RESEARCH ARTICLE

Effectiveness of Cognitive Behavioral Therapy Techniques for Control of Pain in Lung Cancer Patients: An Integrated Review

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Abstract

Background: Experience of lung cancer includes negative impacts on both physical and psychological health. Pain is one of the negative experiences of lung cancer. Cognitive behavioral therapy techniques are often recommended as treatments for lung cancer pain. The objective of this review was to synthesize the evidence on the effectiveness of cognitive behavioral therapy techniques in treating lung cancer pain. This review considered studies that included lung cancer patients who were required to 1) be at least 18 years old; 2) speak and read English or Thai; 3) have a life expectancy of at least two months; 4) experience daily cancer pain requiring an opioid medication; 5) have a positive response to opioid medication; 6) have "average or usual" pain between 4 and 7 on a scale of 0-10 for the day before the clinic visit or for a typical day; and 7) able to participate in a pain evaluation and treatment program. This review considered studies to examine interventions for use in treatment of pain in lung cancer patients, including: biofeedback, cognitive/attentional distraction, imagery, hypnosis, and meditation. Any randomized controlled trials (RCTs) that examined cognitive behavioral therapy techniques for pain specifically in lung cancer patients were included. In the absence of RCTs, quasi-experimental designs were reviewed for possible conclusion in a narrative summary. Outcome measures were pain intensity before and after cognitive behavioural therapy techniques. The search strategy aimed to find both published and unpublished literature. A three-step search was utilised by using identified keywords and text term. An initial limited search of MEDLINE and CINAHL was undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe the article. A second search using all the identified keywords and index terms was then undertaken across all included databases. Thirdly, the reference list of all identified reports and articles were searched for additional studies. Searches were conducted during January 1991- March 2014 limited to English and Thai languages with no date restriction. Materials and Methods: All studies that met the inclusion criteria were assessed for methodological quality by three reviewers using a standardized critical appraisal tool from the Joanna Briggs Institute (JBI). Three reviewers extracted data independently, using a standardized data extraction tool from the Joanna Briggs Institute (JBI). Ideally for quantitative data meta-analysis was to be conducted where all results were subject to double data entry. Odds ratios (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals were to be calculated for analysis and heterogeneity was to be assessed using the standard Chi-square. Where statistical pooling was not possible the finding were be presented in narrative form. Results: There were no studies located that met the inclusion requirements of this review. There were also no text and opinion pieces that were specific to cognitive behavioral therapy techniques pain and lung cancer patients.Conclusions: There is currently no evidence available to determine the effectiveness of cognitive behavioural therapy techniques for pain in lung cancer patients.

Keywords: Biofeedback - cognitive/attentional distraction - imagery - hypnosis - meditation - relaxation - mood

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Introduction

Lung cancer is the most common cancer in the world with 1.61 million new cases diagnosed every year (Simmons et al., 2012). Currently, about half of all lung cancer patients are diagnosed at early stages (Stage I to III). Prognosis is generally poor, with five-year survival rates ranging from 54% for Stage I disease to 10% for Stage III disease. Even among those with tumours that are resettable at the time of diagnosis, only 10% are cured (Porter et al., 2012). Lung cancer mortality is very high; 80-90% of patients die within one year of diagnosis (Jean and Irene, 2004). Therefore; it is not surprising that many of these patients experience significant emotional distress. This often contributes to an exaggerated lung cancer patients' perception of physical symptoms and

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suffering. Conversely, physical symptoms and a decline in physical abilities may adversely affect emotional well-being (Gauvin, 2013).

Patients with the greatest physical disability and functional impairment experience more emotional distress (Li et al., 2012). Symptoms commonly associated with lung cancer include: dyspnea, fatigue, pain, cough, anorexia, weight loss and insomnia. These symptoms are also often associated with emotional distress, increased symptom distress, decreased quality of life and functional decline (Susan et al., 2013) which can persist for months or years following treatment. In addition, patients with lung cancer report higher levels of distress than patients with other types of cancer (Porter et al., 2012). The predominance of palliative rather than curative treatment in this group implies that symptom relief is of paramount importance for patients with lung cancer (Jean and Irene, 2004).

Pain is a significant problem for people with cancer. Investigators estimate that upwards of 75% of the people with cancer will experience pain at some point in their illness (Wildiers et al., 2015). Cancer related pain is caused by the disease itself, or alternatively the effects of treatments used. Pain can be chronic, lasting for weeks to months such as metastatic bone pain; or acute, lasting only minutes or hours after a painful procedure (Kwekkeboom, 1993). Lung cancer can cause pain either locally by invading the parietal pleura, ribs, thoracic spinal cord or brachial plexus, or elsewhere in the body by its propensity to metastasis (Jean and Irene, 2004). In addition, short and long term radiotherapy and chemotherapy treatments can also be painful. For these reasons lung cancer is thought to be one of the most common cancers to cause pain (Jean and Irene, 2004). The reported prevalence of pain in patients with lung cancer is 28%-51% (Yoder, 2006). Chest discomfort and/or chest wall pain is common and occurs in about 50% of patients at diagnosis (Yoder, 2006). The discomfort is often ill-defined, aching, and intermittent (Yoder, 2006). Pleuritic pain may be present due to direct spread of the tumour to the pleural surface (Yoder, 2006).

Pain resulting from lung cancer can be classified by two methods: either by the type of pain or according to the original of pain. The location or origin of the pain may determine the type of pain experienced. Pain can also be affected by the histological type and biological behaviour of the lung cancer present. Pain in patients with lung cancer can be differentiated according to its origin, namely intra-thoracic or extra-thoracic, the latter of which may be the consequence of cancer complications (Sansom-Daly et al., 2012; Simmons et al, 2012).

Cancer pain is multidimensional and can be more than simply a physiological or sensory experience. Ahles and colleagues view cancer pain as having five dimensions: physiologic, sensory, affective, cognitive, and behavioral (Ahles et al., 1983). When people experience cancer pain, they not only experience its location, quality, and severity, but also an emotional reaction, often based on the personal meaning ascribed to pain. A person might respond with behavior that is based on one's individual history with pain. In addition, pain can affect how people perceive themselves in relation to others (Ahles et al., 1983).

Because cancer pain has many dimensions, pain management programs are best developed by selecting interventions based on each person's pain experience.4 Strategies with several mechanisms of action might be selected to work together to complement each other, thereby maximizing pain relief (Kwekkeboom, 1993; Sansom-Daly et al., 2012).

Pharmacological treatments have long been used for pain in lung cancer patients, and commonly used medications for pain management include: non-steroidal anti-inflammatory drugs, opioids, and co-analgesics. However, pharmacological interventions may not completely eliminate the pain in cancer patients and often come with their own set of side effects. Therefore, it is important to examine non-pharmacological approaches to control pain (Darba, 2014; Golden, 2004)

Fortunately, a variety of psychological interventions are available to help cancer patients manage their pain. More specifically, cognitive behavioral therapy (CBT) techniques have shown to be valuable tools to relieve pain in various cancer populations and several such treatments have been empirically validated for use with cancer patients (Tatrow and Montgomery, 2006; Sansom-Daly et al., 2012)

Cognitive behavioral therapies represent a class of short term multidimensional approaches to treating emotional and physical problems (Dobson and Dozios, 2001). Cognitive behavioral therapies focus on changing the cognitive precursors of a behavior and demonstrating to patients that they can carry out the behaviors and, once implemented, that they lead to the desired change (Folkman and Greer, 2000; Dobson and Dozios, 2001; McGinn and Sanderson, 2001). Cognitive behavioural therapies for pain management are focused on changing the way a person thinks about and interprets including its cause, meaning, and effects of treatment. The person's perception of pain is influenced by beliefs, appraisals, and coping responses (Dobson and Dozios, 2001). Cognitive behavioural therapies might help lung cancer patients alter their conceptualization of pain, increase tolerance to pain, regulate emotional response, and divert attention from pain (McGinn and Sanderson, 2001)

In this integrated review cognitive behavioral therapy is broadly defined to include any intervention containing components of either behavioral and/or cognitive techniques. Based on reviews, studies were included if they utilized any cognitive behavioral therapy techniques, containing any of the following: activity pacing, assertiveness/communication training, autogenic training, behavioral activation, biofeedback, cognitive/attentional distraction, cognitive restructuring, contingency management, goal setting, imagery, hypnosis, meditation, modeling, pleasant activity scheduling, problem-solving, relaxation training, role playing, systematic desensitization or visualization (Bottomley, 1996; Compas et al., 1998; Mundy et al., 2003; Noyes, 1981; Trijsburg, 1992).

Current practice guidelines suggest that cognitive behavioral pain control methods may provide additional pain control for cancer patients taking opioid medications

(Jacox et al., 1994; Benedetti et al., 2000). If such methods are effective, their use might help to lower opioid requirements for control of moderate to severe cancer pain, resulting in lower opioid related side effects and reduced opioid tolerance (Anderson et al., 2006).

Cognitive behavioral interventions have shown to be effective in reducing persistent pain, thus they have been advocated as adjuncts to the traditional medical management of persistent cancer pain. Although there has been considerable interest in the use of psychological interventions for persistent cancer pain management, few controlled clinical trials have examined the efficacy of these techniques (Karen et al., 1995; Sansom-Daly et al., 2012). In one of the few controlled studies, Spiegel and Bloom assigned metastatic breast cancer patients to 1 of 3 conditions: a support group, a support group combined with a self-hypnosis procedure, or a non-treatment control group. Patients assigned to the psychological treatment groups reported significantly less pain than those in the control condition. The lowest pain was reported by patients in the self-hypnosis condition, although pain in this group was not significantly lower than in the support only group (Spiegel and Bloom, 1983).

This integrated review was the first to examine cognitive behavioral therapy techniques for pain specifically in lung cancer patients. Cognitive behavioural therapy techniques have shown to be effective in reducing pain in patients with breast cancer, prostate cancer, multiple myeloma cancer, colon cancer, lymphoma, gynecologic cancer, and lung cancer (Dalton et al., 2004; Anderson et al., 2006; Kwekkeboom et al., 2012).

The objective of this review was to establish the effectiveness of cognitive behavioral therapy techniques in treating lung cancer pain. The specific review question to be addressed in this review was "what is the effectiveness of cognitive behavioral therapy techniques in treating pain in patients with lung cancer?"

This review considered studies that included patients who were required to 1) be at least 18 years old; 2) speak and read English or Thai; 3) have a diagnosis of lung cancer; 4) have a life expectancy of at least two months; 5) experience daily cancer-related pain requiring the use of an opioid medication; 6) have a positive response to opioid medication (defined as a decrease in pain intensity of at least 1 point on a 0-10 scale the start of opioid therapy); and 7) have "*average or usual*" pain between 4 and 7 on a 0-10 scale for the day before the clinic visit or for a typical day.

Patients were excluded if they 1) had a current diagnosis of major psychiatric illness (e.g., psychosis); 2) were currently receiving therapy expected to modify the source of pain (e.g., palliative radiotherapy); or 3) have had major surgery or blood or marrow transplantation in the past 30 days.

This review considered studies that examined any intervention containing components of either behavioral and/or cognitive techniques for use in treatment of pain in patients with lung cancer pain, including any of the following: biofeedback, cognitive/attentional distraction, imagery, hypnosis, and meditation.

Types of studies: This review considered any randomized controlled trials (RCTs) that examined cognitive behavioral therapy techniques for pain specifically in lung cancer patients. In the absence of RCTs, quasi experimental design reviewed for possible conclusion in a narrative summary.

This review considered studies that included outcome measure that examine the pain intensity before and after practice. The pain intensity was assessed by using a numeric rating scale (NRS) before and after practice.

The search strategy aimed to find both published and unpublished literature. A three-step search was utilised by using identified keywords and text term. An initial limited search of MEDLINE and EMBASE was undertaken followed by analysis of the text words contained in the title and abstract, and of the index terms used to describe the article. A second search using all the identified keywords and index terms was then undertaken across all included databases. Thirdly, the reference list of all identified reports and articles were searched for additional studies. Searches were conducted during January 1991 to March 2014 and searches were limited the both English and Thai languages with no date restriction.

MEDLINE/Pub Med
EMBASE
CINAHL
MEDLINE/Pub Med
DARE
ProQuest 5000
Science Direct
Currents @ OVID
Center for Reviews and Dissemination databases
Major biomedical and specialist complementary medicine

In order to avoid publication bias, the following journals were searched for additional references: Journal of Oncology Nursing, The Management of cancer pain, The Journal of Nursing Scholarship, The Journal of Behavioral Medicine, Cancer. The search also aimed to locate relevant unpublished materials, such as conference papers, research reports, and dissertations. The sources searched to locate unpublished studies included: Dissertation Abstracts; Index to Theses; Conference proceedings; Websites of relevant associations; Direct communication with cancer organizations, and oncology nurse researchers.

Content experts were contacted in order to provide other alternatives for securing relevant literature. All included literature had their reference lists searched for additional relevant studies.

All studies were retrieved with a combination of keywords in the title, abstract, or descriptive terms, based on the inclusion criteria. Keywords included: behaviour(al), biofeedback, cognitive/attentional distraction, imagery, hypnosis, meditation, relaxation, mood, cognitive-behavioural, cancer pain, lung cancer.

Materials and Methods

Assessment of methodological quality

All papers selected for retrieval were to be assessed by three independent reviews for methodological validity prior to inclusion in the review. A secondary reviewer

Table 1. Cognitive-Behavioral Audiotape Interventions for Cancer-Related Pain, Tailoring Cognitive-Behavioral Controlled Trial of a Patient-Controlled Cognitive-Behavioral Intervention Symptom Cluster in Cancer

Setting	Sample	Interventions	Results
Home	N=57 Breast cancer (N=38) Multiple myeloma (N=8) Prostate cancer (N=5) Lung cancer (N=6)	Distraction, positive mood, and relaxation, practice at least five times a week (for each of two weeks) for approximately 20 minutes per section.	Patient in the relaxation and distraction groups reported significantly reduced pain intensity immediately after listening to the tapes.
Four sites (Three cancer treatment centers and one hospital)	N=121 Breast cancer (N=50) Colon cancer (N=10) Lung cancer (N=15) Lymphoma (N=11) Other cancer (N=35)	Standard CBT, profile- tailored CBT, or usual. CBT patients attended five 50-minute treatment sessions.	When compared to standard CBT patients, profile-tailored CBT patients experienced substaintial improvement from baseline to immediately post- intervention in worst pain, least pain, less interference of pain with sleep, and less confusion. From baseline to one-month post-intervention, profile- tailored patients saw greater improvement in less interference of pain with activities, walking, relationships, and sleep; less composite pain interference; and less mobility and confusion symptom distress. Standard CBT and usual care patients experienced little change. Compared to profile-tailored CBT patients, standard CBT patients showed greater improvement at six-months post-intervention with less average pain, less pain now, better bowel patterns, lower summary symptom distress, better mental quality of life, and greater improvement in Karnofsky performance status; usual care patients showed little change.
" Comprehensive cancer center "	N=43 Lung cancer (N=10) Prostate cancer (N=6) "Gynecologic cancer (N=21) Colorectal cancer (N=6)	Relaxation, imagery, or distraction exercises 2 weeks	Decrease severity and distress of "pain, fatigue, and sleep disturbance.

is a requirement when conducting a systematic review but for the purpose of this review, the intention was to limit the role of the secondary review to only critically appraise papers that met inclusions requirements. The critical appraisal instruments to be utilized were from JBI-SUMARI and were dependent on the paper's methodology.

Data collection

Data was to be extracted from papers included in the review using a standardized data extraction tool from JBI-SUMARI. The appropriate data extraction instrument would be chosen based on the methodology used in the paper.

For quantitative studies data would include bibliographic information, study methodology, details relating to the setting of the study, the study participants, the interventions used, the outcomes evaluated, the study results and the authors conclusions (The Joanna Briggs Institute, 2008).

Data analysis

Ideally for quantitative data meta-analysis was to be conducted where all results were subject to double data entry. Odds ratios (for categorical data) and weighted mean differences (for continuous data) and their 95% confidence intervals were to be calculated for analysis and heterogeneity was to be assessed using the standard Chi-square. Where statistical pooling was not possible the finding were be presented in narrative form.

Results

Search results

In total there were 2099 potentially relevant papers identified by literature search. Following the removal of duplicates, 2000 papers were excluded after evaluation of abstracts and 99 citations remained. Ninety-nine papers were retrieved for detailed examination. Ninety-six papers were then excluded after review of the full text. The remaining three papers were assessed for methodological quality although the population of the study is not solely the lung cancer patients. They are, 1) the study of Anderson et al. entitled "*Brief Cognitive-Behavioral Audiotape Interventions for Cancer-Related Pain*" which studied in patients with breast cancer (67%),

prostate cancer (9%), multiple myeloma cancer (14%), and lung cancer (10%) (Anderson et al., 2006), 2) the study of Dalton et al. entitled "*Tailoring Cognitive-Behavioral Treatment for Cancer Pain*" which studied in breast cancer patients (41%), colon cancer patients (8%), lung cancer patients (12%), lymphoma patients (9%), and other cancer patients (30%) (Dalton et al., 2004), and 3) the study of Kwekkeboom et al. entitled "Pilot Randomised Controlled Trial of a Patient-Controlled Cognitive-Behavioral Intervention for the Pain, Fatigue, and Sleep Disturbance Symptom Cluster in Cancer" which studied in lung cancer patients (23%), prostate cancer patients (14%), colorectal (14%), and gynecologic cancer patients (49%) (Kwekkeboom et al., 2012). However, the authors try to contact the author of primary research to ask for the detail of the result for each group of patient. Only one paper responded and addressed that there were no subgroup analysis in the study. We could not pull the data of lung cancer patient together; therefore, we decided to provide the narrative evidence for these three papers and presented in Table 1.

Discussion

The aim of this review was to synthesize the evidence on the effectiveness of cognitive behavioral therapy techniques in treating lung cancer pain. However, the three studies that made methodological quality have the limitation. The first limitation was the "*Brief Cognitive-Behavioral audiotape Interventions for Cancer-Related Pain*", the study of Anderson et al. studied in patients with breast cancer (67%), prostate cancer (9%), multiple myeloma cancer (14%), and lung cancer (10%)

(Anderson et al., 2006), the study of Dalton et al. about "*Tailoring Cognitive-Behavioral Treatment for Cancer Pain*" studied in breast cancer patients (41%), colon cancer patients (8%), lung cancer patients (12%), lymphoma patients (9%), and other cancer patients (30%) (Dalton et al., 2004), and the last study, the study of Kwekkeboom et al. about "*Pilot Randomised Controlled Trial of a Patient-Controlled Cognitive-Behavioral Intervention for the Pain, Fatigue, and Sleep Disturbance Symptom Cluster in Cancer*" studied in lung cancer patients (23%), prostate cancer patients (14%), colorectal (14%), and gynecologic cancer patients (49%) Kwekkeboom et al., 2012). These studies reported positive results from cognitive behavioural therapy techniques in lung cancer patients experiencing pain. These include decreased pain intensity. However, the result of the studies were not presented the subgroup analysis for each group of cancer, as previously addressed on the result section, the authors tried to contact with three authors about the statistical analysis of each cancer type, and only received the response from Anderson's study. Based on the authors' reply, they indicated that the subgroup analysis could not be performed due to the small number of each subgroup. The limitations of three studies were the small size of sample and they studied in many types of cancer patients not only in patients with lung cancer.

The lack of results may have been a consequence of the search itself. The search was not limited by date but was restricted to English and Thai language papers only. Although the search terms used were developed in consultation with a librarian, it is well known that the literature in this area is not standardised and difficult to locate. There is a chance that literature was not captured in part due to these reasons (Cindy, 2011).

Lung cancer has great impact on people's lives, especially for those with pain associated with advanced disease. Pain was also significantly associated with psychological distress in lung cancer patients (Hsu, 2003). However, even though pain appears to be a significant problem for lung cancer patients worldwide, there has been very limited research on pain in lung cancer patients (Hsu, 2003).

Working with lung cancer patients with pain is challenging. However, teaching cognitive behavioural therapy techniques to these very sick patients should not be discouraged. Research is needed to determine what cognitive behavioural therapy treatment period improves patient outcomes without taxing those who report they are too fatigued to participate in a five-week program; perhaps two or three weekly sessions, or even one-time instruction, would be more effective. Though patients were given the option to receive cognitive behavioral therapy techniques over the telephone, only six of 241 treatment sessions were delivered by phone. Delivery of cognitive behavioral therapy techniques treatment by home visits, phone, or internet to patients with pain related to cancer needs to be explored further (Dalton et al., 2004).

Nurses were educated about the cognitive behavioral therapy techniques for pain in lung cancer patients. They were taught these techniques through comprehensive workshops. They were taught how to teach lung cancer patients to use these techniques and when to recommend the use of these techniques to lung cancer patients. When lung cancer patients experienced severe pain, it would be difficult for them to focus on progressive muscle relaxation or visualization exercise but they benefited from deep breathing exercises, distraction techniques or utilizing positive affirmations. When lung cancer patients experienced milder to moderate levels of pain, they could benefit from progressive muscle relaxation or visualization exercises (Anderson et al., 2006).

Current clinical practice guidelines suggest that cognitive behavioral methods provided additional pain control for lung cancer patients taking opioid medications. If such methods were effective, their use might help to lower opioid requirements for control of moderate to severe lung cancer pain, resulting in fewer opioid related side effects and reduced opioid tolerance. The study had one limitation. There were no studies located that met the inclusion requirements of this review. There were also no text and opinion pieces that were specific to cognitive behavioral therapy techniques pain and lung cancer patients (Sherwood, 2005).

The clinical practice guidelines for the treatment of lung cancer recommended that the randomised controlled trials (RCTs) evaluating the efficacy of psychological support in reducing pain specifically in non-small cell lung cancer (NSCLC) cancer patients are not available (Sherwood, 2005).

There is currently no evidence available to determine the effectiveness of cognitive behavioural therapy techniques for pain in lung cancer patients. However, the narrative result indicated that for cognitive behavioural therapy techniques decreased in pain intensity with cancer patients not specific in patients with lung cancer.

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