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SYSTEMATIC REVIEW

Non-drug Stress Management for Patients with Cancer: A Systematic Review

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Abstract:

Background:

Patients with cancer suffer from the physical impacts of the disease, including pain in organs where cancer has spread to and treatment side effects. Many factors affect the mental state of cancer patients, especially stress which can cause muscle tension around the affected area and create a higher degree of pain. Stress impacts physical conditions and results in a worse quality of life. Thus, an appropriate approach to cope with, evaluate, and manage stress in cancer patients is considered crucial.

Objective:

The purpose of this systematic review was to determine and evaluate non-drug stress management guidelines for cancer patients.

Methods:

A systematic review was undertaken to synthesize knowledge concerning stress and non-drug stress management for cancer patients. Information was sourced from documents and articles published by related institutions in relevant electronic databases, including PubMed, PsycINFO, Dynamed, and ScienceDirect between 2013 and 2019. No limitations were imposed regarding the type of study design previously used. Conference abstracts were not accepted. The quality of all included studies was independently appraised by two review writers.

Results:

The search generated 129 studies, of which only 20 met the inclusion criteria. The 20 studies cover 11 studies of music for cancer prevention and 6 studies of mindfulness-based stress reduction in cancer patients. The studies utilized both quantitative and qualitative approaches, while three studies of biofeedback in cancer patients only collected quantitative data. For the outcome from the reviews, 6 studies found that music therapy, biofeedback, and mindfulness greatly impact physical alterations such as insomnia, nausea or vomiting, and pain. Furthermore, 17 studies found that non-drug management techniques had a positive impact on psychological adjustments such as stress and anxiety reduction and relaxation promotion. Non-drug stress management such as music, biofeedback, and mindfulness was found to reduce stress among patients.

Conclusion:

This review confirms that non-drug stress management approaches can reduce suffering, lead to a better quality of life, reduce mortality rates, minimize treatment costs, and prevent and mitigate unwanted symptoms in cancer patients. This approach can be adapted and applied to patients with other diseases in the future. However, because several of the reviewed studies did not have a follow-up period, the present study was unable to collect evidence suggesting how long the observed benefits will remain.

Keywords: Cancer patients, Stress in cancer patients, Non-drug stress management, Music therapy, Biofeedback, Mindfulness.

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1. INTRODUCTION

Cancer is a chronic disease that requires expensive, long-term treatment and significantly affects one's quality of life. Cancer is the main cause of death in the world. The World Health Organization (WHO) [1] reported that cancer causes 12% of all deaths among diseases worldwide, and 80% of all cancer patients are in developing countries. Patients are most likely to be diagnosed with cancer when they have already reached the final stages of the disease [2]. Torre *et al*. [3]

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recorded that 14 million people are diagnosed with cancer each year, with a projection of 20-25 million new cancer patients in 2030 [1]. In Thailand, the main cause of death and suffering is cancer, with 113,000 new cancer patients in 2012 [4]. Cancer patients have a mortality rate of up to 90% [5]. These data show that cancer is a serious problem in Thailand and around the world.

Cancer patients suffer from the disease's physical symptoms, such as pain when cancer has spread to organs, as well as medical side effects such as those from chemotherapy and radiotherapy. Many factors, especially stress, have an impact on cancer patients' mental health. Cancer patients and their family members tend to feel stressed about the outcome of treatment, cancer recurrence, and the cost. If stress is not adequately managed, it will have an adverse effect on health [6]. When the body is exposed to stress, adrenaline is released, and blood pressure increases [7]. Changes in the body caused by stress can lead to serious illnesses such as heart disease, diabetes, and cancer. If stress accumulates for a long time, it may affect the person's health status or lead to other symptoms such as increased pain in cancer patients. Stress causes muscle tension and creates a higher degree of pain around the affected area. The American Psychological Association [8] has stated that stress can lead to health problems and exacerbate symptoms in many patients. Opasrattanakorn *et al*. [9] conducted a study entitled "Stress and Coping of Nasopharyngeal Carcinoma Patients Receiving Concurrent Treatment." They reported that cancer patients receiving chemotherapy and radiotherapy for at least three months had high levels of stress. Further, Kaewrat *et al*. [10] carried out a study entitled "Life Experiences of Ongoing Chemotherapy for Colorectal Cancer Patients." They stated that intestinal cancer patients tend to feel anxious and worried about the curability and spread of cancer.

These reports show that cancer has a significant impact on the health of patients as well as their mental state and that stress has an impact on physical health and also a negative impact on cancer patients' quality of life. Pharmacological treatment is mainly used in cancer patients to manage symptoms and to treat side effects, particularly chemotherapy and radiation therapy, which can result in unfavorable side effects and suffering. There are many ways in which non-pharmacologic cancer treatments can be used to successfully manage symptoms of stress in cancer patients (*e.g*., fear of diagnosis, treatment options and side effects, consequences of their diagnosis on the family, *etc*.). This systematic review will evaluate the effects of non-drug stress management interventions in patients with cancer as a guideline for finding the right way to manage stress in cancer patients beyond drug therapy.

1.1. Objectives of the Systematic Review

This study systematically reviewed determined non-drug stress management interventions in patients with cancer.

2. METHODS

This study was guided by the methodological framework outlined following the Preferred Reporting Items adapted from PRISMA 2009 [11], including four processes for paper selection: 1) identification of key terms within the database, 2) screening the papers, 3) checking the content and details, and 4) listing the considered studies.

2.1. Inclusion and Exclusion Criteria

An article was included if it met the following criteria: 1) included in PubMed, PsycINFO, Dynamed, and ScienceDirect between 2013 and 2019, 2) if the study participants were patients with cancer, 3) if published in Thai or English, and 4) if no limitation regarding the type of study design previously utilized was made. Abstracts from conferences were not accepted.

2.2. Search Strategy

A systematic search was performed using thesaurus terms and keywords regarding stress management for cancer patients. A combination of search terms and keywords was used in the search strategy: stress in cancer, stress management, and non-drugs in cancer patients. Information was sourced from relevant electronic databases, including PubMed, PsycINFO, Dynamed, and ScienceDirect between 2013 and 2019.

2.3. Study Selection and Quality Assessment

Following the completion of the search, two reviewers separately reviewed the titles, abstracts, and full papers in a series of rounds, using the inclusion criteria. This systematic review was guided using the PRISMA 2009 [11] flow diagram, including four processes for paper selection. In step 1, the search process involved the identification of key terms within the database, including "stress in cancer," "stress management," and "non-drugs in cancer patients." Step 2 screened the papers using the inclusion criteria for selecting relevant studies as primary sources. The research studies were written in both Thai and English, while studies written in other languages that were not related to stress and non-drug stress management for cancer patients were excluded. Step 3 involved checking the content and details of the investigation, while step 4 listed the considered studies. Two review authors independently assessed the quality of all included studies using the Critical Appraisal Skills Programme (CASP) [12]. For each checklist to be included, at least 70% of the criteria had to be met. When there was no agreement between the two reviewers during the title and abstract screening, the study was included in the next round for further consideration in order to reduce the possibility of selection bias [13, 14].

2.4. Data Extraction

Data extracted from the systematic reviews were tabulated, including study design, purpose, and key content or findings related to stress and non-drug stress management for cancer patients.

In total, 129 studies were identified and adapted following the PRISMA 2009 process, while 41 studies were assessed for eligibility and included in the review in terms of the cause of stress, the consequences of stress, and non-drug stress management for cancer patients. Finally, 20 studies were included for the quantitative synthesis detailing non-drug use by cancer patients, including music with 11 studies, biofeedback with 3 studies, and mindfulness for reducing stress with 6 studies, as shown in Fig. (**1**).

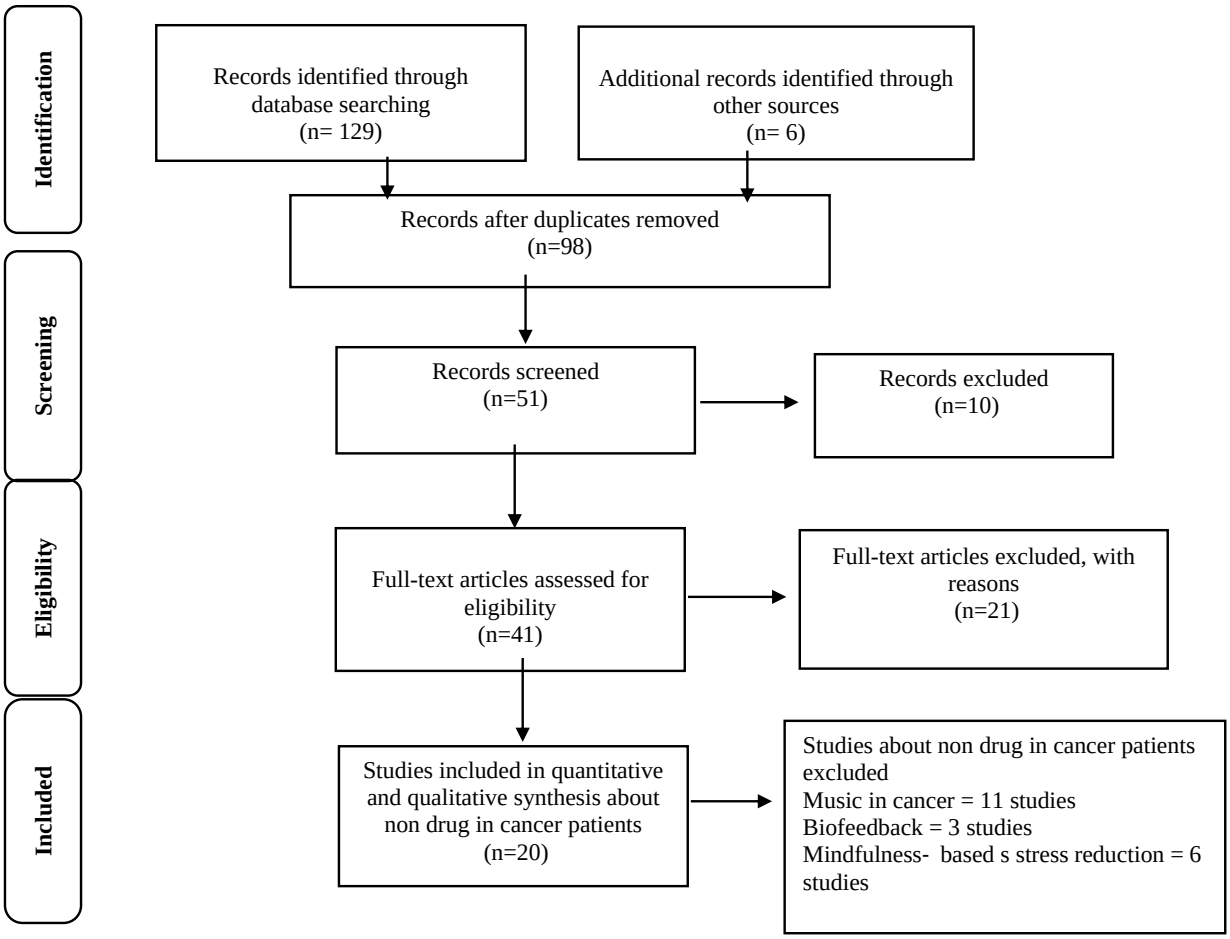

Fig. (1). PRISMA 2009 flow diagram to examine the terms "stress in cancer," "stress management" and "non - drug in cancer patients."

3. RESULTS AND DISCUSSION

The results of the review process are shown in Fig. (**1**). The PubMed, PsycINFO, DynaMed, and ScienceDirect searches and screenings resulted in 20 articles.

3.1. Characteristics of the Studies

Table **1** presents an overview of the 20 studies, including their titles, research design, the number of participants, and outcomes/results. The 20 articles refer to 11 studies of music regarding cancer reduction and 6 studies on mindfulness-based stress reduction in cancer patients, presenting both quantitative and qualitative designs, while 3 studies on biofeedback in cancer patients were presented in quantitative format only.

In terms of the studies of music in relation to cancer patients, 4 were of an experimental design [15 - 19], 2 were randomized controlled trials [13, 20], while 1 study was a systematic review [21, 22], 1 was an integrative review [23, 24], 1 was a qualitative study [14], 1 was a retrospective study [16], and 1 was a feasibility study [25 - 27].

Table 1. A summary of the articles reviewed.

Article (Reference)	Year	Design	Participants	Outcome/Results
Music in Cancer (11 Studies)				
Bro *et al*., (2019). [13]	2019	Randomized controlled trial	143 patients with non-Hodgkin and Hodgkin lymphomas	Patients with malignant lymphomas undergoing chemotherapy preferred live music to reduce anxiety
Gallagher *et al*., (2017). [14]	2017	Qualitative method	100 palliative medicine and/or hospice patients' family members	Family members of patients in palliative medicine and hospice settings reported an immediate positive impact of music therapy on the patient and themselves
Toccafondi *et al*., (2018). [15]	2018	Experimental study	242 patients at the medical oncology unit of Massa Carrara's AUSL 1 Hospital in Tuscany, Italy	Music was shown to be an effective, standardized, easy-to-replicate, and low-cost intervention that reduced psychological burden and improved the well-being of hospitalized cancer patients

(Table 1) contd.....

Article (Reference)	Year	Design	Participants	Outcome/Results
Gallagher, Lagman, & Rybicki, (2018). [16]	2018	Retrospective study	293 patients admitted to the Horvitz Center	Responses to participating in music therapy showed positive symptoms and behaviors of palliative medicine patients
Karagozoglu, Tekyasar, & Yilmaz, (2013). [17]	2013	Experimental cross-section study	l40 cancer participants who received chemotherapy	Music therapy and visual imagery had positive effects on chemotherapy-induced anxiety, nausea and vomiting
Romito *et al*. (2013) [18]	2013	Experimental study	62 breast cancer patients were recruited in the outpatient Oncology Unit	Music has been rated helpful by patients with cancer and can be considered useful in lowering negative emotions during the administration of chemotherapy
Tahan, Akherati, & Ahangri,(2018) [19]	2018	a quasi-experimental study	40 patients with cancer admitted for treatment in Valiasr Hospital in Birjand City	Music therapy is effective in lowering stress, anxiety, and depression in patients with cancer.
Warth *et al*., (2014). [20]	2014	Randomized controlled trial	84 participants from a palliative care unit in Heidelberg	Music therapy was more effective than the control treatment at promoting relaxation
Bradt *et al*., (2016). [21]	2016	Systematic review	23 music therapy trials and 29 music medicine trials	Music interventions may have beneficial effects on anxiety, pain, fatigue, and quality of life in people with cancer
Keenan *et al*., (2015). [23]	2015	Integrative review	An electronic literature search from 1986-2014, 82 papers	Nonpharmacologic methods such as music may minimize cancer pain
Greenberg *et al*., (2015). [27]	2015	Feasibility Study	16 patients with non-small cell lung cancer (NSCLC)	Patients learned to reduce their stress, improve their respiration and heart rate variability and improve coping
Biofeedback in Cancer (3 studies)				
Alvarez *et al*., (2013). [28]	2013	Experimental study	23 female breast cancer patients	EEG biofeedback showed potential for reducing negative cognitive and emotional sequelae of cancer treatment as well as improving fatigue and sleep patterns
Shockey *et al*., (2013). [29]	2013	Experimental study	12 children diagnosed with cancer	Biofeedback relaxation training offers a portable, easily learned, and memorable technique that is appropriate for children in the treatment setting before invasive procedures
Kotozaki *et al*. (2014) [30]	2014	Randomized clinical trials (RCTs)	30 participants were recruited between June 2012 and November 2012	Biofeedback training (BFT) is effective against the gray matter (GM) structures vulnerable to stress.
Mindfulness-based stress reduction in cancer (6 Studies)				
Garland *et al*. (2013). [31]	2013	Experimental study	268 heterogeneous cancer patients	Patients with cancer benefited psychologically by participating in a mindfulness-based stress reduction program.
Van den Hurk *et al*. (2015). [32]	2015	Mixed methods	19 lung cancer patients and 16 partners recruited at one tertiary care academic medical center	Patients with lung cancer and their partners appeared to benefit from mindfulness-based stress reduction training.
Schell *et al*., (2019). [33]	2019	A Systematic Review	14 papers of randomized clinical trials (RCTs)	Stress reduction based on mindfulness improved quality of life slightly at the end of the intervention and reduced anxiety, depression, as well as a modest improvement in sleep quality at both the end of the intervention and up to six months later
Zainal, Booth, & Huppert, (2013). [34]	2013	Meta-analysis	625 references in English	Mindfulness-based stress reduction showed a moderate to a large positive effect on the mental health of breast cancer patients
Rush & Sharma, (2017) [36]	2017	A Systematic Review	31 articles from October 2009 to November 2015	Mindfulness-based stress reduction appears to be beneficial for cancer patients' stress management.
Schellekens *et al*. (2017) [37]	2017	Randomized clinical trials (RCTs)	31 patients and 21 partners were diagnosed with non-small cell or small cell lung cancer based on cytology or histology.	MBSR can effectively address psychological distress in lung cancer patients.

For the studies on biofeedback in relation to cancer, 2 studies were in the experimental form [28, 29], and 1 study was a randomized controlled trial [30 - 32]. In terms of the studies of mindfulness-based stress reduction in cancer patients, 2 were systematic reviews [33 - 36], and 1 study was of an experimental form [31], 1 was mixed-methods [32], 1 meta-analysis [34], and 1 was a randomized controlled trial [37].

The sample sizes in 3 studies [27 - 29] were relatively small: the group sizes ranged from 12 to 23 participants. The most frequently studied research populations were cancer patients (15 studies) [13 - 20, 27 - 32] (*e.g.*, cancer participants that received chemotherapy, breast cancer patients, lung cancer patients, and heterogeneous cancer patients).

Regarding the outcomes from the reviews, 6 studies showed that music therapy, biofeedback, and mindfulness had a positive effect on physical changes, such as reducing insomnia, nausea/vomiting, and pain from cancer [16, 17, 21, 23, 27, 28]. In addition, 17 studies showed that non-drug management techniques had a positive effect on psychological changes, such as reducing stress and anxiety and promoting relaxation [13 - 15, 17 - 21, 27, 29 - 34, 36, 37].

3.2. The Effects of Music Therapy on Cancer Patients (11 Studies)

This section describes the effects of music therapy on cancer patients. This systematic review found that 11 studies reported the effectiveness of music on stress in cancer patients. The studies showed that the use of music therapy could reduce physical symptoms such as pain, rapid breathing, tiredness, and mental symptoms such as stress and depression [13 - 19], while one study found that music therapy was more effective in promoting relaxation in palliative care patients [20].

Thus, music therapy is a non-pharmacological approach that can reduce stress in cancer patients through the melody and rhythm of the music. Music can enhance the secretion of endorphins in the brain, which affects the levels of stress in the body [20, 21]. Music intervention is an effective, nontoxic, easy-to-replicate, and low-cost intervention that reduces the psychological burden and improves the well-being of hospitalized cancer patients [15, 23]. Music is currently used to reduce stress, anxiety, and pain and to promote the quality of life of cancer patients and their families [22 - 24]. Music therapy is considered beneficial for cancer patients with stress, as it can enhance their quality of life and distract them from pain and other unpleasant symptoms. However, more research needs to be conducted in order to better understand the benefits of music therapy for palliative medicine patients [16, 18].

3.3. The Effects of Biofeedback on Cancer Patients (3 Studies)

Biofeedback is a tool that patients can use to develop their own stress management capabilities. It is an important tool for managing stress that has an effect on various symptoms such as high blood pressure, muscle tension, and chronic pain [25]. Patients will learn to control their stress by developing awareness of the stress through the physical reactions associated with it. In this way, patients will finally be able to control the stress on their own without having to use biofeedback [26]. Three studies showed that biofeedback is beneficial for cancer patients. The results suggested that biofeedback can help reduce stress, decrease rapid breathing, help people maintain a normal heart rate, and help in improving sleep disorders and fatigue [26 - 30].

Therefore, biofeedback is a promising treatment that has the potential to minimize patient stress and can reduce or eliminate the need for medication. Biofeedback may become the most commonly used treatment in the near future.

3.4. The Effects of Mindfulness on Cancer Patients (6 Studies)

Mindfulness is the practice of mediation that mainly focuses on one's inward and outward breathing, with the aim of developing awareness of the present moment, promoting relaxation, and reducing stress and anxiety [31]. Mindfulness can be used to develop the presence of mind and reduce stress in patients with cancer. Six studies explained the effectiveness of mindfulness in patients with cancer. Five studies revealed that mindfulness-based stress reduction is a useful intervention for reducing stress, anxiety, and cortisol levels and is also beneficial to caregivers [32 - 36], while one study indicated that mindfulness-based stress reduction can decrease symptoms such as fatigue, sleep disorders, stress, and anxiety, and can contribute to a better quality of life in patients with cancer [37].

Therefore, mindfulness-based stress reduction can help not only with reducing psychological discomfort but also with acknowledging and accepting the disease and impending mortality. Moreover, mindfulness-based stress reduction can be recommended to cancer patients as an option as part of their rehabilitation to help maintain a better quality of life in the longer term [32, 34].

3.5. Clinical Significance

Non-drug stress management, such as music therapy, biofeedback, and mindfulness-based stress reduction, is an alternative nursing therapeutic technique of stress management for cancer patients. The medical profession can easily use this intervention in patients with stress and can help reduce stress levels and prevent complications in patients that have stress. The results of the study may also prove useful as information to support the implementation and application of relaxation techniques in nursing.

3.6. Strengths and Limitations

The strength of this systematic review is to be the best available research evidence for stress management in cancer patients particularly. Healthcare providers can use this information to better nursing implementation and applications. Specifically, cancer patients will be able to manage their stress appropriately. Moreover, this review can provide useful guidance to prevent stress and enhance the quality of care for cancer patients. However, the major limitation is that the review could not provide the information that can indicate how long the observed effects will last since many studies included in this review do not have a follow-up period.

CONCLUSION

Cancer patients are exposed to stress caused by a variety of factors, including symptoms of the disease, the cost of treatment, and the side effects, which have an effect on their quality of life. Non-pharmacological stress management approaches that are convenient and easy to implement and that are free of charge are likely to allow cancer patients to cope with stress in a more effective way. They can reduce the suffering from cancer, lead to a better quality of life, reduce the mortality rate, minimize the cost of treatment, and prevent and mitigate unwanted symptoms. It would be very helpful if these approaches were adopted and applied to patients with other diseases in the future.

CONSENT FOR PUBLICATION

Not applicable.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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