Review Article

Cancer Pain: A Critical Review of Mechanism-based Classification and Physical Therapy Management in Palliative Care

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ABSTRACT

Mechanism-based classification and physical therapy management of pain is essential to effectively manage painful symptoms in patients attending palliative care. The objective of this review is to provide a detailed review of mechanism-based classification and physical therapy management of patients with cancer pain. Cancer pain can be classified based upon pain symptoms, pain mechanisms and pain syndromes. Classification based upon mechanisms not only addresses the underlying pathophysiology but also provides us with an understanding behind patient's symptoms and treatment responses. Existing evidence suggests that the five mechanisms – central sensitization, peripheral sensitization, sympathetically maintained pain, nociceptive and cognitive-affective – operate in patients with cancer pain. Summary of studies showing evidence for physical therapy treatment methods for cancer pain follows with suggested therapeutic implications. Effective palliative physical therapy care using a mechanism-based classification model should be tailored to suit each patient's findings, using a biopsychosocial model of pain.

Key words: Mechanism-based classification, Pain pathomechanisms, Pain rehabilitation, Palliative oncology, Physical therapy

INTRODUCTION

Cancer is the common condition where addressing pain relief is often the leading concern for the patient and palliative care team at end-of-life care.[1]

The incidence of cancer worldwide is 6–7 million patients per year, with half or more occurring in developing countries. Every year, approximately 4.5 million patients die from cancer, and 3.5 million suffer from cancer pain daily, with only a limited number of them receiving adequate pain treatment.[2]

The pain in cancer patients may be caused by direct tumor involvement, diagnostic or therapeutic procedures, side effects, or toxicities of cancer treatment. No matter its source, uncontrolled pain can affect every aspect of a patient's quality of life, causing suffering, interference with sleep, and reduced physical and social activity and appetite.[3] Though specialist palliative care teams are available for treating cancer pain, the deaths due to cancer pain are alarmingly at 28%.[4]

Approximately 30–50% of all cancer patients experience pain, and of them, 75–90% experience substantial life-altering cancer-induced pain.[5] The good news for patients with cancer is that with improvements in detection and treatment, cancer patients are surviving for significantly longer periods than in the past. Unfortunately, the quality of life of these patients is frequently diminished[6] and pain can be a major contributor to this decrease in the quality of life.[7,8]

In India, of 156 patients who were receiving radiotherapy for their cancer pain, 61% had incidence of pain.[9] Bisht

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et al,[10] found that pain was the most common prevalent symptom (96% of 100 patients assessed) among cancer patients attending a palliative care unit in Uttarakhand, India.

World Health Organization (WHO) analgesic ladder management is currently the most accepted and widely employed pain management strategy in patients with cancer pain. Despite their well-known adverse effects ranging from local to general in bodily distribution, opioids are still the most recommended drug therapy of choice for patients with cancer pain.[11] Despite great advances in the fields of pain management and palliative care, pain directly or indirectly associated with a cancer diagnosis remains significantly undertreated.[12]

Non-pharmacologic methods used in conjunction with analgesics have as their goal to help the patient with cancer gain or maintain functionality and restore a sense of psychological control over their pain and their circumstances. These approaches ordinarily have no negative side effects.[13] Physical interventions form a part of non-pharmacological interventions that include a variety of therapeutic methods for pain relief in palliative care, administered by physical therapists.[14]

One of the recent developments in conceptualization of physical therapy management for pain relief in palliative care is the mechanism-based classification of pain.[15] Identification of a cancer patient's clinical presentation and its relationship to symptoms is essential for initiation of appropriate therapeutic strategy for pain relief. Classification of cancer pain was considered to be a controversial issue.[16] Earliest categorization of cancer pain was done broadly into three categories: primary cancer pain, secondary cancer pain or pain secondary to treatment, and pain unrelated to cancer.[17] Later, symptom-based and syndrome-based classifications started evolving, thus leading to heterogeneity in cancer pain terminology and treatments which are based upon such diverse classification methods.

Pain necessarily involves three different levels of classification – based upon pain symptoms, pain mechanisms and pain syndromes.[18] The three levels can be applicable for cancer pain as follows.

CANCER PAIN – SYMPTOM-BASED CLASSIFICATION

Lasheen *et al*,[19] designed a clinical classification of cancer pain and they classified the pain into continuous and intermittent pain. Intermittent pain alone category can be divided further into incident, non-incident and mixed pain. The category of continuous pain [termed as breakthrough pain (BTP)] was further similarly divided into incident, non-incident, mixed and end-of-dose failure pain.

Serlin *et al*,[20] classified cancer pain into mild (1-4), moderate (5-6) and severe (7-10) depending upon the level of interference with function, using a numeric pain rating scale from 0 to 10.

CANCER PAIN – SYNDROME-BASED CLASSIFICATION

Grond *et al*,[21] found prevalence and characteristics of cancer pain syndromes among patients with cancer pain and they found that 30% of the patients presented with one, 39% with two and 31% with three or more distinct pain syndromes. The majority of patients had pain caused by cancer (85%) or anti-neoplastic treatment (17%); 9% had pain related to cancer disease and 9% due to etiologies unrelated to cancer. Pain was classified as originating from nociceptors in bone (35%), soft tissue (45%) or visceral structures (33%), or otherwise as of as neuropathic origin (34%). Region-wise, pain syndromes were located in the lower back (36%), abdominal region (27%), thoracic region (23%), lower limbs (21%), head (17%) and pelvic region (15%).

CANCER PAIN – EVOLUTION OF MECHANISM-BASED CLASSIFICATION

The influence of mechanism into pain perception, evaluation and management was evident from 1950s in cancer pain[22] and cancer pain syndromes. Mantyh[23] suggested that a shift was necessary and imperative in understanding cancer pain by moving toward a mechanism-based model for classification. Mantyh[24] identified three mechanisms in bone cancer pain – inflammatory, neuropathic and tumorigenic. Such a classification aided not only in diagnosis but also in analgesic management of bone cancer pain.[25]

Cancer pain was classified into ongoing pain and BTP, both of which have been identified to have central and peripheral mechanisms.[26] BTP has been defined as "the transient exacerbation of pain occurring in a patient with otherwise stable, persistent pain". It is usually unpredictable and heterogeneous.[27] The predominant pain pathophysiology involves three – somatic, visceral and neuropathic. Somatic pain involves pain arising from external structures (soma) such as skin, soft tissues and musculoskeletal tissues. It is

likely to be felt as 'localized, superficial and sharp' pain. Visceral pain involves pain arising from internal organs (viscera) like vital organs, systemic organs and organ systems. It is likely to be felt as 'diffuse, deep and dull'. Neuropathic pain involves pain arising from structures of the somatosensory system such as receptors, peripheral nerves, autonomic nerves and central nervous system. It is likely to be felt as 'tingling and numbness, pins and needles, and, sensory and motor deficits. Overall prevalence for BTP is 40–86% and is the most common and feared symptom of cancer.[27] Portenoy *et al*,[28] utilized an assessment algorithm that categorized BTP patients into three groups: (1) those with uncontrolled background pain; (2) those with controlled background pain and no BTP, and (3) those with controlled background pain and BTP. The authors found that the presence of BTP was a marker of a generally more severe pain syndrome, and was associated with both pain-related functional impairment and psychological distress.

Looking to the future, if we acknowledge that rigorous classification and assessment of break-through pain allows for more efficient diagnosis, more timely access to appropriate treatment and more detailed study of prognosis, then every effort should be made in this direction to produce a meaningful system of classification and assessment.

-Bennett[29]

Haugen *et al*,[30] in their systematic review of classification for cancer pain found that there existed no formal classification system for BTP in spite of it being a huge public health issue with a high prevalence rate of 40–80%. Knudsen *et al*,[31] in their recent systematic review on classification of cancer pain emphasized the need to develop better classification systems to enhance symptom evaluation, to facilitate homogenous subgrouping of patients, and to adequately address the underlying source of cancer patients' symptoms.

Siddall and Duggan[32] suggested that pain medicine should shift its focus on mechanism-based approach to management. Pharmacological treatments were suggested by Woolf[33] along a mechanism-based approach.

Non-pharmacological treatments such as physical therapy have their range of treatment options, whose effects not only involve symptom control but are also toward improving the quality of life in cancer patients receiving pain rehabilitation and palliative care.[14] Recent studies by Smart and Doody[34,35] found using qualitative methodology that expert musculoskeletal physiotherapists used mechanism-based classification in their clinical reasoning process of evaluation of pain in their patients. Mechanism-based treatments are most likely to succeed[36] compared to symptomatic treatments or diagnosis-based treatments.

There are five operating mechanisms in pain perception that are categorized under mechanism-based classification of pain by Kumar and Saha,[15] who described in detail the individual mechanisms, their clinical features, assessment findings and probable physical therapy treatment techniques. The five mechanisms are:

- central sensitization/central neurogenic mechanism/ central nociceptive mechanism
- peripheral sensitization/peripheral neurogenic mechanism
- peripheral nociceptive mechanism
- sympathetically maintained pain/sympathetically dependent pain mechanism and
- cognitive-affective (psychosocial) mechanism.

The objective of this paper is to update the physical therapists, oncologists and cancer rehabilitation professionals working in palliative care on the application of mechanism-based classification to cancer pain and its interpretation, with available therapeutic evidence for providing optimal patient care using physical therapy.

MECHANISM-BASED CLASSIFICATION OF CANCER PAIN

Ballantyne[37] outlined the common causes for chronic pain among cancer patients as: peripheral neuropathies (due to radiation, chemotherapy, tumor erosion); radiation fibrosis; chronic postsurgical incisional pain; phantom pain; arthropathies and musculoskeletal pain due to posture and mobility; visceral pain due to visceral damage or treatment-related blockage (opioid-induced constipation).

From the above description, syndrome-specific mechanisms for chronic pain in cancer patients can be seen as follows: peripheral neuropathies presenting as either peripheral sensitization or sympathetically maintained pain; radiation fibrosis presenting as nociceptive pain; chronic postsurgical incisional pain presenting as nociceptive and central sensitization; phantom pain presenting as central sensitization; musculoskeletal pain being nociceptive or central sensitization; and visceral pain being nociceptive or sympathetically maintained.

Central sensitization and cancer pain

In short, central sensitization denotes increased sensitivity of higher order neurons of the central nervous system,

which causes an "ongoing pain" in the absence of peripheral nociceptive stimulus. Presence of either hyperalgesia or allodynia in a patient with cancer pain who has "spontaneous or ongoing" pain was highly indicative of central pain mechanisms.

Presence of hyperalgesia was demonstrated in animal models[38-43] of cancer pain and in a very few studies on human beings[44] with cancer pain. Allodynia was also shown in animal[45] and human[46] models of cancer pain. Hyperalgesia is an exaggerated pain perception to a painful stimulus and allodynia is pain perception in response to a non-painful stimulus.

Taber *et al*,[47] described the functional anatomical basis for central pain and explained the role played by amygdala and somatosensory cortex in "pain memory" and cortical representation of pain. Deafferentiated pain was common in patients with phantom limb pain.[48] Spiritual pain due to emotional influences and spirituality was also described as a central sensitization phenomenon among cancer patients.[49]

Clinical examination and objective screening for central neuropathic pain could be done using Leeds assessment of neuropathic signs and symptoms (LANSS) scale,[50] wherein Potter *et al*, used the scale to identify cancer-related central neuropathic pain among patients with head and neck cancer, and found its sensitivity to be 79% and the specificity was 100%.

Peripheral sensitization/peripheral neuropathic mechanism and cancer pain

Paice[51] described in her review on the cancer-related and non–cancer-related causes of peripheral neuropathic pain in cancer patients as follows:

Cancer-related: Brachial plexus neuropathies, chemotherapy-induced neuropathy, cranial neuropathies, post-herpetic neuropathy, post-radiation plexopathies and surgical neuropathies

Non–cancer-related: Alcohol-induced neuropathy, brachial plexus avulsion (trauma), carpal tunnel syndrome, complex regional pain syndrome (CRPS), diabetic neuropathy, Fabry's disease, failed-back syndrome, Guillain–Barré syndrome, HIV-associated neuropathy, post-stroke pain, trigeminal neuralgia and vitamin deficiencies

Sympathetic pain and cancer

Over- or under-activation of the sympathetic nervous system associated with pain in patients with cancer is not new.[52,53] Churcher[54] emphasized identification of sympathetic dependent pain (SDP) or sympathetic maintained pain (SMP) in cancer patients by looking for cutaneous dysesthesia often accompanied by sympathetic overactivity, and relieved by sympathetic block. The pain descriptors are "burning" and "throbbing" and are present with allodynia (pain caused by a non-noxious stimulus and often tested by light touch), hyperpathia (delayed pain response to touch stimulus) and hypoalgesia to pin prick testing (nondermatomal and in circumferential vasotopographic distribution) in the painful area. Signs of excessive sweating and vasoconstriction (pale, cold and white extremities) indicate sympathetic overactivity. In cancer patients, the SDP is often observed in lower limbs, chest, head and neck and rarely in upper extremities.

Though a direct mechanism-based relationship with cancer symptoms was not established, earlier authors found evidence for SMP mechanism in patients with cancer pain[55-59] through relief of symptoms with sympathetic blocks in patients with cancer pain.

Lack of proper understanding of SDP in cancer pain patients would lead to misdiagnosis of "tumor spread" (since increased radionuclide uptake is noticed in both situations) and unnecessary radiotherapy to which the patients are often unresponsive at this stage.[60]

Nociceptive mechanisms in cancer pain

Nociceptive pain could be mostly secondary to disuse, deconditioning and abnormal movements or postures adopted by a cancer patient due to symptoms. Cancer treatment related nociceptive pain mechanisms were demonstrated in two studies. Winters *et al*,[61] showed the clinical manifestation of musculoskeletal pain among patients with breast cancer treated with aromatase inhibitors and Frieze *et al*,[62] showed the same in cancer patients who underwent long-term corticosteroid therapy. Krakowski *et al*,[63] provided evidence-based clinical practice guidelines for WHO analgesic recommendations for patients with cancer pain to specifically address nociceptive pain mechanism. Other clinical findings of nociceptive or musculoskeletal pain among patients with cancer pain are pain which is essentially provoked by specific postures and/or movements, present in anatomically relevant areas, and is intermittent and of bearable intensity.

Cognitive-affective mechanisms in cancer pain

Cognitive-affective dysfunction in cancer pain could be due to two causes – cancer-related and treatment-related. Chen

et al,[64] showed that compared to cancer patients without pain, the patients with cancer pain exhibited greater anxiety and depression scores which related with their reduced levels of function.

The causes for cognitive-affective dysfunction in patients with cancer are multifold. It may be due to narcotic analgesic prescription[65] and opioids.[66,67] Cognitive functioning influences the pain reporting characteristics[68] and mostly self-reports do not coincide with objective examination findings in such patients.[69] Cognitive status of patients also bear a relationship with other affective factors such as depression, hopelessness and spirituality[70] in those patients.

Dalton and Feuerstein[71] in their detailed review listed psychological characteristics such as anxiety, depression and guilt, preoccupation with pain, emotions, low ego strength, high neuroticism, low self-confidence, and high dependence on external locus of control; and social/environmental factors such as general stressors, family and work strain, social networks, family support, social functioning, coping response, family modeling as associated with reporting higher pain intensity, pain frequency and diminished quality of life in cancer patients compared to their controls. The responses to cancer pain were thus categorized into affective, cognitive, behavioral and physiological.

PHYSICAL THERAPY TREATMENT OF CANCER PAIN – APPLICATION OF MECHANISM-BASED CLASSIFICATION

Use of this mechanism-based classification for pain is not new for physical therapists. Schafer *et al*,[72] proposed the pathomechanism-based classification system for neural low back related leg pain and this system was studied for its reliability[73] and the four subgroups (central sensitization, denervation, peripheral sensitization and nociceptive) were differentiated based upon their levels of disability and psychosocial factors.[74] Treatment for low back pain was studied and utilized a combination of treatment-based and mechanism-based classification.

American Pain Society quality of care task force for treatment of acute and chronic cancer pain had recommended relaxation, heat, cold, deep breathing, walking, imagery or visualization under non-pharmacological methods for cancer pain relief.[75]

Thus, the physical therapists have a very important role to play in holistic care of patients diagnosed with cancer as stated by Flomenhoft[76] and Rashleigh.[77] Rashleigh[77] listed the therapeutic strategies employed by physical therapists in palliative oncology as ambulation and musculoskeletal therapy, neurological therapy, respiratory therapy, electrophysical agents, mechanical therapy, decongestive physiotherapy, and education. Santiago-Palma and Payne[78] listed treatments used by physical therapists on cancer patients as therapeutic massage, therapeutic heat, therapeutic cold, patient education (advice on activity modification), range of motion and strengthening exercise, training ambulation using assistive devices, environmental modification, energy conservation and work simplification techniques. Twycross[79] mentioned that physical treatment methods like massage, heat pads and TENS are useful for pain management in cancer patients.

Physical therapy treatment techniques have also been reported in cancer-related fatigue by Watson and Mock,[80] in breast cancer,[81,82] prostate cancer[83] and breast cancer-related lymphedema,[84,85] older women with cancer,[86] cancer therapy-related hyperthermia[87] and colorectal cancer.[88]

The physical therapy treatment modalities and methods are listed here building upon existing evidence under the five mechanism-based classification categories of cancer pain.

Central sensitization mechanism-based physical therapy for cancer pain

Bennett *et al*,[89] in their detailed systematic review with meta-analysis of 15 studies found that educational interventions (written and/or audiovisual learning materials) improved knowledge and attitudes toward cancer pain and analgesia, and perceived pain intensity among cancer patients. Pain educational programs were shown to be highly effective not only in reducing pain and associated pain behaviours, but also in reducing treatment-related barriers in cancer patients. One such method is the use of pain management diary.[90]

Evidence for using TENS for pain relief in cancer patients is continuously growing.[91] TENS addresses the central component of cancer pain and is a very useful therapeutic adjunct in patients with central sensitization.

Peripheral sensitization mechanism-based physical therapy for cancer pain

Paice[51] opined that regardless of the patient's prognosis, rehabilitation for neuropathic pain in cancer patients may enhance function, and attention to safety factors may avoid serious accidents.

Rehabilitation of patients with motor deficits on neurological examination begins with assessment of the patient's functional dependence – their ability to walk, dress, prepare meals, and perform other activities. Assistive devices may be useful when there is impairment in any of these activities. Physical therapy can increase the strength of involved muscles as well as accessory muscles, which can improve coordination and sensory integration. Physical activity also maintains muscle and ligament length, preventing later deformities. Ankle foot orthotics (AFO)-type braces, which fit easily within a standard shoe, can help prevent falls when patients experience a slapping gait or foot drop.[51]

Using neurodynamic testing on patients with "nerve trunk pain" (stimulus-evoked pain along the course of the nerve) and nerve mobilization (neural manual therapy technique as described by Kumar and Jim[14]) and nerve massage are useful therapeutic adjuncts.[92]

Hypersensitive skin can be treated with desensitization measures with other alternative sensory stimuli that are tolerated fairly by the patient. A hyposensitive skin can be treated with sensory re-education methods using various forms and textures of materials. A variety of physiotherapy treatment methods like electrical simulation, magnetic therapy, pulsed electromagnetic energy, photon stimulation, monochromatic near infrared therapy for peripheral neuropathic pain are used.[93]

Sympathetically maintained mechanism-based physical therapy for cancer pain

Cold therapy may reduce swelling and relieve pain longer than heat therapy by decreasing nerve conduction velocity and desensitization of free nerve endings of the skin.[94] This method can either be utilized at the painful region itself or as remote desensitization. Though studies on physical therapy management for sympathetic pain in cancer do not exist, management in CRPS and other altered sympathetic states includes TENS (burst mode) application to the related spinal level, combined with relaxation and biofeedback techniques to restore vasomotor balance.[15]

One of the manual therapy techniques (neural manual therapy technique as described by Kumar and Jim[14]) commonly employed by physical therapists was the "sympathetic slump" or "slump long sitting with sympathetic emphasis",[95] a sympathetic nervous system mobilization technique,[96,97] which was shown to have sympathoexicitatory effects in extremities including sudomotor and vasomotor effects.[98] The technique is very simple and is well tolerated by patients and was shown to be useful in CRPS patients.[97] Another technique is the use of thoracic spine mobilization[99] in patients who had spinal dysfunction which is another useful manual physical therapy method.

Nociceptive-mechanism-based physical therapy for cancer pain

Massage therapy improves local circulation and gently stimulates the free nerve endings, the pressure of which may also help in draining local tissue edema and induce local and general relaxation. One of the well-established scientific forms of massage is the manual lymphatic drainage therapy[100] and complete decongestive therapy (manual lymphatic drainage, compression garments, skin care and range of motion exercises). Massage therapy was shown to be very effective to relieve symptoms of cancer pain in numerous studies.[101-104]

Reeves[94] explained the importance of physical interventions such as changes in patient positioning, relaxation techniques for sleeplessness, and energy conservation techniques for fatigue in patients with cancer pain. Therapeutic modalities such as electrical stimulation (including transcutaneous electrical neurostimulation), heat, or cryotherapy, can be useful adjuncts to standard analgesic therapy in patients with cancer-treatment–related lymphedema and pain. The treatment of lymphedema by use of wraps, pressure stockings, or pneumatic pump devices may both improve function and relieve pain and heaviness.[105]

Mufazalov and Gazizov[106] showed that laser therapy enhanced therapeutic efficacy of pain-relieving drug regimen in patients with cancer pain. Cancer treatments like radiation therapy can induce mucositis in patients with oral or head and neck cancer and can cause oral pain due to impaired wound healing. Bensadoun[107] commented on the importance of low-level laser therapy on wound healing and its role in mucositis treatments. Maiya *et al*,[108] subsequently showed that helium–neon laser therapy was effective to reduce pain and improve healing of radiation-induced mucositis after 6 weeks of therapy in head and neck cancer patients.

The benefits of exercise and increased physical activity on people diagnosed with cancer are many, including improved function, quality of life, strength, and endurance, and reduced depression, nausea, and pain.[109] Beaton *et al*,[110] in their systematic review found strong, high-quality evidence in favor of exercise interventions (aerobic exercises and strength training given alone or as part of a multimodal physical therapy intervention) in patients with metastatic

cancer for improving physical and quality of life measures. McNeely *et al*,[111] found that progressive resisted exercise training (PRET) program significantly reduced shoulder pain and disability and improved upper extremity muscular strength and endurance in postsurgical head and neck cancer survivors who had shoulder dysfunction because of spinal accessory nerve damage.

Keays *et al*,[82] found improvements in shoulder range of motion and function in women with breast cancer undergoing radiation therapy, who were given pilates exercises which involves whole body movements with breath control. Similar improvements in pain and mobility were observed following physiotherapy intervention (exercises, advice, soft tissue massage to surgical scar) in breast cancer patients who underwent axillary dissection.[112]

Graded activity prescription and regular physical activity as a component of multimodal approach in treatment of cancer pain[113] have a direct influence on the peripheral musculoskeletal system via the exercising muscles. Regular physical activity bears a direct effect on tissue functions, thus leading to counterirritation phenomenon of pain relief. However, for these programs to be effective, it should be accompanied with behavioral training and patient education.

Cognitive-affective mechanism-based physical therapy for cancer pain

Cognitive behavioral therapy (CBT) intervention comprising education, distraction, relaxation, positive mood development and self-coping strategies for pain helps the patient develop acceptance toward symptom persistence and enables them to lead a functionally active life. CBT was studied extensively and shown to be effective in a large number of studies.[114-123]

Music therapy for pain relief in cancer patients was shown to be effective by many authors across the globe[124-131] in cancer patients.

DISCUSSION

Any therapeutic strategy developed for patients experiencing cancer pain depends on the goals of care, which can be broadly categorized as prolonging survival, optimizing comfort, and optimizing function.

-Cherny[132]

While physicians and oncologists are responsible for prolonging survival and nurses and counselors for optimizing comfort, the physical therapists have a major role to play in optimizing function in cancer pain patients. Pharmacotherapy[133] and surgery[134] continue to be mainstay interventions for patients with cancer pain in "prolonging survival" domain of care. A biopsychosocial spiritual care[135] and interventional pain management procedures such as anesthetic blocks[136] would provide "optimizing comfort" domain of care and the physical therapy would address the "optimizing function" domain of care. Is it not true then, *"Physicians add years to life; physical therapists add life to those years?"*

Physical therapists can thus be an inherent team member in the integrated care pathway for cancer pain management in primary, secondary and tertiary care.[137] Molecular mechanisms in pain perception[138] will direct mechanism-based drug therapy prescription[139] in palliative care, whereas mechanism-based understanding will direct physical therapy treatment decision-making and efficient treatment delivery in patients with cancer pain. Pain relieving therapy should always accompany disease-modifying therapy and can never substitute the latter. Understanding and recognizing pain by mechanisms will lead to efficient management of underlying pathobiological process behind pain perception and reporting.[36] Accurate identification of mechanisms is probably best achieved by accurate identification of clusters of information on the basis of a combination of findings from history, examination, and other investigations.[32]

The evidence from animal models should be very carefully extrapolated to clinical situations and hence successful management of patient symptoms in palliative care depend upon an individualized comprehensive multidisciplinary biopsychosocial model of care.[140] Such a holistic examination of a patient with cancer pain will lead to sustainable improvements in the quality of life in a multidisciplinary setting.[141] An integrated psychosocial–spiritual model of care[135] for cancer pain is the most essential therapeutic strategy for these suffering patients. Physical therapists have the ability and potential to integrate physical aspects of treatment in a biopsychosocial model of pain[142] into a comprehensive rehabilitation[143] program for cancer patients.

Physical modalities can be applied by the patient, family, and health care providers, and include physical therapy, external electrical stimuli (TENS), heat, cold, acupuncture, and immobilization. As with psychological measures, their use is intended to augment, not replace, analgesic drug therapy. Importantly, physical measures should be applied early on to minimize the generalized deconditioning and myofascial

pain associated with reduced activity and intervals of immobility associated with cancer and its therapy.[13]

Blaney *et al*,[144] found that exercise barriers in cancer patients were mainly related to treatment side effects, particularly fatigue. Fatigue was associated with additional barriers such as physical deconditioning, social isolation, and the difficulty of making exercise a routine. Environmental factors and the timing of exercise initiation also were barriers. Exercise facilitators included an exercise program being group-based, supervised, individually tailored, and gradually progressed. Exercise motivators were related to perceived exercise benefits. These should be kept borne in mind during evaluation and exercise prescription for pain relief in such population.

Sloan *et al*,[145] demonstrated positive learning benefits and experiences among medical students on cancer pain and its management after they visited a home-care hospice center. Such an educational approach to physical therapy students would facilitate positive health attitudes and behaviors. Earlier study by Kumar *et al*,[146] showed similar positive benefits in knowledge, attitudes, beliefs and experiences about palliative care among physical therapy students following a focused group training program.

Future studies on treatment of cancer pain using such a mechanism-based classification and management is warranted before extrapolating the current evidence into oncological palliative care physical therapy practice.

"Alone we can do so little, together we can do so much..."
-Helen Keller (1880–1968)

CONCLUSION

The paper outlined the mechanism-based classification of cancer pain with evidence for physical therapy treatments for symptomatic relief and toward better quality of life among those with cancer.

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