Bachelor Thesis

The Role of Nurses in Symptom-Management of Cancer-Related Fatigue: a literature review

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25.03.2019 *Ayla Zukic, e. h.”*

Table of Contents

Table of Figures

Abstract

Background: Cancer is the second leading cause of death in the world with about 9.6 million deaths in 2018. This number is foreseen to grow due to the aging population. When a patient is diagnosed with cancer, their physical wellbeing is affected.
One of the most distressing symptoms that affects their wellbeing is fatigue. It affects 70-100% of cancer patients and can be more distressing than other symptoms, such as pain, nausea, depression, or vomiting. Fatigue is even longer lasting than other symptoms and remains with the patient the longest, even after treatment.

Aim: The aim and objective of this research is to find what a nurse can do, and what their role is, in the symptom-management of cancer-related fatigue.

Method: The search for literature was done in October and November 2018. Databases PubMed and CINAHL were used for the search using keywords. 289 studies were found altogether and after screening, eleven were included in the results after being critically appraised.

Results: The results can be categorized in four categories: exercise, mind and body interventions, education, and light therapy. Exercise includes aerobic exercise, home-exercise, and a combination of different types. Mind and body interventions include meditation, yoga, body scan, relaxation, therapeutic touch, etc. Education includes psychoeducation, one-on-one nursing education, education on energy conservation, and monitoring and assessing followed by education.

Conclusion: The role of nurses in symptom-management of CRF is assessing and monitoring, working in a multidisciplinary team, therapeutic touch, and educating patients on how to manage their fatigue.

Keywords: cancer-related fatigue, nursing, symptom-management, intervention

Zusammenfassung

Hintergrund: Krebserkrankungen sind die zweithäufigste Todesursache weltweit. Im Jahr 2018 sind etwa 9,6 Millionen Menschen an Krebs verstorben und die Zahl wird voraussichtlich aufgrund der alternden Bevölkerung weiter zunehmen.

Bei der Diagnose Krebs wird das körperliche Wohlbefinden durch verschiedene Faktoren beeinträchtigt. Das Symptom Fatigue betrifft 70-100 % der KrebspatientInnen und wird belastender als andere Symptome wie Schmerzen, Übelkeit, Erbrechen und Depression empfunden, da es länger andauert und nach Beendigung der Therapie auf längere Sicht anhält.

Ziel: Das Ziel dieser Arbeit ist es, herauszufinden, welche pflegerischen Interventionen gesetzt werden können und welche Rolle Pflegepersonen im Symptom-Management von krebsbedingter Fatigue spielen.

Methode: Die Literaturrecherche fand im Zeitraum von Oktober bis November 2018 statt und in den Datenbanken PubMed und CINAHL wurde die Suche mit passenden Schlüsselwörtern durchgeführt. Insgesamt wurden 289 Studien identifiziert und nach einem Screening konnten 11 Studien in die Ergebnisse inkludiert werden. Diese wurden anhand eines standardisierten Bewertungsbogen kritisch beurteilt.

Ergebnisse: Die Ergebnisse lassen sich in vier Kategorien einteilen: Bewegung, Interventionen für den Körper und Geist, PatientInnen-Edukation sowie Lichttherapie. Die Bewegungen umfassen Aerobic-Übungen, Übungen zu Hause und einer Kombination von verschiedenen Übungen. Zu den Interventionen für den Körper und Geist zählen unter anderem Meditation, Yoga, Körperscan, “therapeutic touch”, und Entspannungsübungen. Die PatientInnen Schulung umfasst eine Psychoedukation, one-on-one Edukation, Edukation zur Einsparung von Energiereserven, sowie Assessment und Überwachung der Symptome inkl. Schulung seitens der Pflege.

Schlussfolgerung: Die Rolle der Pflege beim Symptom-Management von Krebs-assoziierter Fatigue liegt in der Beurteilung und Überwachung der Symptome, der Zusammenarbeit im multidisziplinären Team, „therapeutic touch“ und der Edukation von PatientInnen im Umgang mit Fatigue.

Keywords: cancer-related fatigue, nursing, symptom-management, intervention

1. Introduction

1.1. Background

Cancer, malignant tumor or neoplasm, is an abnormal growth of cells beyond the normal confinement that can spread to other parts of the body and organs. Cancer is the second leading cause of death in the world, about 9.6 million deaths in 2018. (World Health Organization).

In 2018, the five- year cancer prevalence in the world was at 43.8 million, with lung and breast cancer leading the percentage of most common, 11.6% each. Colorectal follows closely behind, and prostate and other cancers afterward. In Europe the five-year prevalence was at 12.1 million and in Austria the number was at 133,934 (Global Cancer Observatory, 2018a).

Advancing age is a risk factor for many different cancer types. The mean age of cancer diagnosis is approximately 66 years (National Cancer Institute, 2015a). Almost every country in the world today is confronted with an aging population, meaning that the number and proportion of the population's elderly is growing. The number is expected to double by the year 2050 and Europe currently has the highest number in population age (60 and over) (United Nations). Because of the aging population, this number has grown in the past years in Austria and it is foreseen to continue to grow. (Bundesministerium für Gesundheit, 2015b).

When a patient is diagnosed with cancer, their physical wellbeing is affected. This can either be because of the cancer itself, or because of the treatment. It is affected mostly because of the various symptoms that come with the diagnosis or treatment, such as, appetite disturbance, nausea, vomiting, constipation, pain, fatigue, dysphagia, sleep deprivation, weight loss, and anxiety and depression (King and Hinds, 2012, p. 197). With time, after the diagnosis, wellbeing continuously deteriorates, leading to a decrease in overall health and quality of life, mobility and activities of daily living, life satisfaction, and an increase in depressive symptoms (Williams et al., 2015).

1.2. Fatigue

One of the most distressing symptoms that affects a patient's wellbeing is fatigue. Not only does it affect 70-100% of cancer patients, but can be even more distressing than pain, nausea, depression, or vomiting. It is even longer lasting than other symptoms and remains with the patient the longest, even after treatment. Experiencing non-cancer related fatigue is not the same as experiencing cancer-related fatigue. It is more distressing, and in contrast to non-cancer related, it cannot be improved with rest (King and Hinds, 2012, p. 394).

1.2.1. Definitions of Fatigue

Fatigue is defined as:

"A condition marked by extreme tiredness and inability to function due to lack of energy." (National Cancer Institute)

Fatigue can be acute or chronic, meaning it can be a specific single event or long-term ongoing, quick or slow, brief or continuous, and controllable or non-controllable. The cause of fatigue can be due to illnesses or circumstances, such as childbearing, multiple sclerosis, AIDS, rheumatoid arthritis, or cancer. Cancer-related fatigue is described as "unique" (Fitzpatrick and Wallace, 2006, p. 206)

The definition of cancer-related fatigue (CRF) is

"a distressing, persistent, subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning." (King and Hinds, 2012, p. 393)

1.2.2. Cause and Effect

The cause of cancer-related fatigue is still unclear, but what is known is that it is multi-dimensional. Factors such as:

- demographic, for example marital status and income
- medical, for example comorbidity, medication, nutritional problems, physical deconditioning and symptoms
- psychosocial, for example depression

- behavioral, for example mood-swings and
- biological, for example anemia and cytokine dysregulation

have an effect on CRF. CRF tends to increase during and after cancer treatment, as a result from therapy, such as chemo, radiation, hormone, and biological therapy (Bower, 2014).

CRF affects patients' daily lives on different levels, and limits their abilities from the norm; physically, psychosocially, occupationally, and economically. Patients are not able to lead their life as they usually would because of the constant tiredness and the need for more sleep and rest, as well as the diminished energy level and the need to slow down from their usual pace. Simple tasks such as walking, household chores such as cleaning and cooking, and socializing become difficult to perform or they can only perform half of the usual activities. Patients are affected mentally and emotionally because of the decreased motivation and interest, as well as the increased sadness, frustration, and irritability. They have to push themselves more than usual in order to perform. Their concentration and memory are limited, including keeping dates straight. In some cases, patients start to feel depressed and hopeless, or even start to feel like they want to die. Not only do patients have to often take sick days or stop working altogether, take disability, or unpaid leave because of the fatigue, but they often have to hire someone to help them with chores and errands that they cannot do themselves. Also, their primary caregiver often has to take time off work or work less hours, sometimes even completely stop working, in order to take care of the patient, all because of the fatigue. This can majorly affect a patients economical or financial situation (Curt et al., 2000).

Fatigue also has a profound effect on a patient's quality of life. The more intense the fatigue is, the more the quality of life continues to decline (Gupta et al., 2007). It is even possible that the CRF becomes so intolerable to patients, that they choose to discontinue their treatment or therapy because of it. Women diagnosed with ovarian or lung cancer with metastasis, and who have a poor performance status, are especially

prone to be burdened with CRF, as well as younger women with breast or ovarian cancer (King and Hinds, 2012, p. 402).

1.2.3. Health Care Professional's Perception

It is not quite known to health care professionals, such as doctors and nurses, how much CRF actually impacts and burdens a patient. In a study that compared the perception of fatigue versus pain, most health care professionals believed that pain impacts daily lives much more than fatigue. However, this is not the case. The patients in this study reported that fatigue had a larger impact. It is also less monitored, tracked and treated than pain (Williams et al., 2016).

CRF is under-recognized and under-treated. This is most likely due to the fact that health care professionals have a lack of knowledge and because the topic is often beyond their practice area. In a study that surveyed health care professional's knowledge on CRF, occupational therapists were the health care group that performed the most interventions for it. Most participants were not even able to list strategies for the management of CRF, or they only listed under five. Also, the majority received their knowledge informally, such as reading or personal experience, and therefore resulted in a lack of confidence when confronted with CRF. Nowhere in the study was the knowledge and role specific to nurses. Another issue was the inconsistency of assessment or routine screening, and the lack of resources, such as guidelines. Some also stated that CRF was not considered high priority and was not managed because of this reason (Pearson et al., 2015).

1.2.4. Treatment

Currently there are studies that show a couple of pharmacological treatments effective in reducing CRF. A review by Bower (2014) discussed the different current treatments. This includes hematopoietic agents, however only due to chemotherapy-induced anemia causing the fatigue. Also, methylphenidate, a psychostimulant, and paroxetine, an antidepressant. Conversely, dexamethasone, a steroid, also improved fatigue as well as the quality of life of patients. Etanercept, a TNF-decoy receptor and infliximab,

an anti-TNF antibody, showed some improvement as well, when comparing to only chemotherapy-receiving patients.

There are some studies that show effectiveness of the use of dietary and herbal supplement treatment. L-cartinine and American ginseng were both successful in reducing CRF.

The same study also discussed non-pharmacological interventions, such as physical activity, psychosocial, and mind-body interventions *(Bower, 2014).*

1.2.5. Risk Factors

There are some psychological and biobehavioral risk factors to CRF. Pretreatment fatigue, meaning patients who have higher levels of fatigue before their treatment starts, is the strongest risk factor. Also, depression is a risk factor as well. The association between the two symptoms is complex, however it does increase the chance of CRF. Sleep disturbances, physical inactivity, and the patient's body mass index are also risk factors that can increase the chance of being affected by CRF. Lastly, coping and appraisal, such as the inclination to catastrophize or having negative thoughts, can be a factor as well (Bower, 2014).

1.2. Relevance to Nursing

Because of the prevalence of CRF, nurses are bound to be confronted with this issue, especially oncology nurses. Fatigue in general is a nursing issue, as it is a diagnosis found in the North American Nursing Diagnosis Association (NANDA). Here fatigue is defined as:

"An overwhelming sustained sense of exhaustion and decreased capacity for physical and mental work at usual level" (NANDA International, 2013).

The role of nurses in symptom-management in general is working together with a physician and identifying the symptoms through continuing and systematic assessment (King and Hinds, 2012, p. 197). The definition of symptom-management from the National Cancer Institute is:

"Care given to improve the quality of life of patients who have a serious or life-threatening disease. The goal of symptom management is to prevent or treat as early as possible the symptoms of a disease, side effects caused by treatment of a disease, and psychological, social, and spiritual problems related to a disease or its treatment" (National Cancer Institute).

1.3. Gap in Knowledge and Objective

As concluded in the background of this topic, CRF is an important issue that should have more information available on how to help patients as a nurse or any other health care professional. Due to the aging population and the rise in cancer prevalence, the importance of this topic will continue to grow.

To date, no literature review on the role of nurses in symptom-management of cancer-related fatigue, that concentrated on only nurses, was found, yet nurses are the profession that work bed-side and communicate with patients. Therefore, the aim and objective of this research is to find what a nurse can do, and what their role is, in the symptom-management of cancer-related fatigue. This includes hands-on, bedside intervention and as well as communication and education. From this aim the research question is: What is the role of nurses in symptom-management of cancer-related fatigue (CRF)?

2. Methods

A literature review was conducted, in order to answer the research question. A literature review is a summary of evidence on a research problem, and a literature review in a thesis includes a thorough, critical literature review, as well as an evaluation of the overall body of literature and a critique of key individual studies (Polite and Beck, 2017, p. 88, 114)

2.1. Literature Search

The search for literature was done in October and November 2018. Databases PubMed (Public Medical Literature Online) and CINAHL (Cumulative Index to Nursing and Allied Health Literature) were used for the search using keywords.

Different strategies or combinations of the following keywords were attempted until the optimal results were presented: cancer-related fatigue, symptom-management, intervention, and nurs. The keywords were combined with the Boolean operators “AND” and “OR”. “AND” delimits the search and “OR” expands the search. The keyword ‘nurs’ had a truncation symbol, an asterisk, in order to expand the search.

MeSH- Terms (Medical Subject Headings) were not used. MeSH- Terms (Medical Subject Headings), are used to describe articles by experts for MEDLINE records (U.S. National Library of Medicine, 2018b).

Final search strategy

Table 1: Final search strategy in databases PubMed and CINAHL

PubMed	(cancer-related fatigue) AND ((symptom-management) OR intervention) AND nurs*
CINAHL	“cancer-related fatigue” AND (“symptom-management” OR intervention)

Two additional filters were added as well: the year of publication from 2008 to 2018, as well as a language filter, German and English.

2.2. Study Selection

Content Criteria

Only the studies that concentrated on cancer-related fatigue were included. These studies needed to describe either interventions that could be done by a nurse, or education and counseling measurements, that could be done by a nurse as well. Pharmacological or interventions that must be done by a medical doctor were excluded, as the review focuses on the role of nurses. Also, patients must have a cancer diagnosis, since “regular” fatigue and cancer-related fatigue are not considered equivalent (see definitions). The treatment could be either ambulatory, in-patient, or at home. Studies which included children with cancer were not included as well. Cancer survivors were not considered an exclusion criterion, as it is still cancer-related. All types of research designs were included.

Selection Process

When the optimal search strategy was chosen, the results from both PubMed and CINAHL were imported into Endnote X8, a reference management software. In Endnote, the duplicates were removed to reveal the total number of studies. A title and abstract screening followed in order to eliminate the studies that did not meet the criteria to answer the research question. The screening removed a large number of studies and left 34 studies to be further evaluated. After the title and abstract screening, each study was read in order to identify if it could answer the research question. This revealed twelve relevant studies to be included in the review. The excluded full-text articles were excluded as they did not answer the research question. This process is portrayed in a flow diagram (Figure 1). The relevant studies were then evaluated using a critical appraisal tool.

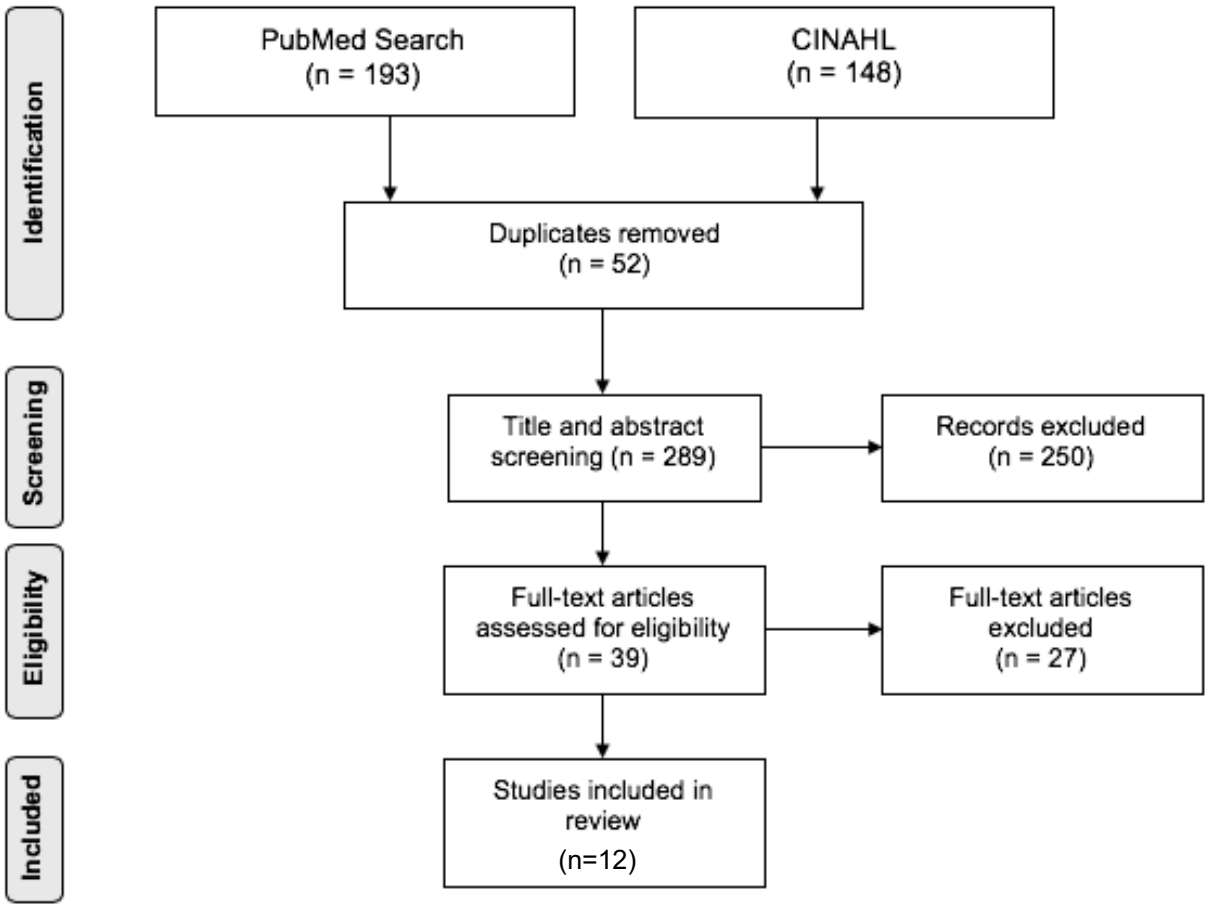

Figure 1: Flow diagram portraying the search for literature and process using the PRISMA Statement (Moher D, 2009)

2.3. Critical Appraisal

The final twelve studies were assessed using a critical appraisal tool by Hawker et al. (2002) in order to uncover the strengths and weaknesses of each study. This tool can be used for both qualitative and for quantitative studies. This was conducted in order to have all studies equally evaluated using the same objectivity.

The appraisal tool has nine criteria for which a study is assessed. This includes: abstract and title, introduction and aim, method and data, sampling, data analysis, ethics and bias, results, transferability or generalizability, and implications and usefulness. Each criterion is scored with either good, fair, poor, or very poor. These

scores range from 1 to 4, 4 being good quality and 1 being poor quality (Hawker et al., 2002).

After scores are given to each criterion, they are added up and must equal 60% or more in order to be included in the review. The assessments are to be found at the end of the review.

The results of the studies will be exemplified in the following chapter.

3. Results

The results of the studies are exemplified in this chapter. After being critically appraised for their quality and compared to each other, they were categorized based on their findings: exercise, mind-body interventions, education, and light therapy.

3.1. Characteristics

Ten of the studies were randomized controlled trials, and two were quasi-experimental. The number of participants ranged from 31 to 269. Four studies were conducted in North America, five were in Asia, and three were in Europe. Each study used one or more of the following assessment tools to measure fatigue levels in patients: the Brief Fatigue Inventory, the Fatigue Symptom Inventory, the Piper Fatigue Scale, the Multidimensional Fatigue Inventory, the Functional Assessment of Cancer Therapy - Anaemia Questionnaire, Rhoten Fatigue Scale, and/or the Cancer Fatigue Scale. A brief description of the assessment tools is summarized in Table 2.

Table 2: Description of instruments used for CRF assessment

Title	Description
Brief Fatigue Inventory (BFI)	A quick, reliable and valid, patient self-report instrument to assess CRF. It assesses the severity of fatigue as well as the patient's ability to function in the past 24 hours. The instrument consists of nine items with the measurement scale ranging from zero to ten (Patel and Bhise, 2017).
Piper Fatigue Sale (PFS)	A valid and reliable instrument to assess the cognitive, sensory, behavioral, and affective dimensions of fatigue with three open-end questions. (Yesilbalkan et al., 2009)
Multidimensional Fatigue Symptom Inventory (MFSI)	A psychometric, multidimensional instrument, with internal consistency, used to assess physical and psychological sides of fatigue. The instrument consists of 30 items, either general, physical, emotional, mental, and vigor. The higher the score, the greater the fatigue, except for vigor (Johnson et al., 2018)
Fatigue Symptom Inventory (FSI)	A patient self-report instrument that measures the severity of fatigue, the frequency of fatigue, and the interference of fatigue on quality of life. The instrument consists of 13 items, measuring the

	interference and severity on an eleven-point scale and frequency on a two-item scale (Johns et al., 2015)
Cancer Fatigue Scale (CFS)	A quick, self-report instrument which assesses the nature of fatigue. The instrument consists of the 15 items either physical, affective, or cognitive with the measurement scale ranging from one to five. This instrument is considered stable, reliable, and has a good internal consistency (Sadeghi et al., 2016).
Functional Assessment of Cancer Therapy- Anaemia Questionnaire (FACT-An)	A cancer-specific and valid self-report questionnaire that has 47 items that relate to quality of life and 20 that relate to anemia. Of those 20 items related to anemia, 13 are directly related to fatigue and 7 are indirectly related. It measures the physical and functional capacity. The measurement scale ranges zero to four (Andersen et al., 2013).
Rhoten Fatigue Scale	An eleven-point, self-rating, graphic, visual analogue scale, with verbal anchors at both ends: “no fatigue” and “the fatigue is as much as I can bear”.

A summary of the characteristics of the used studies is found in Table 3.

Table 3: Characteristics of the Studies

Author, Country	Title	Study Aim	Design	Setting, Sample	Method	Main Findings
Patel, J.G.; Bhise A.R.; 2017 India	Effect of Aerobic Exercise on Cancer-related Fatigue	To search for the benefits of aerobic exercise on cancer-related fatigue, physical performance, and quality of life.	Randomized control trial	34 patients recruited in an intervention group or a control group, with a mean age of 49 in the intervention croup and 60.6 in the control group.	Intervention: six-week aerobic exercise program which consisted of a warm up, aerobic exercise, and cool down at the end Control: instructed to stay active with stretching by themselves at home. Fatigue assessment: Brief Fatigue Inventory (BFI).	Aerobic exercise can significantly reduce cancer-related fatigue, as well as improve physical performance and quality of life.
Anderson C. et. al.; 2012 Denmark	The effects of a six-week supervised multimodal exercise intervention during chemotherapy on cancer-related fatigue	To evaluate whether a multimodal exercise intervention can reduce cancer-related fatigue levels for patients currently undergoing standard care as well as chemotherapy.	Randomized control trial	Copenhagen University Hospital 269 patients recruited in an intervention group or a control group, with a mean age of 47.5 years	Intervention: six-week, nine hours a week, exercise training program (included resistance and cardiovascular training, relaxation training, body-awareness training, and a massage). T Control: waitlisted for the intervention. Fatigue assessment: Functional Assessment of Cancer Therapy - Anaemia Questionnaire (FACT-An).	Multimodal exercising can significantly reduce fatigue in patients who are concurrently going through chemotherapy. There was no change in quality of life.
Zhang Q. et. al.; 2016 China	Effects of nurse-led home-based exercise and cognitive behavioral therapy on reducing cancer-related fatigue in patients with ovarian cancer	To examine the effect of a nurse-led home-based therapy and cognitive behavioral therapy (CBT) for ovarian cancer patients undergoing therapy on cancer-related fatigue.	Randomized control trial	First Hospital of Jilin University 72 women recruited in an intervention or control group, with a mean age of ca. 50 years.	Intervention: online exercise program, either at home or in a nurse-led clinic, that consisted of a warm-up, aerobic exercise, muscle strength exercise, resistance training and stretching, and deep relaxation and cooling down,3-5 times a week for 25-60 minutes. CBT was online, once a week for one hour. Included fatigue assessment, recognizing negative thinking, setting goals and	A home-based exercise program with CBT can significantly decrease fatigue and lower symptoms of depression.

	during and after chemotherapy: A randomized trial				reinforcing strategies, and management training. Control: no extra care. Fatigue assessment: Mandarin Chinese version of the Piper Fatigue Scale (PFS).	
Bower J.E. et. al.; 2012 USA	Yoga for Persistent Fatigue in Breast Cancer Survivors – A Randomized Controlled Trial	To examine the effect of an Iyengar yoga intervention in breast cancer survivors with persistent cancer-related fatigue.	Randomized control trial	UCLA Medical Center 31 women recruited in an intervention group or a control group, with a mean age of 53.9 years	Intervention: a twelve-week Inyengar yoga intervention, twice a week for 90 minutes. Control: health education classes for 12 weeks, once a week for 120 minutes. Fatigue assessment: Fatigue Symptom Inventory (FSI) and the Multidimensional Fatigue Symptom Inventory.	Inyengar yoga has a significant effect on reducing fatigue, and positively impacts depression and stress, but not sleep quality.
Johns S.A. et. al.; 2014 USA	Randomized Controlled Pilot Study of Mindfulness-based Stress Reduction for Persistently Fatigued Cancer Survivors	To examine the effect of mindfulness-based stress reduction (MBSR) on cancer-related fatigue and other related symptoms in cancer survivors.	Randomized controlled pilot trial	National Cancer Institute; Oncology Clinic in the Midwest 35 participants recruited in an intervention group or a control group	Intervention: seven, two-hour classes, which included a body scan, gentle hatha yoga, walking meditation, and compassion meditation, as well as a brief psycho-education about CRF. Control: wait-listed for the intervention. Fatigue assessment: Fatigue Symptom Inventory (FSI).	Significant improvement in fatigue (fatigue interference, fatigue severity, fatigue days, and percent of day fatigued). Also improved depression and sleep quality.
Johns S.A. et. al.; 2016 USA	Randomized Controlled Pilot Trial of Mindfulness-Based Stress Reduction Compared to Psychoeducational Support for Persistently Fatigued Breast and	To compare the effect of mindfulness-based stress (MBSR) to psychoeducational support (PES) on CRF and related symptoms in breast and colorectal cancer survivors.	Randomized controlled pilot trial	National Cancer Institute 71 participants recruited in an intervention or a control group with a mean age of 56.5.	MBSR intervention: eight, two-hour classes, which included a body scan, hatha yoga, sitting meditation, and compassion meditation, as well as a brief psycho-education about CRF. PES intervention: eight, two-hour classes, with the goal of education and support on how to cope with their illness, including discussions on CRF, its impact, and discussing	Both MBSR and PES significantly improve CRF. However, MBSR might affect CRF sooner than PES.

	Colorectal Cancer Survivors				patients' experiences and self-management strategies. Fatigue assessment: Fatigue Symptom Inventory (FSI).	
Aghabati N. et. al.; (2010) Iran	The Effect of Therapeutic Touch on Pain and Fatigue of Cancer Patients Undergoing Chemotherapy	To examine the effect of therapeutic touch (TT) on pain and fatigue on cancer patients currently undergoing chemotherapy.	Randomized control trial	Imam Khomeini Hospital, Tehran 90 female patients recruited in intervention, placebo or control group with a mean age of 42 years.	Intervention: five, thirty-minute therapeutic touch sessions. Placebo: Mimic therapeutic touch Fatigue assessment: Rhoten Fatigue Scale	Therapeutic touch significantly decreases pain and fatigue in cancer patients undergoing chemotherapy
Nguyen L. T. et. al.; (2018) Vietnam	Psychoeducational Intervention for Symptom Management of Fatigue, Pain, and Sleep Disturbance Cluster Among Cancer Patients: A Pilot Quasi-Experimental Study	To examine the effect of a psychoeducational support (PES) intervention on cancer-related symptom cluster (fatigue, pain, and sleep disturbance).	Pilot quasi-experimental study	General Public Hospital Hanoi 102 participants recruited in an intervention or a control group with a mean age of 56.2 years.	Intervention: one-hour session to a to personalize a self-management plan including identifying their priority symptoms and advice on strategies (ex. Energy conservation and restorative activities), followed by phone calls to reinforce the education and to assist with any difficulties. Control: standard care. Fatigue assessment: Brief Fatigue Inventory (BFI).	PES effects fatigue severity and fatigue interference significantly, as well as the severity of symptom cluster, sleep disturbance and psychological distress. No effect was seen on pain and quality of life.
Yesilbalkan U. O. et. al.; 2009 Turkey	The Effectiveness of Nursing Education as an Intervention to Decrease Fatigue in Turkish Patients Receiving Chemotherapy	To examine whether nurse-led education can decrease fatigue in gastrointestinal cancer patients undergoing chemotherapy.	Quasi-experimental	University Hospital of Izmir 35 patients were recruited with a mean age of 49 years.	Intervention: a three-time, 90-minute education program that combined nurse-to-patient, one-on-one education, training, and counseling, regarding fatigue assessment and management, tailored to the patients' individual needs in every session. Fatigue assessment: Brief Fatigue Inventory (BFI) and the Piper Fatigue Scale (PFI).	One-on-one patient education program can reduce a cancer patient's, currently undergoing chemotherapy, fatigue severity.

Pleun J. et. al.; 2013 Netherlands	Systematic Monitoring and Treatment of Physical Symptoms to Alleviate Fatigue in Patients with Advanced Cancer: A Randomized Controlled Trial	To examine whether systematic monitoring and treatment can decrease fatigue in advanced cancer patients.	Randomized controlled trial	Erasmus Medical Center Rotterdam 152 patients were recruited in the intervention or the control group with a mean age of 58 years.	Intervention: meeting with a nurse specialist at least four times every two weeks to discuss symptoms. Each time they rated a symptom over 1 they would receive a nursing intervention, and by scores over 4, the oncologist would be advised for a pharmacological intervention. Control: usual care. Fatigue assessment: Multidimensional Fatigue Inventory (MFI) and the Brief Fatigue Inventory (BFI).	Systematic monitoring and treatment improve fatigue intensity and interference with daily life significantly in patients with advanced cancer.
Sadeghi et. al.; (2016) Iran	Effects of Energy Conservation Strategies on Cancer Related Fatigue and Health Promotion Lifestyle in Breast Cancer Survivors: A Randomized Control Trial	To examine the effect of energy conservation strategies and health promotion in breast cancer survivors.	Randomize controlled trial	Urmia University of Educational and Therapeutic Center of Omid of Urmia 135 patients were recruited in the intervention or the control group with a mean age of 55.7 years	Intervention: 90-minute small group discussion for 5 weeks about energy conservation strategies, reviewing daily routines, organizing activities based on energy levels, and keeping a diary. Control: wait-listed. Fatigue assessment: Cancer Fatigue Scale (CFS).	Educating patients on energy conservation strategies significantly improved fatigue and health promotion lifestyle.
Johnson et. al.; (2017) Canada	Bright Light Therapy Improves Cancer-Related Fatigue in Cancer Survivors: a Randomized Controlled Trial	To examine the effect of bright light therapy on fatigue, mood, and quality of life in cancer survivors.	Randomize controlled trial	Calgary, Canada and surroundings 81 participants were recruited in the intervention or control group with a mean age of 58.2	Intervention: blue-white, bright light every day for 30 minutes, 30 minutes within waking up, for 28 days. Control: same task, but with dim red light. Fatigue assessment: Multidimensional Fatigue Symptom Inventory (MFSI).	Bright light therapy improved the fatigue score and continued to improve with time.

3.2. Exercise

A randomized controlled trial (RCT) conducted by Andersen et. al. (2012) examined the effect that a multimodal exercise intervention had on fatigue for patients undergoing chemotherapy. 52 men and 161 women patients, with a range age from 21 to 65, participated in this trial. The majority of the patients (51% in the intervention group, 52% in the control group) had breast cancer, followed by bowel cancer (15% and 14%), and other cancer types.

The multimodal exercise intervention included:

1. High-intensity physical training: heavy resistance and cardiovascular training with 10-minute intervals of stationary bikes, stretching as a warm-up and cool-down, and coordination training.
2. Relaxation training in groups: progressive relaxation of the major muscles with instructions being played on tape, in the background, together with relaxation music.
3. Body- awareness training: pilates, stretching, yoga, and breathing.
4. Massage: therapeutic, relaxing, or facilitative

The intervention was six weeks long, nine hours a week, and was supervised by physical therapists and oncology nurse specialists.

At baseline, the physical activity level was collected from patients, both pre-illness and current levels. The majority of the patients were currently physically active (83.7%), despite the illness. The rest considered themselves inactive. Fatigue was measured at baseline and after the six-week period with the Functional Assessment of Cancer Therapy- Anaemia self-report questionnaire. This self-report assessment is made up of 47 items, 27 being related to quality of life and 20 related to anemia. Of the 20 items related to anemia, 13 are directly related to fatigue, and 7 are indirectly related to fatigue. It measures the physical and functional capacity of cancer patients and ranges seven days back.

After six weeks, the fatigue scores improved statistically significant in the multimodal exercise intervention group compared to the control group (Andersen et al., 2013).

An RCT by Patel and Bhise (2017) examined the effect of aerobic exercise on fatigue. Fourteen male and eleven female patients participated, who finished chemotherapy and/or radiotherapy, and they had an age range from 42 to 56 years. The patients either had breast, gastrointestinal, gynecological, or a head and neck cancer, with no significant difference of number.

The aerobic exercise was six weeks long and included treadmill walking and interval training. It lasted for 20 to 40 minutes and was done five times a week. The intensity was determined based on the participants heart rate, performing at 50 to 70% of the maximum heart rate. Before the exercise began, a ten-minute warm-up with total body movement and exercise was done. Afterward, a five-to-ten-minute cool-down was done with walking and stretching. The control group was instructed to remain active by stretching their hamstrings and calves, but were not told about the aerobic exercise. The study did not mention which health profession implemented the intervention.

Fatigue was measured using the Brief Fatigue Inventory (BFI), a self-report instrument, before and after the intervention. BFI quickly measures the severity of fatigue as well as the interference of fatigue on the patient's ability to function in the past 24 hours.

The improvement of fatigue in the aerobic exercise intervention group was statistically significant. Physical functioning and the quality of life was also significantly improved (Patel and Bhise, 2017).

Zhang et. al. (2017) conducted a randomized control trial combining twelve weeks of a nurse-led, home-based, exercise intervention together with cognitive behavioral therapy (CBT). 74 women with ovarian cancer undergoing chemotherapy, with an age range of 18 to 65 years, participated in the study.

The home-based exercise was an online intervention that patients received each week. It was done either at the patient's home or at a nurse-led clinic. The intervention was paired with home visits and motivational interviewing per telephone. It included a warm-up, aerobic exercise, muscle strength exercise, resistance training and stretching, and a deep relaxation and cool-down. Patients were actively engaged in the exercise and received motivational phone calls from nurses twice a week. It was recommended that they exercised three to five times a week for 25-60 minutes. The intensity of the exercise was based on the patient's heart rate, performing at 45 to 75% of the maximal

heart rate. The exercise plan was prepared by two physical therapists and one research nurse.

Concurrently to the exercise, the participants received a cognitive behavioral therapy intervention once a week for one hour from a CBT-trained nurse. The nurse was also available by telephone for CBT counseling whenever patients were in need of it. Before the intervention was started, the nurses built a trusting relationship with the patients and identified their thought patters and negative feelings. The intervention then included assessment of fatigue, recognizing negative thinking, setting goals and findings strategies, and relaxation and fatigue management.

Fatigue was also measured using the Mandarin Chinese version of the Piper Fatigue Scale (PFI), at baseline, as well as right after the intervention, and three months afterward. The PFI, a self-report scale, has four fatigue subscales: behavioral, affective, sensory, and cognitive.

The results of the study concluded that a nurse-led home-based exercise, together with cognitive behavioral therapy, decreases fatigue levels (behavioral, sensory, and cognitive fatigue subscales) in ovarian cancer patients who are undergoing or have underwent chemotherapy. The change was statistically significant. However, no significant change was seen in the affective fatigue subscale. The intervention also lowered the patients' depression symptoms significantly (Zhang et al., 2018).

3.3. Mind-Body Interventions

An RCT by Bower et. at. (2012) examined the effect of an Iyengar yoga intervention on cancer-related fatigue in breast cancer survivors. Iyengar yoga is a form of Hatha yoga that focuses on maintaining postures without stress and tension, as well as breathing techniques. 31 women participated in the study, with an age range of 48 to 60 years.

The yoga intervention was twelve weeks long, twice a week for ninety minutes. An Inyengar yoga instructor taught the classes. The results were compared to a control group, who were participating in health education classes, for twelve weeks long, 120 minutes a week, which were taught by a psychologist who had previous experience in breast cancer survivor treatment. The classes covered cancer survivorship topics about CRF, weight and chronic disease management, cancer testing and counseling, diet,

nutrition, sleep, psychological and cognitive issues, body image and sexuality, osteoporosis, achieving goals, and finding meaning.

Fatigue was measured at baseline, after the intervention, and again after three months using the Fatigue Symptom Inventory (FSI). The FSI, a self-report instrument, measures the severity and frequency of fatigue, and the interference of fatigue on a patient's quality of life.

It was discovered that the Inyengar yoga statistically, significantly reduced fatigue, continuously decreasing after the intervention and three months afterword, while simultaneously increasing vigor. (Bower et al., 2012).

A randomized controlled pilot study on mindfulness-based stress reduction (MBSR) conducted by Johns et. al. (2015) was done to examine the effect this type of training had on fatigue and related symptoms. Symptoms such as sleep, depression, functional status, and anxiety. 33 women and two men participated in the study and the age range was 47 to 67 years. Most participants (86%) had breast cancer, and the rest had esophageal or hematological cancers.

MBRS training in this study included a body scan, sitting meditation, gentle hatha yoga, walking medication, and compassion meditation. The training included seven, two-hour classes, and the participants also received brief psychoeducation on cancer-related fatigue. They also received a short take-home guide on the psychoeducation and video recordings of the MBSR training for at-home practice as well.

Fatigue scores were measured using the Fatigue Symptom Inventory (FSI) before the intervention started, after it ended, at a one-month follow- up, and lastly at a six-month follow up. The FSI is a self-report assessment tool that measures the extent to which fatigue interferes with a patient's quality of life, the severity and frequency of the fatigue, and the interference of fatigue on a patient's general level of activity; ability to bathe and dress, ability to concentration, relations with others, normal work activity, enjoyment of life, and mood. It measures the fatigue from the past week and the current fatigue.

The study concluded that MBSR training statistically, significantly improves fatigue interference, fatigue severity, fatigue frequency, and the percentage of the day fatigued. It also significantly lowers depression and sleep disturbance (Johns et al., 2015).

Johns et. all followed up on their MBSR study one year later, in 2016, this time around comparing it with psychoeducational support. The goal of the randomized controlled pilot trial was to discover the effect these two interventions had on CRF, as well as depression, anxiety, and sleep. 60 breast cancer and 11 colorectal cancer survivors participated, 90% being female. The age range of the participants was from 45 to 68 years.

The MBSR intervention content stayed the same as the study done in 2015, with eight, two-hour classes and a brief psychoeducation on cancer-related fatigue.

The psychoeducation intervention group had a goal of coping better with symptoms and side effects through education and support. It was eight weeks long, once a week, for two hours. The psychoeducation intervention was a program that consisted of group discussions of CRF and how it impacted functioning. The participants in this group shared their experiences, and their tips and strategies on CRF management. They listed and affirmed the other participants that were sharing as well. Specific topics were discussed each week, such as nutrition, sleep, exercise, and survivorship. Fatigue was measured with the Fatigue Symptom Inventory (FSI) before and after the intervention, and six months post intervention.

The results of the study were that MBSR training significantly improved fatigue interference, vitality and global improved in fatigue immediately after the intervention ended. However, six months after the intervention, the psychoeducational intervention participants had ongoing improvement's in their fatigue. In conclusion, both interventions improve fatigue and there is no statistically significant difference between the improvement six months post intervention. However, MBRS training does improve fatigue sooner than psychoeducation (Johns et al., 2016).

A randomized experimental study by Aghabati et. al. (2010) examined the effect of therapeutic touch (TT) on pain and fatigue on cancer patients currently undergoing chemotherapy. Therapeutic touch bases its theory off of the assumption that the human body is surrounded by an aura and penetrated by energy called prama, which flows through the body. TT is believed to promote a rhythmic flow of energy waves on the body.

Ninety female patients with an age range of 41 years participated in the study. The types of cancer the patients were diagnosed with was not mentioned. They were randomly assigned to either the TT group, a placebo group with mimic TT, or a control group. Patients received TT for five days, once a day, for half an hour by a therapeutic touch expert. They were told to relax as much as possible before the treatment began. Fatigue was measured using the Rhoten Fatigue Scale (RFS), which is a graphic, eleven-point, self-rating scale, with verbal anchors ("no fatigue" and "the fatigue as much as I can bear") on both ends. Fatigue and pain were both measured a total of ten times in the five days.

The results of the study showed that TT significantly reduced fatigue in patients, whereas the placebo and control group showed no difference in fatigue levels. Pain was also decreased significantly (Aghabati et al., 2010).

3.4. Education

A pilot quasi-experimental study by Nguyen et. al. (2018) examined the effect psychoeducation had on fatigue, pain, and sleep disturbance cluster in cancer patients. 59 female and 43 male patients partook in this study, with an age range of 43 to 66 years. More than half of the participants had a gastrointestinal cancer, and the others had breast or gynecological cancer, or other.

The intervention group partook in a one-hour, nurse-led, session to receive information about the structure, personalize specific goals and a self-management plan to help identify their priority symptoms and advice on strategies. Strategies such as energy conservation, restorative activities, sleep hygiene, and pain management. Also, self-management behaviors that impact the symptoms negatively were discussed, as well as strategies on how to reduce them. All strategies were personalized individually to the participant. This session was within a week of the participants first chemotherapy session. It was then followed by three phone calls over two weeks to reinforce the education, assist with any difficulties, motivate, and rehears the strategies.

Fatigue was measured using the Brief Fatigue Inventory (BFI) before and after the intervention. The BFI measures the fatigue severity and its impact on patient's lives.

The results of this study concluded that the psychoeducation intervention significantly decreased fatigue interference, sleep disturbance, and symptom cluster severity. Although the fatigue severity improvement was not statistically significant, the control group who received standard care had a significant increase (Nguyen et al., 2018).

An educational intervention quasi-experimental study was conducted by Yesilbalkan et. al. (2009) to decrease fatigue in cancer patients currently undergoing chemotherapy. 20 female and 15 male gastrointestinal cancer patients partook in this study, with an age range of 39 to 60 years.

The nurse-led intervention included one-on-one education, training, and counseling on fatigue assessment and management, tailored to individual needs of every patient. The goal was to improve the knowledge of causes and strategies of fatigue. Strategies such as self-monitoring levels, energy conservation, distraction, stress-management, relaxation methods, increasing activity and mobility, and managing the factors which triggered fatigue. The educational intervention took place three times for 90 minutes, before the start of the first chemotherapy cycle, ten days afterward, and lastly ten days after the second cycle of chemotherapy ended.

After three 90-minute sessions, the fatigue severity decreased for these participants. Fatigue scores were measured using the Brief Fatigue Inventory (BFI) and the Piper Fatigue Scale (PFI) before the intervention and again after the second and third cycle of the intervention. The BFI measured the severity of fatigue and the effect it had on the patient's daily living, and the PFI measured the four dimensions of fatigue, cognitive, behavioral, sensory, and affective.

During both measurements, the fatigue continuously decreased. The decrease was statistically significant in fatigue as it was for pain and lack of appetite. The intervention also increased the quality of life significantly (Yesilbalkan et al., 2009).

Raaf et. al. (2013) conducted an RCT to examine the effect of systematic monitoring together with protocolized patient-tailored treatment (PPT) on fatigue and other related cancer symptoms. 87 female and 65 male advanced cancer patients participated in the study with an age range of 48 to 70 years. 37% had breast cancer, 29% gastrointestinal cancer, and the rest had a different type.

The intervention included a meeting with a nurse specialist for a minimum of four times, every two weeks, to assess the current status of their physical symptoms. Although the study was focused on fatigue; pain, nausea, vomiting, constipation, diarrhea, appetite, shortness of breath, cough, and dry mouth was assessed as well. Participants rated their symptoms from one to ten on the Numeric Rating Scale (NRS). The NRS measured the average intensity of the symptom in the past week. When a patient reported a symptom being higher than one, then a nursing intervention was done, either education or a non-pharmacological intervention, depending on the symptom. For scores over four, the oncologist was advised for a pharmacological intervention. For ten weeks the participants met with their nurse specialist.

Beside using the NRS, fatigue was measured using the Multidimensional Fatigue Inventory (MFI), which measured general fatigue, physical fatigue, reduced activity, reduced motivation, and mental fatigue. Fatigue influence on the patient's daily life was measured with the Brief Fatigue Inventory (BFI). This assessment tool measures the interference fatigue has had in the past 24 hours in general activity, walking ability, mood, work, enjoyment of life, and relations with other people. The symptoms were measured before the intervention, after one month, two months, and three months.

The main results of the study concluded a statistically significant reduction of general fatigue (MFI), however, only after one month and two months, but not after three. Also, the reduced activity and reduced motivation dimensions (MFI) was significantly improved as well. Generally, the decrease of the intensity of fatigue, which was measured with the NRS, was statistically significant. The interference of fatigue in daily life (BFI) decreased insignificantly, however, the control group who received usual care showed an increase. Anxiety decreased insignificantly as well, and there was no difference between the two groups with depression and quality of life (de Raaf et al., 2013).

Sadeghi et. al. (2016) conducted an RCT to examine what effect educating breast cancer patients had on energy conservation strategies and a health promotion lifestyle, on fatigue. 135 breast cancer patients currently undergoing chemotherapy with an age range of 42 to 69 years participated in the study.

Sadeghi et. al. described energy conservation principles using the course developed by Brink and Sauriol in 1995. It described that energy conservation included:

- the value of rest
- banking and budgeting energy
- learning how to communicate needs to others
- incorporating rest periods during the day
- using energy efficient appliances and organizing stations of activity
- using good body posture and mechanics
- splitting fatiguing tasks into sections
- prioritizing and setting standards for activities
- planning rest periods for balance and
- setting short and long-term goals.

The intervention was a weekly, ninety-minute, small group discussion for five weeks. Although it was not stated who led these discussions, it can be assumed that it was done by a nurse, as a nursing masters student conducted pre and post-intervention, and follow-up interviews. These discussions included energy conservation strategies (such as setting priorities, doing on thing at a time, etc.), reviewing daily routines, organizing activities based on energy levels, and keeping a diary where they monitored their fatigue, sleep, rest, activity, and other indicators. They discussed their experiences in the group, what strategies they implemented, and what barriers they had to overcome, as well as how they overcame them. Outside of the group meetings, they were told to keep a diary where they monitored their symptoms and assessed their activity patterns, which was prioritizing their everyday activities.

Fatigue scores were measured using the Cancer Fatigue Scale (CFS). The CFS assessed the nature of fatigue on a physical, affective, and cognitive subscale. It was measured pre and post-intervention, and after eight weeks.

The results of the study showed a statistically significant decrease in cancer-related fatigue post-intervention compared to pre-intervention in all three subscales of the CFS. It continued to decrease at the eight-week follow up as well. Health promotion lifestyle showed a statistically significant increase, and this measurement continued to increase at the eight week follow-up as well (Sadeghi et al., 2016).

3.5. Light therapy

Johnson et. al. (2017) conducted a randomized control trial with bright-light therapy, to examine whether it would reduce cancer-related fatigue in cancer survivors and increase mood and quality of life. 70 women and eleven men, with an age range of 30 to 81 years, participated in the study. The majority (63%) were breast cancer survivors, followed by gynecological (12%), and colorectal (12%), and other cancer types.

The intervention included participants using a blue-white, bright-light, therapy device every morning when they wake up, for 30 minutes, for a total of four weeks. The device was placed twelve to 24 inches from the participants face, at a 45-degree angle. The device was used at home, after receiving instruction on how to use it from the researcher. It is not given which health profession gave the instruction or prescribed the bright-light therapy, however it can be assumed that these were medical doctors. The control group used a dim, red-light, device. The frequency and usage of the device did not differ from the bright-light therapy.

Fatigue was measured using the Multidimensional Fatigue Score Inventory (MFSI) at baseline, and then once a week, every week following, until the four weeks came to an end. The MFSI assessed the physical and psychological aspects of fatigue in five subscales: general, physical, emotional, mental, and vigor.

The results of the trial were a statistically significant decrease in fatigue in all subscales of the MFSI. The first decrease was after two weeks of the intervention. It continued to after four weeks of the intervention. The fatigue in the participants of the control group reduced as well after two weeks, however it did not continue to decrease. Mood disturbance, quality of life, and depression decreased in the bright-light therapy group, as well (Johnson et al., 2018).

4. Discussion

The aim of this review was to examine the role nurses have in symptom management of cancer-related fatigue. The studies which were included in the results were categorized based on their findings: exercise, mind-body interventions, education, and light therapy. In this chapter, the findings will be discussed critically.

The majority of the findings had some type of education built into the intervention studied. Beside the studies who were directly observing the effect of an education intervention, studies who were applying a non-educational intervention had a form of it built into the study. Zhang et. al. (2017) included cognitive behavioral therapy concurrently to the nurse-led, home-based, exercise intervention. The cognitive behavioral therapy educated patients on how to deal with their fatigue. Johns et. al. (2015) included psychoeducation additionally to the mindfulness-based stress reduction intervention and one year later Johns et. al. (2016) had a control group who just received the psychoeducation, and it showed significant positive results. Studies from Nguyen et. al. (2018) and Yesibalkan et. al (2009) were both educational interventions that were specifically tailored to the patient's individual needs, meaning to find and plan strategies for self-management and reach the patient's goals based on their individual needs. The studies who did not have any types of educational intervention built in were the multimodal exercise intervention study by Anderson et. al. (2012), the aerobic exercise intervention by Patel and Bhise (2017), the Iyengar yoga intervention study by Bower et. al. (2012), and the bright-light therapy by Johnson et. al. (2017). All of these studies, except for Johnson et. al. (2017) can be a part of the educational information that a nurse gives a patient with CRF, such information on the type of exercise or yoga that can be done to improve the CRF. This is also true to the other studies that had a type of educational intervention built into it as well. The exercise can be part of the information that a patient receives together with the cognitive behavioral therapy, psychoeducation, or other educational interventions. The findings conclude that exercise has a positive effect on patients who suffer from CRF and these patients should be taught and educated on how they can use these exercises and incorporate them into their daily life, as well as how to perform them, possible exercise

classes they can take, things that they should watch out for (such as heart rate), and other vital information. This is also true for the mindfulness-based stress reduction interventions. Education information for patients should include the different strategies, such as Inyengar yoga that Bower et. al. (2012) studied, body scan meditation, sitting meditation, gentle hatha yoga, walking medication, and compassion meditation that Johns et. al (2015) and Johns et. al. (2016) used in their intervention study. Another educational information that could be incorporated in educational interventions is the finding from Sadeghi et. al. (2016), which examined the energy conservation strategies. Beside all the information that can be taught and the different educational interventions, monitoring is something that could be done beside it.

The monitoring and protocolized patient-tailored treatment, which Raaf et. al. studied, had education incorporated every time a patient showed the symptom; however, the monitoring was the priority. The multiple meetings every two weeks with the nurse specialist ensured that the symptoms and the severity were regularly questioned, so that interventions can be done as soon as possible to relieve the patient. This is where the educational intervention was placed, when appropriate. This study displays the importance of continuous monitoring or measuring of symptoms. Table 2 in the results section presents the different assessment tools all the studies used to measure fatigue. Although fatigue can only be measured subjectively by the patient themselves, these tools give reliable information on different aspects of fatigue, as well as severity, impact, etc., to help professionals understand the depth of the fatigue.

The results show that exercise has a strong impact on improving fatigue. Types of exercise that showed improvement were a multimodal exercise with physical training, relaxation training, and body-awareness training. Also, aerobic exercise by itself was effective, and lastly, a combination of aerobic exercise with muscle strength exercise, resistance training and stretching, and deep relaxation. The exercise does not have to be performed with a trainer personally, it can also be done with some kind of online program, so that the patients can exercise at home on their own time, as they did in the study by Zhang et. al. (2017). What is important is that the patients did not over-force themselves. The performance in the study by Zhang et. al. (2017) was 45% to 75% of

the maximum heart rate, whereas the study by Patel and Bhise (2017) was at 50% to 70%.

Although yoga can be considered an exercise, the study by Bower et. al. (2012) was categorized under mindfulness-based intervention due to the type of yoga. This is also a type of movement activity a patient can do, either at home with an online form of instruction, or with a trainer. The same applies for the MBRS studies.

Another important finding was interdisciplinary work of different professions. In the educational intervention studies, nurses were the ones who were performing or carrying out the intervention, such as for the psychoeducation intervention study by Nguyen et. al. (2018) where they structured and personalized goals and self-management plans with patients, the educational intervention study by Yesibalkan et. al. (2009) where nurses educated, trained and counseled patients regarding fatigue assessment and management, and the study by Raaf et. al. (2013) where the nurses monitored, assessed, and intervened with educational and non-pharmacological interventions, or worked together with doctors for a pharmacological solution. In the mindfulness-based stress reduction study by Johns et. al. (2016), the psychoeducation control group intervention was done by a social worker, in contrast to Nguyen et. al. (2018), meaning both profession groups are able to perform such educational interventions.

The exercise intervention studies were interdisciplinary. For the study by Andersen et. al. (2012) the supervision was done by both physical therapists and oncology nurse specialists. Although the exercise part of the intervention falls into physical therapist job description, the nurses had a role as well, whether it was recognizing eligibility of the patients to participate, monitoring vitals, etc. In contrast, the study by Zhang et. al. (2017) the nurses independently led the exercise intervention. The intervention was online and at the patient's home or the nurse-led clinic, thus showing that the physical presence of physical therapists is not a must. However, the exercise plan was created by physical therapists and a nurse together. The nurse's role here was mostly motivating, visiting patients at home, and supervising in general. They also delivered the cognitive behavioral therapy concurrent to the exercise intervention, which was

similar to those of Nguyen et. al. (2018) and Yesibalkan et. al (2009), focusing on assessing fatigue, setting goals, finding strategies, and management.

The intervention study on yoga by Bower et. al. (2012) and the MBSR studies by John et. al. (2015), (2016), were similar to those of exercise; they had little to no nurse involvement. The Inyenar yoga class were taught by a yoga instructor and the MBSR training was led by a clinical psychologist who was also an MBSR specialist. However, this is also a topic that can be included in information that a nurse gives a CRF patient. MBRS training techniques can now even be found online, making it easier for patients to receive access to it.

The profession who prescribed the bright light therapy in the study by Johnson et. al. (2017) is questionable, however bright lights are available without any type of prescription and are non-invasive, therefore it could be possible to be recommended or prescribed by a nurse.

The study by Aghabati et. al. (2010) on therapeutic touch was done by a TT expert, however this is a nursing intervention that can be done by nurses who have received a special education on this. Therapeutic touch is non-evasive yet proved to be effective with fatigue.

An observation made with the results was also that in eleven out of the twelve studies, the participants were either cancer survivors, were currently undergoing therapy, or they finished their therapy. Only one study by Raaf et. al. (2013) were the patients advanced cancer patients. This should be taken into consideration as the progressiveness of the disease also affects the severity of fatigue and the continuance of possible worsening of the symptom, as well as the condition of the patient. In cases with advanced cancer, it could be likely that some of the strategies listed in the results, such as exercise, could not be possible for these patients due to their advanced condition. Also, patients of high age could also not be able to take these types of strategies into consideration. The age of the participants in these studies were relatively young, with the highest mean age of 60 years, meaning most or almost all participants were not geriatric patients. It can be assumed that these patients were physically active or were able to be active before the disease and therapy began.

When comparing the results of this thesis with the non-pharmacological interventions of Bower et. al. (2014) mentioned in the introduction of the thesis, the findings are somewhat similar. Bower et. al. discusses exercise as an intervention, aerobic exercise, home-based programs, and resistance exercise more exactly. This compares with the exercise results of this thesis, as they were aerobic exercise, multi-modal exercise with resistance training built into them, and home-based exercises. Bower et. al. also considered psychosocial interventions and used individualized education as an example, which can be compared to the education intervention in the results of this thesis. The mind-body interventions examples which can be compared to those of the thesis were yoga and mindfulness-based meditation and cognitive therapy.

6. Strengths and Limitations

The strength of this thesis was that the research question was in fact indirectly, yet thoroughly answered, as the results did give information on what the role of a nurse in symptom-management of cancer-related fatigue is. All studies used reliable and valid instruments or assessments to measure fatigue, which is a strength. Another strength is that ten out of the twelve studies were randomized controlled trials, which have a high position in the evidence hierarchy, as seen in Figure 2., and two were quasi-experimental studies.

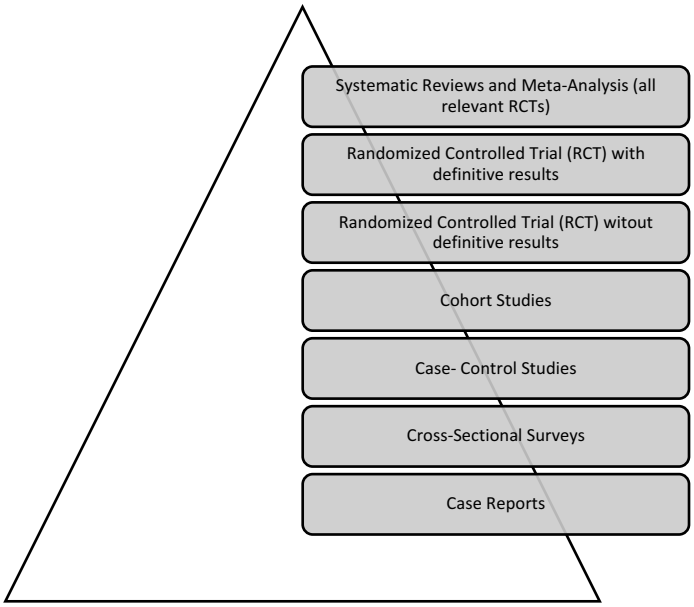

Figure 2: Hierarchy of Evidence (Greenhalgh, 2001, p. 54)

The diversity of the countries of the relevant studies were both a strength and a weakness. The eleven studies were from three different continents, making them generalizable internationally. However, fatigue could be perceived differently depending on culture.

The limitations of this thesis that only two databases were used, PubMed and CINAHL, the search was limited to only studies in German and English, as well as only studies that were published in the last ten years, which could have negatively impacted the results by missing relevant studies.

7. Recommendations for Research and Practice

Research

More non-invasive, complimentary nursing interventions for cancer-related fatigue should be researched. For example, in 2004 a study was done by Kohara et. al. (2004) on aromatherapy, foot soaks, and reflexology (Kohara et al., 2004). No other study which was up-to-date was found on this topic. This is a complimentary therapy widely used by nurses and therefore should be researched more with CRF.

Another research topic that is under-researched with CRF is nutrition. There are no studies that observed the nutritional patterns that could affect CRF. However, guidelines on CRF do mention that nutrition can be found, but they do not give specifics on nutrition.

Practice

Oncology nurses and other professions should be educated on cancer-related fatigue, on the strategies, assessments, and patient education. Every oncology patient, in or outpatient, should be assessed for their fatigue. Based on this, educational interventions should be given to the patient. They should be informed about, for example, strategies they could complete on their own or exercise courses that they can take. Additionally, the nurses should work with other disciplines. Physical therapists, social workers, psychologists, and physicians should be included in the patient's therapy plan for the fatigue.

8. Conclusion

The answer to the research question “What is the role of nurses in symptom-management of cancer-related fatigue (CRF)?”, is extensive.

An important role of a nurse is the continuous assessment of fatigue, and using a reliable instrument is essential to knowing the severity and depth of the fatigue. From this assessment, further therapy and interventions can be done. Nurses should document and plan accordingly after the assessment. A nurse has, without a doubt, the most bedside contact, therefore may be the first profession who is confronted with the patient’s fatigue and therefore should be ready to act on it. However, the assessment should not be only done once. Continuous monitoring should be done multiple times. Fatigue assessment should be a routine screening for oncology patients, as pain often is.

After being encountered with fatigue and assessing it, it is vital to integrate different health professions into treatment: physicians, social worker, psychologists, physical therapists, etc., as each play a vital role in constructing the best form of therapy and combining beneficial and effective strategies for the patient.

Together in a multidisciplinary team, nurses should construct a plan to educate patients on what they can do to effectively reduce their fatigue. They should set goals with the patients together, find exercise strategies with physical therapists, or recommend exercise courses that can be done, discuss mind and body strategies with psychologists, such as yoga, meditation, body scan, etc. Also, patients should be advised to keep a diary with their fatigue levels and their daily activities, to efficiently be able to discover their energy conservation strategies, which is also a topic that a nurse should discuss with their patient. Lastly, bright light therapy should also be recommended, next to the other strategies, depending if the nurse is legally able to. In case not, a nurse should recommend patients to doctors for this intervention.

Therapeutic touch is a nursing intervention that can be planned into the patients care plan. Although it is a time-consuming intervention, it is an effective intervention that

could possibly be planned especially when primary nursing is practiced, as nurses often then have more time for their patients.

In conclusion, the role of nurses in symptom-management of CRF is assessing and monitoring, working in a multidisciplinary team, therapeutic touch, and educating patients on how to manage their fatigue.

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Attachment

The effects of a six-week supervised multimodal exercise intervention during chemotherapy on cancer-related fatigue (Andersen et al., 2013)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title includes the intervention and population, missing the design and setting. The abstract includes the purpose with objective, methods (with the design, sample, and scales), the most important results, and conclusion.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Good (4)
The introduction contains adequate background information, including up-to-date literature, and a clear objective and focus of the study.	
Method and data: Is the method appropriate and clearly explained?	Good (4)
The method was well structured with subtitles and clearly described. Questionnaire used to measure fatigue is described, as well as when it was measured. A clear description of the intervention conducted was included.	
Sampling: Was the sampling strategy appropriate to address the aims?	Fair (3)
The sampling strategy used is appropriate for this study. The researchers included the method how participants were recruited, as well as the characteristics of the participants. Justification for the sample size was not included.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Good (4)
Statistical analysis was sufficiently described.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Good (4)
Stated informed consent and baseline measures obtained and approval by a committee and an agency. Patient participation was randomized, no relation to researchers mentioned.	
Results: Is there a clear statement of the findings?	Good (4)
Results are clearly explained. Tables are easy to understand and are explained additionally in the text.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
The researchers compared their findings and scores to other studies, however there was no power analysis done/no score for sample size was given. The researchers did consider the sample size “large”, but with no justification. This study was also done only patients at the Copenhagen University Hospital, not internationally.	
Implication and usefulness: How important are the finding to policy and practice?	Poor (2)
The researchers discuss the clinical relevance, however direct recommendation for practice are not stated, as well as recommendation for further research.	
	Total: 31/36 = 86%

Effect of Aerobic Exercise on Cancer-related Fatigue (Patel and Bhise, 2017)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title includes the intervention; however the population, design and setting are missing. The abstract is well structured with background, methods, results, and conclusion and includes the purpose of the study, however it is missing the design of the study.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Fair (3)
Adequate background information was provided, however very few up-to-date past studies conducted on this topic were included. The research question is not included; however the aim/objective is described briefly.	
Method and data: Is the method appropriate and clearly explained?	Fair (3)
The study design was not included, it had to be figured out through the intervention. The setting was not mentioned either. However, they provided a clear explanation of the intervention and control group, as well as a clear description of all of the scales used.	
Sampling: Was the sampling strategy appropriate to address the aims?	Poor (2)
The study mentions how many patients were screened and selected/ requested to partake in the study, but not where the patients are being treated (name of hospital, ambulatory or in-patient, etc.) or the justification for the sample size. Inclusion and exclusion criteria are present.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Poor (2)
Only the statistical software was mentioned that was used.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Good (4)
Study mentioned that ethical clearance was performed and by whom, as well as informed consent.	
Results: Is there a clear statement of the findings?	Good (4)
Results are clearly explained. Tables and figures included are easy to read and are explained in text as well.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
The researchers compared their results to those of other studies. However, there was no justification to their sample size, it was only mentioned that the it was small (limitation).	
Implication and usefulness: How important are the finding to policy and practice?	Very Poor (1)
No direct recommendations to practice or further research was included.	
	Total: 25/36 = 69%

Effects of nurse-led home-based exercise and cognitive behavioral therapy on reducing cancer-related fatigue in patients with ovarian cancer during and after chemotherapy: A randomized trial (Zhang et al., 2018)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title includes the intervention, population, design, does not include the setting. Title is too long, a shorter is possible. The abstract includes a short background and study objective. The methods are divided into design, setting, participants, intervention, and instruments. The main results and a conclusion are included; however a practice and research recommendations were left out.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Fair (3)
Introduction includes detailed background information and up-to-date studies on the topic, as well as the gap in knowledge of the topic. They included the purpose of the study. Objective or research question was not included.	
Method and data: Is the method appropriate and clearly explained?	Good (4)
The chosen methods were appropriate for this study. Date collection was described, as well as the measurements, in detail (scales and questionnaire). Intervention was clearly explained.	
Sampling: Was the sampling strategy appropriate to address the aims?	Good (4)
Recruitment setting was acknowledged, the inclusion and exclusion, criteria, and characteristics of the participants were included. Sample size was explained with a power calculation.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Good (4)
Statistical analysis was sufficiently described.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Fair (3)
Approval was mentioned, as well as letter of explanation that participants received, however it was not mentioned that an informed consent was signed. Possible bias was addressed.	
Results: Is there a clear statement of the findings?	Good (4)
Results present enough data to support findings. The findings are also presented in easy-to-read graphs and tables, and they are explained in text as well.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
Because the sample size met the power calculation, the results are transferable. The researchers mentioned that the that because of their inclusion and exclusion criteria it may limit the generalizability of ovarian cancer patients.	
Implication and usefulness: How important are the finding to policy and practice?	Good (4)
Recommendations for further research and clinical practice are briefly mentioned. Because of the positive results, this study can be useful for nursing practice.	
	Total: 32/36 = 89%

Effects of Energy Conservation Strategies on Cancer Related Fatigue and Health Promotion Lifestyle in Breast Cancer Survivors: A Randomized Control Trial (Sadeghi et al., 2016)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title includes design, intervention, and sample, setting is missing. The abstract includes a short introduction with objective, methods with design, sample, and setting (instruments for measurement are missing), the main results, and a conclusion. Recommendation for practice and/or further research was not mentioned.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Fair (3)
Adequate background information and up-to-date studies on the topic was included in the introduction. The purpose and hypothesis were included, however no objective and/or question. Current gap in knowledge was addressed.	
Method and data: Is the method appropriate and clearly explained?	Good (4)
The method used for this type of study was both appropriate and clearly explained. A clear description of intervention being done was included, as well as for all of the instruments used for measurement.	
Sampling: Was the sampling strategy appropriate to address the aims?	Poor (2)
Method of participant recruitment was not explained. A description of inclusion and exclusion criteria, the justification for sample size, and a power calculation was included. Participant characteristics were presented. Inclusion criteria is misleading to rest of the text. Only here does it state that the participants were breast cancer patients undergoing chemotherapy. The rest of the text always said breast cancer survivors.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Fair (3)
Clear description and adequate detail of analysis has been discussed. Analysis did not have its own subtitle.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Fair (3)
Approval and information for participants was included, however whether or not an informed consent was signed, was not given. Possibilities for bias have not been considered, however as it is a randomized trial, there should be no issue with bias.	
Results: Is there a clear statement of the findings?	Good (4)
There is a clear statement of the findings with enough data to support it. The findings are presented in graphs and tables and explained in text.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Good (4)
Sample met the power calculation, making it generalizable to a wider population. A strength of the study was the diversity in demographic characteristics of the participants, making it generalizable.	
Implication and usefulness: How important are the finding to policy and practice?	Good (4)
Recommendations for further research as well as for practice have been given. The study's results contribute new information for nursing and therapeutic interventions.	
	Total: 30/ 36 = 83%

Bright Light Therapy Improves Cancer-Related Fatigue in Cancer Survivors: a Randomized Controlled Trial (Johnson et al., 2018)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title includes the design, intervention, and sample, but no setting. The abstract includes a short background with purpose, the methods with design, intervention, and sample, without the measurements, the main results, a conclusion, and a recommendation for practice.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Fair (3)
The introduction includes adequate background information, up-to-date studies on the topic, and the gap in knowledge. The aim is clearly described with the hypothesis; however, the objective and/or question are missing.	
Method and data: Is the method appropriate and clearly explained?	Good (4)
The method is appropriate for the study and is clearly explained in the text. The intervention and instruments used for measurements are clearly described.	
Sampling: Was the sampling strategy appropriate to address the aims?	Good (4)
The method of sampling was included, as well as the inclusion and exclusion criteria, the justification for sample size, and power calculation.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Good (4)
Statistical analyses of the data is sufficiently and clearly described.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Good (4)
Approval and informed consent were mentioned, as well as the blinding to ensure no bias.	
Results: Is there a clear statement of the findings?	Good (4)
The results of clearly stated and divided into primary and secondary outcomes. Enough data to support the findings is presented. The findings are also shown in tables and graphs and explained in text.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
Given the power calculation, the results of this study are generalizable. However, the predominantly white sample limits the study. The results of the study were compared to general studies on this topic, but no specific research was mentioned.	
Implication and usefulness: How important are the finding to policy and practice?	Good (4)
A recommendation for practice was mentioned in the abstract and thorough recommendation for future research were included in the text. This study offers new findings that can be implemented.	
	Total: 33/ 36 = 92%

Randomized Controlled Pilot Trial of Mindfulness-Based Stress Reduction Compared to Psychoeducational Support for Persistently Fatigued Breast and Colorectal Cancer Survivors (Johns et al., 2016)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
Title includes intervention(s), design, and sample, setting is not present. The abstract includes a short background, the purpose of the study, the methods used (measurements are missing), the most important results, and a conclusion. Recommendations for research was included, however no recommendation for practice was.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Fair (3)
The Introduction included adequate(Johns et al., 2016) background information on the topic, as well as up-to-date studies done on it. The aim of the study was explained as well. Research question and objective was not included.	
Method and data: Is the method appropriate and clearly explained?	Good (4)
The methods included an appropriate design and was well structured. A clear description of all the measurements used, and a description of the intervention was also included.	
Sampling: Was the sampling strategy appropriate to address the aims?	Good (4)
The sampling strategy used is appropriate for this study. The researchers included the method how and when participants were recruited, as well as the criteria. Statistical power was calculated and included (80%).	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Good (4)
A rigorous data analysis description was included.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Good (4)
Approval and informed consent were included. The researchers mentioned funding as well.	
Results: Is there a clear statement of the findings?	Good (4)
The results are clearly presented. Tables were included to demonstrate the results and they were explained in text as well. Adequate data was presented to support the results.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
The researchers included generalizability as both a strength and weakness. It is presented as a strength due to its demographic heterogeneity and presented as a weakness due to low percentage of male participants. The power was low; however it is a pilot study.	
Implication and usefulness: How important are the finding to policy and practice?	Fair (3)
Recommendations for further research have been included, however no direct recommendations were addressed for practice. Based on the positive results, it could be useful for practice.	
	Total: 32/ 36 = 89%

Randomized Controlled Pilot Study of Mindfulness-based Stress Reduction for Persistently Fatigued Cancer Survivors (Johns et al., 2015)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
Title includes the design, sample, and intervention, missing the setting. Abstract included the purpose of the study, methods (the sample size and a short description of the intervention and control group), the main results, and a short conclusion. They did not include the recommendations for practice and further research.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Fair (3)
The introduction included adequate background information on the topic as well as other up-to-date studies on it. They included their hypothesis, but the aim and/or objective was not clearly explained, and the research question was not included.	
Method and date: Is the method appropriate and clearly explained?	Good (4)
Method is appropriate for this study. They explained in detail the method, adding an adequate description of the scales/questionnaires used for measurements.	
Sampling: Was the sampling strategy appropriate to address the aims?	Good (4)
The sampling strategy, recruitment and characteristics of the participants were included. Limited statistical power and sample size was mentioned.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Good (4)
Data analysis was sufficiently rigorous.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Good (4)
Approval and informed consent were included. The researchers also noted that the measurements were not subject to bias, as they were self-reported. It was also noted that bias is subjected in the selection as the study only included patients who were willing to enroll in the trial.	
Results: Is there a clear statement of the findings?	Good (4)
Results are well presented and explained in text, as well as in tables and figures. The results have sufficient data and are comparable to the hypothesis.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
The researchers discuss that the study is not representative of the general population and the statistical power is limited, however it still the findings can still be generalizable to the real-world practice because of the heterogeneity of the sample. Researchers also compared it to multiple other studies.	
Implication and usefulness: How important are the finding to policy and practice?	Good (4)
The researchers include descriptive recommendations for practice as well as for future research.	
	Total: 33/ 36 = 92%

Systematic Monitoring and Treatment of Physical Symptoms to Alleviate Fatigue in Patients with Advanced Cancer: A Randomized Controlled Trial (de Raaf et al., 2013)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title includes the intervention, design, and sample, does not include the setting. The abstract includes a background with the purpose of the study, the methods with sample, intervention, and measurement, the main results of the study, and a conclusion. No recommendations for practice or research were in the abstract and the keywords are missing completely.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Poor (2)
Background information on the topic was briefly mentioned with up-to-date studies. The purpose was included however no objective or questions	
Method and date: Is the method appropriate and clearly explained?	Good (4)
Method was very clearly described and appropriate for this study. The design, intervention, and instruments used for measurements were included in detail.	
Sampling: Was the sampling strategy appropriate to address the aims?	Good (4)
The method of sampling was described and was appropriate for this study. Participant criteria was included as well as the characteristics of the participants. A power calculation was conducted, showing that the sample size was high.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Good (4)
A description of the data analysis was sufficiently rigorous.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Good (4)
Approval and informed consent were included. Possible selection bias was addressed.	
Results: Is there a clear statement of the findings?	Good (4)
The results are clearly presented with enough data to support the findings. The findings are presented in tables and figures and are explained in the text.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
Due to the power calculation being reached, the generalizability is high. However, the participants were predominantly white, making it less generalizable to the public. They compared their results to those of different studies.	
Implication and usefulness: How important are the finding to policy and practice?	Good (4)
Both recommendations for practice and research have been addressed in the study. No other RCT was conducted with this type of intervention, making it a new contribution.	
	Total: 32/ 36 = 89%

The Effectiveness of Nursing Education as an Intervention to Decrease Fatigue in Turkish Patients Receiving Chemotherapy (Yesilbalkan et al., 2009)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title includes the intervention, setting, and sample, but does not include the design. The abstract includes the purpose and objective of the study, the methods with design, setting, sample, measurements, and intervention, the main findings, conclusion and implication for practice.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Good (4)
The introduction provides adequate background information on the topic, including up-to-date studies on the topic, and the current gap in knowledge, the purpose and research questions.	
Method and data: Is the method appropriate and clearly explained?	Good (4)
The method used for this study is appropriate. The instruments used for measurement are all clearly explained, as well as the interventions.	
Sampling: Was the sampling strategy appropriate to address the aims?	Fair (3)
The sampling conducted was appropriate and explained. Criteria was addressed, and the reason for patient exclusion, however no justification for the sample size was given/power calculation was not done. Patient characteristics were included.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Poor (2)
Minimal details regarding the analysis.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Good (4)
Approval and informed consent have been mentioned.	
Results: Is there a clear statement of the findings?	Good (4)
The results are simple to understanding and presented well in text, as well as in tables and figures. Adequate data was presented to support the results.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
Generalizability is a limitation to this study, as the inclusion and exclusion criteria made the sample size very limited, there was no power calculation done, and there was not a control group. However, this limitation was addressed. The findings were compared to multiple other study's findings.	
Implication and usefulness: How important are the finding to policy and practice?	Fair (3)
Implications and recommendations for practice were discussed, as well as where and how the findings of this study have already been implemented. Further research recommendation has been briefly mentioned as well, but nothing specific.	
	Total: 30/ 36 = 83%

Psychoeducational Intervention for Symptom Management of Fatigue, Pain, and Sleep Disturbance Cluster Among Cancer Patients: A Pilot Quasi-Experimental Study (Nguyen et al., 2018)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title includes the design, intervention, and sample, but no setting. The abstract includes the objective of the study, the methods (measurements are missing), the main results, and a recommendation for further research.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Good (4)
The introduction includes adequate background information and up-to-date studies on the topic, as well as the gap in knowledge. The aims and objective are clearly stated.	
Method and date: Is the method appropriate and clearly explained?	Good (4)
The method for this study is appropriate and the explanation for it was included. The setting was included, the interventions were clearly described, as well as the scales/questionnaires used for measurement.	
Sampling: Was the sampling strategy appropriate to address the aims?	Fair (3)
Criteria was included; however the recruitment strategy was not. Statistical power was also not mentioned, but the justification for the small recruitment rate was. Characteristics of participants were presented in a table.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	Good (4)
Data Analysis was described sufficiently rigorous.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Poor (2)
Funding was mentioned, as well as approval. However, whether or not an informed consent was signed was not stated.	
Results: Is there a clear statement of the findings?	Good (4)
The results were clearly presented and well explained, with sufficient data to support. Tables and figures were used to present and described in text.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Poor (2)
Similarities and differences to those of other studies were compared. Since a power was not calculated, generalizability is unclear.	
Implication and usefulness: How important are the finding to policy and practice?	Fair (3)
The positive results on some symptoms do implicate usefulness of the strategy, however direct recommendations for practice were not mentioned, recommendations for further research were.	
	Total: 29/ 36 = 69%

Yoga for Persistent Fatigue in Breast Cancer Survivors – A Randomized Controlled Trial (Bower, 2014)

Abstract and Title: Did they provide a clear description of the study?	Fair (3)
The title included the intervention, population, and design, and no setting. The abstract included the background, method including objective and design, the main results, and a conclusion. Recommendations for further research and/or practice were not mentioned.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Good (4)
Introduction includes the objective as well as the hypothesis of the researchers. A detailed background of the subject, as well as previous up-to-date research was discussed.	
Method and date: Is the method appropriate and clearly explained?	Good (4)
The method used is appropriate for the research conducted and the method of data collection was present. A descriptive explanation of all questionnaires and scales used was included. The intervention, as well as the control group was described in detail.	
Sampling: Was the sampling strategy appropriate to address the aims?	Fair (3)
The researchers explained how the participants were recruited and the inclusion and exclusion criteria, as well as the characteristics of the participants in tables. Sample size is not justified.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	God (4)
The statistical analyses was described adequately.	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Fair (3)
The approval was briefly mentioned, as well as the informed consent.	
Results: Is there a clear statement of the findings?	Good (4)
The results are categorized with subtitles based on effect of the intervention, making it simple to read. The results are also presented in tables and figures and explained in text as well. Sufficient data is presented to support the results.	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Poor (2)
Study mentioned that a limitation was the generalizability, as it had a small sample size and they only included breast cancer survivors who were not comorbid or had physical limitations. Results from the research were compared to one other study.	
Implication and usefulness: How important are the finding to policy and practice?	Fair (3)
The researchers suggested recommendations for further research on this topic. Direct recommendations for practice for were not mentioned but can be used in practice because of the noteworthy results.	
	Total: 30/ 36 = 83%

The Effect of Therapeutic Touch on Pain and Fatigue of Cancer Patients Undergoing Chemotherapy (Aghabati et al., 2010)

Abstract and Title: Did they provide a clear description of the study?	Poor (2)
The title includes the intervention and sample, does not include the setting and design. The abstract includes a background with the purpose of the study, the methods with sample, intervention, and measurement, the main results of the study, and a conclusion. No recommendations for practice or research were in the abstract. Keywords are right after the abstract. The abstract is flow text, making the overview unclear.	
Introduction and aims: Was there a good background and clear statement of the aims of the research?	Good (4)
Background information on the topic was mentioned with up-to-date studies. The purpose was included with objective and hypothesis.	
Method and date: Is the method appropriate and clearly explained?	Good (4)
Method was very clearly described and appropriate for this study. The design, intervention, and instruments used for measurements were included in detail.	
Sampling: Was the sampling strategy appropriate to address the aims?	Good (4)
The method of sampling was described and was appropriate for this study. Participant criteria was included as well as the characteristics of the participants. A power calculation was conducted, showing that the sample size was adequate for the study.	
Data Analysis: Was the description of the data analysis sufficiently rigorous?	VeryPoor(1)
Analysis missing	
Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?	Fair (3)
Approval and informed consent were included. Possible selection bias not mentioned.	
Results: Is there a clear statement of the findings?	Good (4)
The results are clearly presented with enough data to support the findings. The findings are presented in tables and figures and are explained in the text with subtitles for the different outcomes	
Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?	Fair (3)
Due to the power calculation being reached, the generalizability is high. However, the participants were all female due to cultural issues, making it less generalizable to the public. They compared their results to those of different studies.	
Implication and usefulness: How important are the finding to policy and practice?	Good (4)
Both recommendations for practice and research have been addressed adequately in the study.	
	Total: 29/ 36 = 80.5%