internal organs. There may be as many as 1,300 nociceptors in a square inch (6.4 square centimeters) of skin. However, there are fewer nociceptors in muscle tissue and the internal organs, as they are covered and protected by the skin. Nociceptors are specialized to detect different types of painful stimuli—some are sensitive to heat or cold, while others detect pressure, toxic substances, sharp blows, or inflammation caused by infection or overuse.

In contrast to nociceptive pain, neuropathic pain results from damage to or malfunctioning of the nervous system itself. It may involve the central nervous system (the brain and spinal cord); the peripheral nervous system (the nerve trunks leading away from the spine to the limbs, plus the 12 pairs of cranial nerves on the lower surface of the brain); or both. Neuropathic pain is usually associated with an identifiable disorder such as stroke, diabetes, or spinal cord injury, and is frequently described as having a "hot" or burning quality.

Psychogenic pain is distinguished from somatogenic pain by the influence of psychological factors on the intensity of the patient's pain or degree of disability. The patient is genuinely experiencing pain—that is, he or she is not malingering—but the pain has either no organic explanation or else a weak one. Common psychogenic pain syndromes include chronic headache or low back pain; atypical facial pain; or pelvic pain of unknown origin.

Some cases of psychogenic pain belong to a group of mental disorders known as somatoform disorders. According to the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (DSM-IV), somatoform disorders are defined by "the presence of physical symptoms that suggest a general medical condition," but cannot be fully explained by such a condition, by the direct effects of a drug or other substance, or by another mental disorder. The somatoform disorders include somatization disorder, characterized by chronic complaints of unexplained physical symptoms, often involving multiple sites in the body; hypo-chondriasis is a preoccupation with illness that persists in spite of the doctor's reassurance; and pain disorder, characterized by physical pain that is intensified by psychological factors, often becoming the focus of the patient's life and impairing his or her family relationships and ability to work.

It is important to recognize that some pain syndromes may involve more than one type of pain. For example, a cancer patient may suffer from neuropathic pain as a side effect of cancer treatment as well as nociceptive pain associated with pressure from the tumor itself on nociceptors in a blood vessel or hollow organ. In addition to the somatogenic pain, the patient may experience psychogenic pain related to the loss of physical functioning or attractiveness, coupled with anxiety about the progression or recurrence of the cancer.

Other pain syndromes do not fit neatly into either somatogenic or psychogenic categories. A case in point would be certain types of chronic headache that involve the stimulation of nociceptors in the tissues of the head and neck as well as psychogenic factors related to the patient's handling of stress. Pathophysiology of pain can be understood better if discussed in more details in separate section.

Pathophysiology of Pain:

Pain is a common experience to every one. Its complexities go well beyond the mere transmission of a signal from the periphery to the brain. Pain is a much more objective phenomenon as it is a subjective one –sometimes can not be measured independent of the person experiencing it.

J. D. Loeser (1980) broke pain down into a more practical description, coming up with four dimensions included nociception, perception of pain, suffering, and pain behavior. Understanding all four of these components not just nociception allows providers to better manage and treat suffering from pain.

Nociception:

Nociception is purely about the biochemical neural changes that occur in response to noxious stimuli. This response is relatively consistent from individual to the next even though the entire process of "pain" is unique to the person experiencing it. The process of nociception can be divided into the following separate processes: transduction, transmission, modulation, and perception. Perception, the fourth process, has a tremendous influence on modulation of pain.

Transduction:

Transduction is the conversion of tissue injury and a biochemical response to a neural response. Tissue damage caused by any form of injury or inflammation releases local pain producing substances or algogenic substances into the local milieu of the extra-cellular fluid surrounding the injury. The sources of these substances are quite variable, but they include K⁺, H⁺ prostaglandins and other inflammatory mediators of the arachidonic cascade. Histamines released from mast cells, platelets, and basophiles, and serotonin is released from mast cells and platelets. Other substances such as leukotrienes, bradykinins, substance P, and slow reacting substance of anaphylaxis (SRS-A) also can be released with tissue damage.

Many of these substances are products of the arachidonic acid cascade, which are formed via enzymatic conversion by cyclooxygenase and lipoxigenase. Cyclooxygenase can be inhibited by agents such as aspirin, indomethacin, ibuprofen, and most recently and highly selective cyclooxygenase inhibitors such as celecoxib and rofecoxib. Substance P, which has been the focus of intense research over the past decade, is released from the unmyelinated nociceptive nerve terminals themselves. Substance P is produced in the cell bodies of the spinal and gasserian ganglia with four times as much substance P released into the peripheral nervous system as into the central nervous system.

Both somatic and visceral nervous system possess stores of substance P. Although the role of substance P is pain is still being defined substance P, a vasodilator, is believed to cause local micro-dilation and changes in vascular permeability along with recruitment of other local nociceptor fibers. Thus, it is believed that substance P may cause local tissue edema and lower the threshold of surrounding nociceptive fibers increasing both the field of local response and the intensity. Considerable amount of focus on depletion of substance P has been made. In fact, capsaicin, the active ingredient in chili peppers is believed to deplete substance P from peripheral nerve terminals when applied locally.

Scott J. Zashin, M.D. (2007), clinical assistant professor at University of Texas Southwestern Medical School, Division of Rheumatology, in Dallas, mentioned Nerve cells communicate with one another through neurotransmitters. Substance P is one such neurotransmitter. It is a protein found in the brain and spinal cord, and is associated with some inflammatory processes in the joints. Its function is to cause pain. Substance P has been implicated in pain syndromes such as: low back pain, arthritis.

Newer research has looked at a more intricate and expanded role for Substance P. Evidence about the role of Substance P has evolved since it was first discovered around 1931. Substance P is now believed to be involved in the integration of pain, stress, and anxiety. Substance P also is involved in other physiologic activities such as: the vomiting reflex, defensive behavior, and change in cardiovascular tone, stimulation of salivary secretion, smooth muscle contraction, and vasodilatation.

Although the exact method in which these substances convert injury into a painful pulse is not known, it most likely represents a multi-factorial response, involving both direct and indirect mediation. Local chemicals such as bradykinins, and K^+ may directly activate the nociceptive fibers. Chemicals such as prostaglandins may indirectly sensitize the nervous system to physical and chemical stimulation and analgesic chemicals such as substance P, which cause local micro-edema and recruitment of other nociceptive fibers.

Transmission:

Nociceptors

Injury and inflammation activate distinct peripheral nerves that process and transmit painful stimulation to central nervous system. These nerves are called nociceptors. Two types of nociceptors (C fibers and A- δ fibers), along with subcategories of each, are present as free nerve endings in the periphery and viscera. C fibers are unmyelinated fibers that are activated by chemical, thermal, mechanical, and cold noxious stimulation. A- δ fibers, which are myelinated fibers, transmit at rates of 10 to 25 times the speed of C fibers, and are activated by both mechanical and thermal noxious stimulation. They have subcategories with different threshold levels.

Somatic structures, such as the skin, and deep structures, such as muscles and joints, are rich with both C and A- δ fibers. Visceral structures are rich in C fibers, along with some A- δ fibers. A- δ fibers can transmit noxious stimuli to the central nervous system at faster

rates, defining precise location injury. These fibers may allow the organism to remove itself or the effected area from the source of injury in a timely fashion to prevent further damage. C fibers, transmitting a significantly slower rate, rich in the visceral nervous system, and not so clearly defined in the somatic system, may allow for continued transmission of pain, ill- defined, to continue for a time after injury, thus possibly causing the organism to seek treatment after the injury to help promote healing.

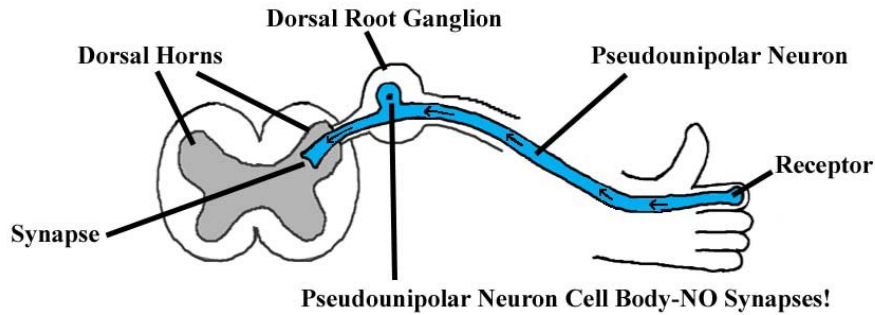
Sensitization:

Unlike other fibers that transmit sensory information such as touch and proprioception, nociceptors are unusual in that repeated stimulation results in enhanced sensitivity, lowered threshold, and longer response, versus fatigue and higher threshold levels for other fibers, both peripheral and central sensitization can occur with the release of local algescic substances such as substance P, and the direct lowering of thresholds of nociceptors by repeated pain stimuli. The central nervous system, and more specifically, the dorsal horn, has been shown to undergo changes in its morphological make up with repeated noxious stimuli. This "rewiring" that takes place most recently has been coined as the term, neuroplasticity. Neuroplastic changes that take place to repeated painful stimuli also contribute to the sensitization process. In fact, much research has been focused on these Neuroplastic changes and methods to prevent these changes from occurring. Uses of neuraxial anesthesia such as epidurals or spinals prior to surgery or amputations have been shown to preempt these changes, thus preventing sensitization.

Central Nervous System:

Dorsal Horn:

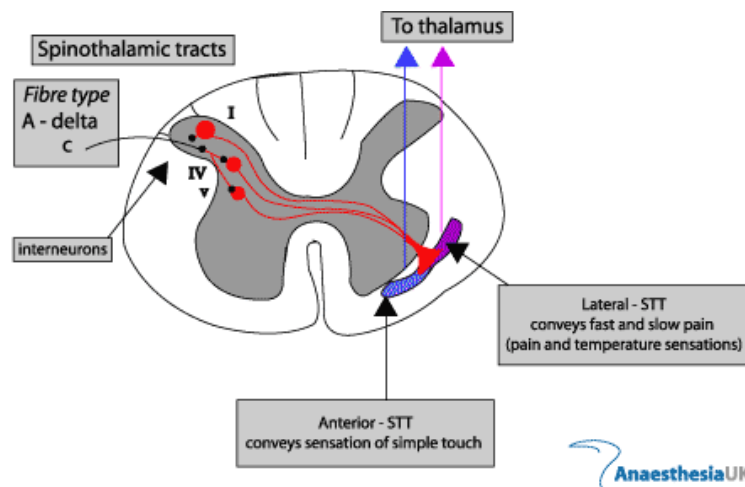
Afferent neurons of the spinal nerves and cranial nerves transmit both sensory and nociceptive stimulation via the dorsal-root ganglia to the dorsal horn of the spinal cord. The dorsal horn was once thought of as a simple connection between first and second order neurons, and as a relay station. Large amount of research and focus over the past two to three decades have revealed complex circuitry, along with multiple synaptic and biochemical interactions resulting not only in a simple relay but in considerable amount of signal processing, summation, and selection. Signals from the periphery converge at the dorsal horn and are acted upon inhibitory and excitatory influences from local interneurons, higher central nervous system structures, and from local biochemistry prior to the transmission to higher spinal cord and brain levels. The dorsal horn automatically has been divided into laminae, with lamina I being the most lateral and superficial of the layers. A- δ fibers and C fibers converge to form the second synapses largely in lamina I, Iii, Iio (substantial gelatinosa), and V. these neurons also somato-typically arranged in lamina I. larger more heavily myelinated A fibers that transmit light touch, proprioception, and muscle tone, synapse to a large degree in laminae I,II, III, IV, and V. laminae V also appears to have a high concentration of wide dynamic neurons (WDNs).



By: www.anatomy.med.umich.edu

Dorsal Horn

Wide dynamic neurons (WDNs) appear to receive input from both nociceptive and non-nociceptive sensory fibers, and inputs from visceral and somatic structures. Because WDNs receive input from both visceral and somatic structures, it is believed that the possibility of referred visceral pain may be influenced from these neurons. Other importance phenomenon such as override stimulation (i.e., rubbing and injured area to help alleviate pain) may be influence through WDNs. Multiple inter-neurons such as stalk cells, though to be excitatory, are largely located in lamina Ii, and islet cells, and though to be inhibitory are located in Iii. Multiple neurotransmitters have been localized in the dorsal horn, such as the excitatory transmitter's glutamate and asparate, and others such as somatostatin, cholecystikin, vasoactive intestinal polypeptide, and substance P.



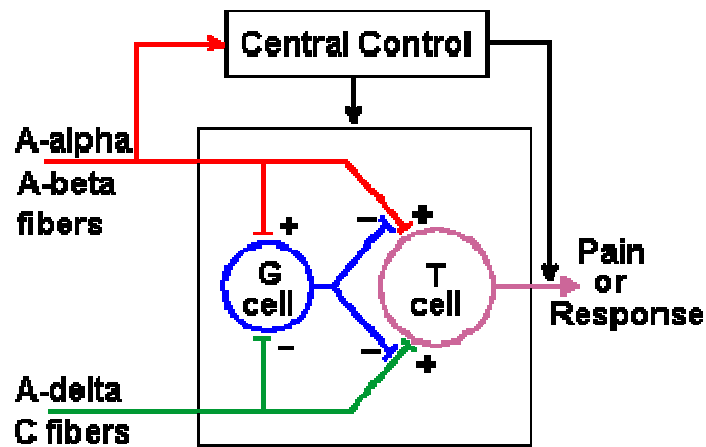
By: www.anaesthesiauk.com

Pain fibers terminate mainly in the superficial dorsal horn (laminae I- II). Ad fibers enter lamina I (and V) and synapse on a second set of neurons. These neurons will carry the signal to the thalamus and are part of the spino-thalamic tract (STT). The C fibers enter the spinal cord and synapse on lamina I cells and lamina II interneuron - neurons that make synaptic connections with other cells within the local environment. The interneurons convey the signal to the STT cells that reside mainly in laminae I, IV and V. The axons of the STT cells project across the spinal cord to the STT, which is located in the ventro-lateral quadrant of the contra lateral spinal cord white matter.

Gate Control Theory:

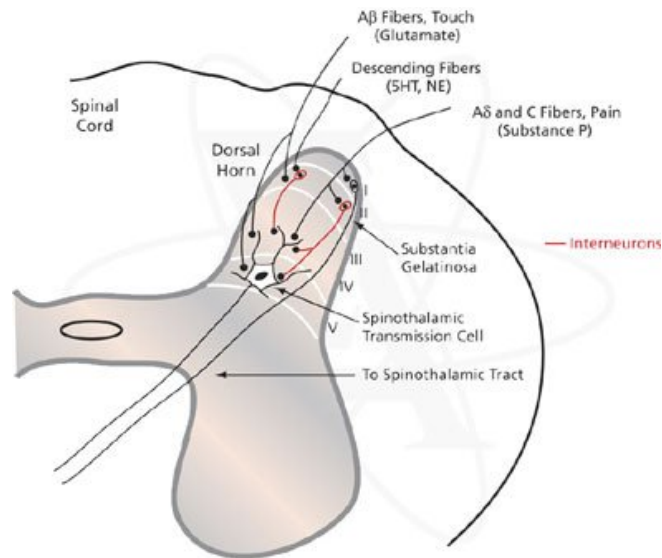
Ronald Melzack and Patrick Wall (1965) in Pain Mechanism: a new theory: proposed gate control theory which suggests that the spinal cord contains a neurological “gate” that either blocks pain signals or allows them to continue on to the brain. Unlike an actual gate, which opens and closes to allow things to pass through, the ‘gate’ in the spinal cord operates by differentiating between the types of fibers carrying pain signals. Pain signals traveling via small nerve fibers are allowed to pass through, while signals sent by large nerve fibers are blocked. Gate control theory is often used to explain phantom or chronic pain.

Coral A and Hilary J. (2002) in Manual of Pain Management mentioned gate control hypothesis stipulated that both non-nociceptive transmission via large myelinated fibers and nociceptive fibers via A- δ and C fibers entered the dorsal horn and substantia gelatinosa and then the dorsal column and T cells that mediated transfer of signal to the brain. According to the gate control theory, the transfer of information to the T cells and subsequently the brain is influenced by the relative amount of activity of large diameter somato-sensory fibers and small diameter nociceptive fibers. If the activity of the larger fibers were greater than the transmission of pain, impulses would be inhibited and the gate closed. If the influences from pain fibers were greater than those of other sensory fibers, the pain signal would be allowed to propagate to higher central nervous system structures. Descending influences from the brain that play a role in the ease at which the gate would be opened or closed also influences the T cells.



By: www.unmc.edu

The circuit diagram of the gate-control theory of pain perception as proposed by Melzack and Wall



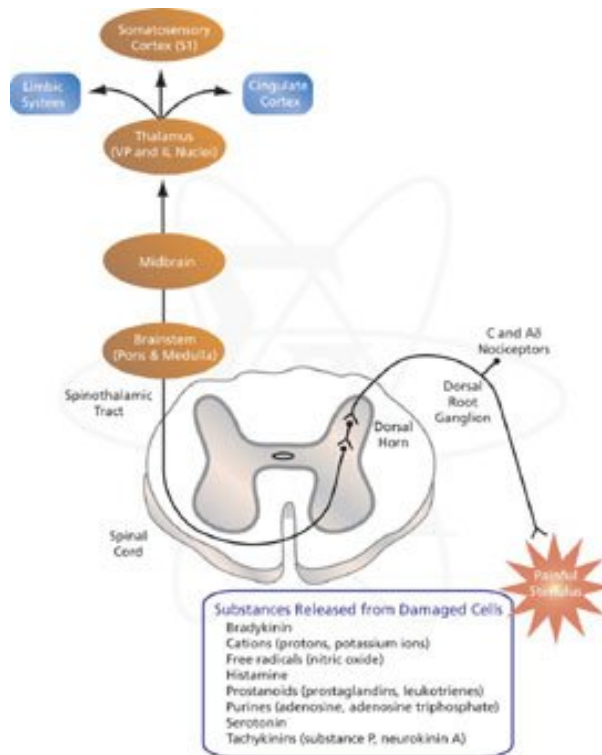
By: www.sigmaaldrich.com

Modulation of pain transmission in the dorsal horn of the spinal cord, illustrating the interaction of small diameter pain afferents and large diameter mechanoreceptors (touch) afferents, as well as the influence of descending neurons on afferent pain pathways; 5HT: serotonin, NE: norepinephrine

Ascending Pain Transmission:

After modulation and interneuron influence, second order neurons pass to the anterior and antero-lateral aspect of the contra-lateral side of the spinal tracts are made up of the spinothalamic tract, the spinoreticular tract, and the spinomesencephalic tract. The ascending spinal pain tracts can further be divided into two distinct tracts, the first one being the neospinothalamic (new) tract, which is composed of the lateral aspect of the spinothalamic tracts. The second is the paleospinothalamic (old) tract, which is composed of the medial aspects of the spinothalamic tract, the spinoreticular tract and the spinomesencephalic tract.

Pain transmission from the head and neck has similar anatomic and physiologic distribution via the trigeminal nerve, forming the neotrigeminothalamic tract and the paleotrigeminothalamic tract. The neospinothalamic tract is composed of large myelinated fibers that propagate towards the brain to form a third order synapse within the ventral, posterior and lateral aspects of the thalamus. From there, tracts extend third order neurons to the somato-sensory cortex distributed anatomically in a somato-topical manner. The neospinothalamic tract makes very few synapses along the way and is much larger in humans than in other species. The paleospinothalamic tract is composed of both long and short fibers and is not as richly myelinated as the neospinothalamic tract. This tract makes various synapses along the way to deep brain structures (i.e. hypothalamus, and medial aspect of the thalamus). From there, further projection may be made in a diffuse manner to the limbic system and frontal cortex.



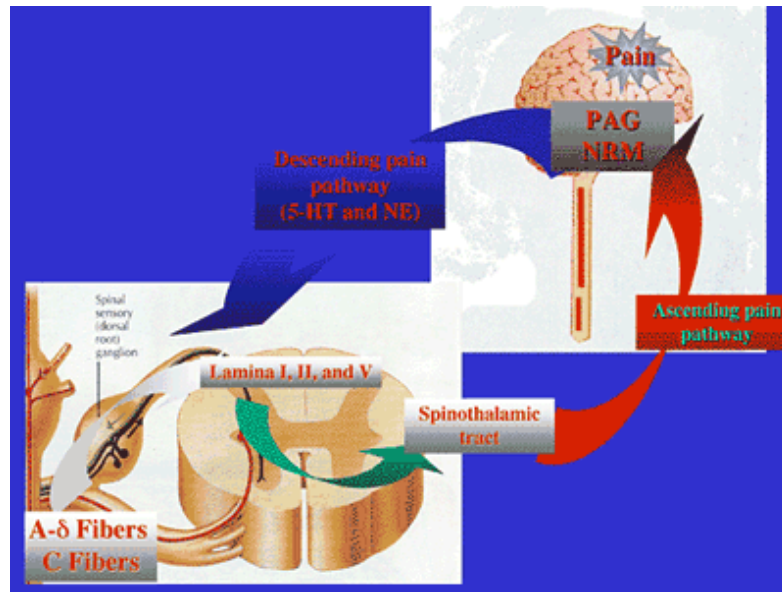
By: www.sigmaaldrich.com

Ascending Pain Pathway

The anatomy of the neurospinothalamic tract, with very few synapse and quick transmission to the somato-sensory cortex, may imply that this tract transmits information about the injury, location, and severity so that action can be taken to remove the organism from the source. The pleospinothalamic tract has a relatively slow transmission time, makes multiple synapses, and projects to deep brain structures that influence emotions and memory. This tract may play a role in increasing the level of arousal; either to prevent such injuries from occurring in the future or promoting behavior to protect the injured area so that healing can take place.

Descending Pain Pathways:

Considerable research has focused on descending pathways both for understanding of pathophysiology of pain and for the development of new treatment modalities. Descending systems pass to areas of the spinal cord via the dorsolateral funiculus to synapse at lamina I, II, and V, and are inhibitory using serotenergic and possibly nor-epinephrine neurotransmitters. The activity of antidepressants, mainly tri-cyclic antidepressants, has been presumed to influence these descending pathways, enhancing modulation by these pathways. Input also occurs into the descending system from higher brain structures such as cortical and diencephalic systems, and the medulla.



By: www.medscape.com

Descending Pain Pathway

Perception of Pain, Suffering, and Pain Behavior:

Pain is more than just transmission of signal from periphery to the cerebral cortex. It is a multi-dimensional process involving past experiences, emotions cultural background, motivations, and family and social dynamics. We know that the hypothalamus, the medial thalamus, and limbic system are involved in motivational and emotional experiences, and readily synapse with paleospinothalamus tract. These systems also influence other brain structures such as hypothalamus and forebrain, which may activate autonomic reflexes that influence features such as respiratory rate and blood pressure. Influences from the reticular formation create the drive to move the injured organism into action away from the noxious stimuli. Emotional and motivational states also have been a great influence via the limbic, hypothalamic, and frontal cortex on descending inhibitory systems, which allow higher mind function to influence pain processing via these pathways.

John D and Ronald M (1999) mentioned the brain contains widely distributed neural networks that create an image of self through genetic programs and memories of past experience. Afferent inputs act on this neuro-matrix and produce output patterns that lead to the report of pain. Stress can change the interactions between the neuro-matrix and peripheral stimuli, as can learned experiences and expectations. Clinically significant acute pain always involves tissue damage; the central and peripheral nervous systems are dynamic, not static, and are modulated by tissue damage and by changes in the central nervous system and stress regulation systems that occur in response to such damage. Although most of these modulations are of short duration, some may persist and lead to chronic pain states. In both clinical and basic research, we are rapidly gaining useful information that will lead to more effective care for those who suffer pain.

Catharine S (2000) in Medical Student JAMA mentioned "EVERY DOCTOR WHO TREATS PATIENTS WILL CONFRONT THEIR PAIN AND SUFFERING". Yet for each individual patient the experience of pain will be private and largely unique. This creates difficulty not only for the clinician but for anyone who tries to grasp the meaning of someone else's pain. The sensory component of pain, the neuronal capacity to localize and identify noxious stimuli, is largely consistent both within an individual and between populations. But the meaning of pain becomes much more than the ability simply to localize or discern it. For the affective component of pain—the subjective sense of suffering that accompanies its perception—is multi-factorial.

Myriad factors underlie our ability to conceptualize our own pain, or to comprehend that of another: the meaning of the pain within one's larger life context, the intensity and location of the pain, the particular illness associated with the pain, the rituals of medicine around pain, and the social understanding of suffering. The pain that results from this multiplicity of factors is uniquely defined for each individual; pain becomes framed in the clinical encounter by the inter-play between the physician's gaze into the patient and the patient's gaze into himself or herself. This exercise of framing is at the center of every patient-physician encounter, but most particularly so for pain.

Pain is not an objective and visible clinical finding in the manner of a fractured femur or purulent sputum. Rather, pain is a perception communicated through both language and nonverbal behaviors such as tears or agitation. As such, pain is intrinsically subjective and inaccessible, "that which cannot be denied, and that which cannot be confirmed. This intangibility contributes to misunderstanding and under treatment of pain in the clinical setting.

Pain remains a serious public health problem. Many patients are inadequately palliated, especially at the end of life. This need not be so. Janet Abraham describes how we can make palliative care itself a goal of medicine. Even when cure of the underlying disease is not possible, there is still much we can do to relieve physical and psychosocial suffering. Jane Loitman recounts that many patients seek pain relief from complementary therapies. Often they feel that these methods offer a holistic approach that is lacking in the traditional allopathic model. As we grapple for solutions to these problems within our current clinical context, we might do well to realize that none of these experiences are entirely new.

Schuyler Henderson (2000) describes the expressions and definitions of pain as a function of not only personal but social, cultural, and historical influences as well. To treat pain adequately therefore requires not just that we understand its pathophysiology, solicit patient reporting, and follow practice guidelines, but that we also reflect on its meanings and thoughtfully incorporate them into our clinical interactions. We hope that this issue will encourage further thought about current issues in pain management and its significance within the clinical encounter.

Lumbar Spine Pain:

Lumbar spine pain (low back pain) is a very common affection that has a tremendous impact on society through lost productivity and increased health care costs. The second leading cause of work absenteeism in United States, back pain leads to productivity loss more than any other medical condition. According to population surveys, the number of people in the United States who sought professional health care for back pain in 1990 was 24 million (9.4 % of the population).

Paul A and Liane Clamen (2002) mentioned every year in United States more than \$33 billion is spent on health care for back pain. When additional cost such as disability and lost productivity are included, total cost for back pain in this country add up to more than \$100 billion per year.

In the United States, approximately 80% of adults will at some point during their lives experience pain in the lumbar spine region, which will affect their daily activities; 1% to 2% will require surgery. The first episode of lumbar spine pain typically occurs in the third decade of life. The incidence of lumbar spine region pain peaks between ages 55 and 64, and then decreases. The severity of pain at onset increases with increasing age of presentation. About 10% to 12% of patients with pain in lumbar spine region have concomitant sciatica.

A common cause of lumbar spine and leg pain is a ruptured or prolapsed intervertebral disc. Symptoms may include dull or sharp pain, muscle spasm or cramping, sciatica, and leg weakness or loss of leg function. Sneezing, coughing, or bending usually intensifies the pain. Rarely bowel or bladder control is lost, and if this occurs seeks medical attention at once. Sciatica is a symptom frequently associated with a lumbar spine intervertebral disc prolapse. Pressure on one or several nerves that contribute to the sciatic nerve can cause pain, burning, tingling, and numbness that extends from the buttock into the leg and sometimes into the foot. Usually one side (left or right) is affected, but both also may affect.

The most practical classification yet advised describes pain in the lumbar spine region in terms of temporal characteristics. While incomplete, this classification is useful because so much of lumbar spinal region pain is still idiopathic (Bigos et al 1994).

Temporal Classification of Lumbar Spinal Region Pain with or without sciatica:

1. Transient Pain.
2. Acute Pain.
3. Persistent Pain.
4. Chronic Pain Syndrome.

Transient Pain:

Transient lumbar spinal region pain typically lasts for a very short period of time and does not come medical attention, except by history later. Basically, it is self limited, duration in hours to days come. Treatment is usually symptomatic and instituted by the patient. The causes are virtually never known and the problem does not have great significance for practice or disability, and comes to medical attention when episodic.

Acute Pain:

Acute lumbar spinal region pain is generally defined as acute low back pain which lasts from a few days to a few months. Back pain with or without leg radiation is common. Experience and some evidence say that the majority of these problems are self limited and resolve spontaneously. Standard treatments have little influence upon the natural history. Typical treatment algorithms is conservatively include short period of bed rest, adequate analgesia, physical therapy, and local physical measures and watchful waiting. Some patients, particularly those with acute disc prolapse have intractable pain which can not be allowed to resolve spontaneously because of its severity. Rarely, a significant neurological deficit may accompany pain, both situation lead to prompt surgical intervention (Bigos et al 1994).

Persistent Pain:

Most commonly it is assumed that pain which persist for six months progressively leads to chronic state, defined by preoccupation with pain, depression, anxiety and disability. In the recent past, a large group of patients has been identified in whom pain persists for more than six months without any concomitants of the chronic pain syndrome, 95% of patients seen demonstrated complaints of pain and dysfunction which reduced, but did not seriously affect, all activities otherwise. Psychological testing in these patients revealed patterns similar to those expected in any ill normal population. There was a 5% incidence of psychological dysfunction in the all overall group. It has been termed "persistent pain syndrome" to differentiate it from the implications of the word chronic in the pain field. The majority of those patients suffered from spondylotic disease. There was no significant worsening or improvement with longitudinal evaluation and these patients did not respond to typical modalities of therapy employed for them.

Chronic Pain Syndrome:

Lasts more than 6 months, worsens with time, associated with major co-morbidities, especially psychological. A very high percentage is depressed and anxious. Specialized treatment facilities have been developed throughout the world to deal with them. So, multi-disciplinary therapy is commonly required. Patients with low back pain and leg pain complaints who fall into this category do not seem to have different anatomical diagnoses than those patients with persistent pain syndrome who do not exhibit the co-morbidities of the chronic pain patients.

Risk Factors for Lumbar Spinal Region Pain:

There are two categories of risk factors associated with lumbar spinal region pain: extrinsic and intrinsic. Extrinsic risks include heavy physical labor, frequently bending and twisting, lifting and forceful movements, repetitive work, vibration, sedentary life style, sedentary office work, and smoking. For example, truck drivers, athletes, and nurses are most likely than others to suffer from this mechanical lumbar spinal region pain. Intrinsic risk factors for disc degeneration, micro-structural disc properties changes, spinal abnormalities, and genetic predisposition.

Vindigni et al and his colleagues (2005) mentioned other modifiable risk factors for LBP in a research paper of Low back pain risk factors in a large rural Australian Aboriginal community an opportunity for managing co-morbidities. The risk factors include:

Smoking

Smoking was highly prevalent 46% (95% CI: 38%–53%) in the community, with equal numbers of males and females smoking. Thirty eight per cent (95% CI: 31%–45%) of people smoked between 10–20 cigarettes daily and 8% (95% CI: .04%–11%) smoked more than 20 cigarettes per day. This is consistent with the 2001 National Health Survey (NHS), which found that 51% of Indigenous people aged 18 years or older were current smokers, compared with 24% of non-Indigenous people.

Physical inactivity

Sixteen percent (95%CI: 10%–21%) of participants spent no time actively exercising and 35.9% (95% CI: 26%–45%) exercised less than 30 minutes per week. There are no other detailed data available on the levels of physical activity among Indigenous people. However, the 2001 NHS reported that 43% of Indigenous people aged 18 years or older living in non-remote areas were sedentary, compared with 30% of non-Indigenous people.

Psychosocial stress

For those reporting LBP 72% (CI: 65%–78%), the most commonly reported traumatic events included sporting injuries 26.5% (95% CI: 20%–38%), motor vehicle accidents 18% (95% CI: 12%–23%) and work-related trauma 17.5% (95% CI: 12%–22%). There was, however, no association between LBP and physical trauma.

Physical trauma

For those reporting LBP (66.1% CI: 54%–68%), the most commonly reported traumatic events included sporting injuries 26.5% (95% CI: 20%–38%), motor vehicle accidents 18% (95% CI: 12%–23%) and work-related trauma 17.5% (95% CI: 12%–22%). There was, however, no association between LBP and physical trauma.

Occupational risk factors

Modifiable occupational risk factors for musculo-skeletal conditions details reported occupational risk factors for LBP. Common risk factors were adopting awkward postures at work 32% (95% CI: 25%–39%), frequent bending and twisting 29% (95% CI: 22%–35%) and heavy lifting 26% (95% CI: 20% – 32%). However, there was no association between LBP and occupational risk factors.

Non-occupational Risk Factors:

Paul A and Liane C (2002), in Manual of Pain Management mentioned under category of non-occupational risk factors of low back pain that, studies have shown a positive association between LBP and participation in sports such as golf, gymnastic, rowing, and bowling. In a survey of 142 athletes involved in activities such as soccer, tennis, wrestling, and gymnastics, 50% to 85% reported low back pain and 36% to 55% had radiology spinal abnormalities. Of course, insufficient exercises also have been linked with an increased risk of disc prolapse. In general, good muscle strength and good overall fitness is suggested for reducing the risk of LBP and disc prolapse.

Many retrospective and prospective studies as mentioned earlier implicated smoking as a risk factor for lumbar spinal region pain. A biomechanical hypothesis is that repetitive increases in intradiscal pressure, as occurs with frequent coughing, could be a cause of discogenic lumbar spinal pain. This theory is supported by the observation that coughing and chronic bronchitis among non smokers have independently been associated with lumbar spinal region pain (LBP).

A second hypothesis is that smoking reduces blood flow to the vertebral body and inhibits diffusion to the intervertebral disc, thereby interfering with systemic nutrient delivery and facilitating disc degeneration. MRI study of smoking and non-smoking identical twins found that those who smoked had an increased frequency of disc degeneration throughout the entire lumbar spine.

Risk Factors Associated with Body Habitus:

Height and body mass both are associated with an increased risk of disc prolapse if they increased above the normal. Obesity independent of height has been correlated with both disc degeneration, as diagnosed by radiographic abnormalities, and with the presence of lumbar spinal region pain (Low Back Pain). Likewise, height independent of weight has been associated with disc prolapse. One study found that men taller than 180 cm had a relative risk of disc prolapse and herniation of 2.3, while woman taller than 170 cm had a relative risk of 3.7. Taller or larger probably place greater loads on their intervertebral discs (IVDs), but they also have correspondingly larger discs. Therefore, people of different statures should not experience significant differences in disc stress related to a given task. Rather, the increased disc pathology in individuals of large stature may be explained by factors such as problems with nutrient diffusion or the fact large individuals are more likely to work in awkward postures.

Genetic Predisposition to Lumbar Spine Pain:

Postacchini and colleagues suggested that there may be a genetic predisposition for disc prolapse (herniation). In a review of 63 patients under the age of 21 who had lumbar disc prolapse, 32% had a positive family history for that same lesion; in the control group, only 7% had a positive family history. Although no genetic markers have been proposed, certain congenital spinal abnormalities such as asymmetric facet orientation and a small vertebral canal hypothetically predispose certain individuals to symptomatic disc prolapse.

Cultural, Social, and Psychological Aspects of Pain Management:

It is important to emphasize that the way a person experiences pain is a function of the inter-relationship between individual's socio-cultural, psychological, and physiologic conditions. Socio-cultural factors are those that relate group interactions in the family, workplace, and community. Cultural factors pertain to beliefs, values, and customs that are transmitted from one generation to another. Psychological factors are those that relate to the emotional states, and cognitive process.

Social factors may influence the emotional and cognitive states of the individual, making them vulnerable to illness and pain. De Girolamo (1991), Masset and Malchair (1994) have done large scale studies demonstrate a high incidence of lumbar spinal region pain in blue collar workers. Westrin et al (1972) mentioned their work is physically demanding and they tend to be in sub-ordinary positions and dissatisfied with their jobs. Bigos et al. (1991) and Skovron et al. (1994) mentioned that job dissatisfaction is a significant risk factor for the onset of lumbar back pain. Hager (1995) mentioned that industrial injury claims from low back injuries have risen steadily since 1981 and compromise nearly 32% of total claims in the United States.

Cultural background has an effect on pain perception. For instance, Hardy et al. (1952) found that radiant heat, described by Jewish and Italian people as painful, was described as worm by Northern Europeans. Zborowski (1952) described open complaining and support seeking by Jewish and Italian people, but the underlying attitudes about pain of the two groups were different. Jewish people were more concerned about the cause and meaning of the pain, whereas Italian people were concerned with obtaining immediate relief. Zola (1966) found that Irish and Italian people differed significantly in their perception of pain. Italian complained of more symptoms in more parts of the body with greater degrees of bodily dysfunction. Furthermore, Italians were most concerned if the symptoms interfered with their social lives, whereas Irish and Anglo-Saxon people were most concerned if their pain interfered with work. Zola noted that Irish people handle their trouble by denial, whereas Italian people handle trouble by dramatization. Muslims always concern if the pain will effect their five times prayers. These coping techniques are reflected in the way people of each culture communicate about their illness. None of these studies should be interpreted as derogatory toward a certain culture. Instead, they are attempts to describe characteristic differences in cultures without judging those characteristic.

Sanders et al. (1992) found important cross cultural differences in self perceived level of dysfunction among patients with chronic low back pain. Sanders compared individuals from United States, Japan, Mexico, Colombia, New Zealand and Italy. He found that lower back pain patients from Mexico and New Zealand had significantly fewer physical findings than other lower back pain groups did and that Americans were the most dysfunctional in psychological, recreational, and occupational area.

These studies reinforce the principle that people with similar learning experiences which actually represent the culture are likely to show similar pain perception, expression, and response patterns. Bates et al. (1993) mentioned these culturally acquired patterns may influence the neurophysiologic processing of nociceptive information as well as the psychological, behavioral, and verbal response of pain.

Finally, we have reached to the relationship between psychological status and the expression of pain which considered by Romano and Turner (1985) as a complex and poorly understood. Dworkin et al (1990) found that those reporting pain at tow sites had a five fold increases in the occurrence of major depression compared with those with no pain, and those with three or more pain sites an eight fold increases in risk for major depression relative to those with no pain. Number of pain sites proved to be a stronger predictor of major depression risk than the severity or persistence of the pain condition. The prevalence of major depression in patients with chronic lumbar spinal region pain is approximately three to four times greater than that reported in the general population Sullivan et al. (1992). Depression is common concomitant of all chronic pain that's why some times physicians prescribe antidepressants medications along with other pain killer's medications for such cases.

Depression, anxiety, and other psychological states can produce pain themselves and influence the intensity of pain from other causes. Kent (1986) mentioned that people who are anxious are more sensitive to pain than calm people. While Bond (1984) said that the anticipation of pain and uncertainty regarding its cause tend to raise anxiety which then increases perceived intensity of pain.

Shutty et al. (1990) mentioned patients' beliefs about pain about pain and treatment and their perception of disability are powerful predictors of the level of functioning they will achieve. Patients who believe they can control their pain avoid catastrophizing and those who believe they are not severely disabled show greater improvement.

Gottliab (1986) presented findings that showed that dysfunctional beliefs about chronic pain (e.g. "I try not to do as much when I have pain") successfully discriminated 83% of positive versus negative treatment outcomes in an outpatient program. Similarly, Dolce (1987) reported that pain patient's rating of their concern about engaging in various treatment activities (e.g. Exercises) were negatively associated with treatment outcome in an inpatient program.

Klapow et al. (1995) done a study of chronic low back pain patients found a complex interaction among the psychosocial factors of life adversity, coping, and social support. Kafee and Dolan (1986) found that back pain patients exhibited higher levels of motor pain behaviors, were less active, and used more medications than Temporomandibular Joint (TMJ) patients. Both back pain and TMJ pain patients had high levels of psychological distress, but back pain patients were more likely to use attention diversion, praying, and hoping as coping strategies.

Attitudes and Beliefs of Physical Therapists about Pain Management:

Health professionals expect visual signs of pain and a physical cause of pain. Both patients and health care providers tend to downplay or all together ignore the interrelationship of emotional, cognitive, and physical aspects of pain. The patient and the professional are both affected by their own culture, age, sex, personal pain experience, beliefs, and expectations. The patient may expect to be cured without active participation.

Wolff et al. (1991) mentioned, there are many problems in pain assessment and treatment that relate to knowledge and beliefs of those responsible for pain management. There is a lack of formal education for health professional regarding pain management, particularly in the area of chronic pain management, inappropriate use of currently available knowledge also occurs.

Physical therapists are not alone in having insufficient educational and attitudinal preparation for working with patients with chronic pain. Nurses and physicians also have been found to not understand basic concepts of pain management said Myers (1985), and Bonica (1978). Editorials in Journals have lamented the insufficient number of hours applied to pain education and propose a curriculum for medical students that would increase exposure of pain theories and management said Liebeskind and Melzack (1988).

MC Battie, DC Cherkin, R Dunn, MA Ciol, and KJ Wheeler (1994), American Physical Therapy Association, Research paper on managing low back pain: attitudes and treatment preferences of physical therapists, mentioned, we surveyed physical therapists about their attitudes, beliefs, and treatment preferences in caring for patients with different types of low back pain problems. Questionnaires were mailed to all 71 therapists employed by a large health maintenance organization in western Washington and to a random sample of 331 other therapists licensed in the state of Washington. Responses were received from 293 (74%) of the therapists surveyed, and 186 of these claimed to be practicing in settings in which they treat patients who have back pain. Back pain was estimated to account for 45% of patient visits. The McKenzie method was deemed the most useful approach for managing patients with back pain, and education in body mechanics, stretching, strengthening exercises, and aerobic exercises were among the most common treatment preferences. There were significant variations among therapists in private practice, hospital-operated, and health maintenance organization settings with respect to treatment preferences, willingness to take advantage of the placebo effect, and mean

number of visits for patients with back pain. Conclusion showed that these variations emphasize the need for more outcomes research to identify the most effective treatment approaches and to guide clinical practice.

Halfens et al. (1990) mentioned the correlation between insufficient knowledge and antiquated attitudes is detrimental to quality of patient care. Inappropriate attitudes result in less than adequate pain management. These studies strongly suggest the need for expanded education of health professionals concerning basic mechanisms of pain, pain assessment, and pain management. Positive attitudes about pain control also need to be taught and fostered in both patients and health professionals.

Lumbar Spine IVD Prolapse Pain Management Strategies:

Treatment of lumbar spine intervertebral disc prolapse comes under the lower back rehabilitation which should be directed to the patients' specific diagnosis. One must remember that the differential diagnosis includes extra-spinal diseases such as the following, which may produce symptoms similar to those caused by degenerative spinal disorders or discogenic disorders: hip osteoarthritis, diffuse idiopathic skeletal hyperostosis, cervical spinal stenosis, central neurological syndromes, psychological disorders, tumors, renal diseases, abdominal-aortic aneurysms, and peripheral vascular diseases.

There are no specific exercise or physical therapy regimens that have been demonstrated to be better than any other in the prevention of intervertebral disc prolapse or back pain in general. The McKenzie exercises deemed the most useful approach for managing patients with back pain, as mentioned previously. However, patients may benefit from physical therapy regimens as these modalities encourage them to take more active role in patients' recovery process.

Epidural steroid injections are commonly used to treat low back pain. They also have shown to provide temporary relief in patients with sciatica. However epidural steroid injections have inherent risks as well. These include the systemic effects of the steroids, persistent cerebrospinal fluid leak, and meningitis. Furthermore, they have been found to have a decrease efficacy in patients with previous surgery, those with symptoms greater than one year duration, and in smokers. Currently, physicians advocate steroid injection only for those patients who have either spinal stenosis, or disc prolapse herniation with sciatica, and who are non-operative candidates for temporary relief.

Medical and surgical interventions have been discussed earlier in the previous research paper. Physical therapy and rehabilitation of lumbar spine intervertebral disc prolapse shall be discussed in more details in the next research paper separately. In the United States, approximately of patients with general low back pain prefer to seek chiropractic care or physical therapy. Many studies have attempted to demonstrate the benefits of spinal manipulation (e.g. Mulligan's technique) for patients with low back pain. However, recent reviews have indicated that the efficacy of spinal manipulation has not been demonstrated by sound, randomized clinical trials.

Conclusion:

Intervertebral disc prolapse pathology is a common cause of lumbar spinal region pain or what it calls low back pain. Intervertebral disc disorders encompass many conditions, from subtle disc degeneration to dramatic disc prolapse. As common as troubling as intervertebral disc prolapse are, there is still agreement regarding their etiology. Most researchers believe that disc prolapse or disruption generally results from a chronic or degenerative process. Researchers agree, however, with the observation that disc degeneration tends to occur in people who either exercise too much or too little.

Concepts of pain management with patients who suffer from intervertebral disc prolapse disorder are similar in general to the most pain management concept. Because there is much more is still not known about pain, making the task of managing chronic pain patients a daunting one for physical therapists. The American Pain Society in 1994 described the ultimate results of faulty pain management, they have presented that "mismanagement of intractable pain has tragic and costly consequences: disabling, depression, overuse of diagnostic services and procedures, hospitalizations, and surgery, and overuse of inappropriate medications".

The complexity of nociceptive transmission and transformation into pain perception is still incompletely understood. One of the most important things to remember treating patients with pain is that pain is subjective experience and that the patients' experience should be respected. When no correctable cause is found, an individualized program of weight control, conditioning, and modification of activity, prevention of recurrence and education or understanding can provide satisfactory pain management and relief. One of our great research goals must be to find out why the lumbar spine hurts so that better more specific therapies can be advised.

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