



IMPROVING SLEEP QUALITY IN CANCER PATIENTS: A LITERATURE REVIEW ON NON-PHARMACOLOGIC INTERVENTIONS

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Abstract – Objective: *Disrupted sleep-in cancer patients is due to several factors. Pre-existing sleep disorders, mental status in cancer, or side effects of cancer treatment are all potential predictors of sleep disturbances in this vulnerable population. This review aims to evaluate and synthesise non-pharmacologic interventions for improving sleep quality and the associated benefits in cancer patients.*

Materials and Methods: *A literature review was performed according to PRISMA guidelines. PubMed, Google Scholar, MEDLINE, CINAHL, and Embase databases were interrogated, selected the article with cancer, neoplasm, oncology, sleep-wake disorders, sleep disturbance, sleep problem, strategies, treatment, and intervention such as keywords. No time and geographic restrictions but paediatrics, children, and interventions unrelated to sleep improvement in cancer were excluded.*

Results: *Overall, twenty-nine articles were included in the review after selection. The included studies analysed different types of cancer, like breast, lung, and prostate cancer and acute leukaemia. Most of the data gathered from the relevant research suggest that nonpharmacologic interventions significantly improved cancer patients' sleep quality.*

Conclusions: *Cancer survival rates are increasing; researchers and healthcare professionals should aim not just at survival but also to allow cancer patients just comfortably to live, considering the best quality of life possible. Nurses have a crucial role in the care of this patient population. Nursing implies an intimate relationship with patients and educating the patient to improve their mental and physical condition through non-pharmacological approaches, which should be considered a specific competence.*

KEYWORDS: *Non-Pharmacologic Intervention, Sleep quality, Cancer patients.*

INTRODUCTION

Worldwide, an estimated 19.3 million new cases of cancer occurred in 2020 (18.1 million excluding non-melanoma skin cancer) and nearly 10.0 million cancer deaths (9.9 million excluding non-melanoma skin cancer) were reported. Globally, the incidence rate for all cancers combined was 19% higher in men

(222 per 100.000) than in women (186 per 100.000) in 2020; rates varied widely between regions¹. Each tumor requires different approaches and often different treatment times. Nowadays, it can be said that the earlier the diagnosis, the greater the chances of successful treatment. Cancer treatment requires the elimination of all cells capable of causing a recurrence. Often, a combination of modalities is used to



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create a treatment pathway appropriate for the patient based on their characteristics and the tumor. Side effects can manifest differently according to various factors contributing to their development, including pre-existing pathologies, comorbidities, and risk factors. In contrast, others, such as taste and smell alterations, have an iatrogenic cause².

There is a growing body of research indicating that certain types of cancer treatments, including chemotherapy, hormone therapy, targeted therapy, and immunotherapy, can have an impact on sleep patterns and quality. Sleep disorders, such as insomnia, sleep apnea, and restless leg syndrome, are common among cancer patients, and may be caused by the treatments themselves, as well as by the stress and anxiety associated with the disease.

Chemotherapy drugs, for example, can disrupt the body's natural circadian rhythms, leading to sleep disturbances. Hormone therapy, particularly in breast cancer patients, can cause hot flashes and night sweats, which can also interfere with sleep. Targeted therapies and immunotherapies may also cause fatigue, which can lead to excessive daytime sleepiness and difficulty sleeping at night.

An estimated 95% of cancer patients complain of sleep disturbances throughout their cancer trajectory, which includes all the patient's pathways, before a definite diagnosis, during treatment, and - in different cases - for years following their oncological treatment³. Disrupted sleep in cancer patients is due to several factors and typically manifests as a comorbid disorder with various somatic and psychiatric diagnoses, psychological disturbances, and treatment methods. Pre-existing sleep disorders, mental status in cancer, or side effects of cancer treatment are all potential predictors of sleep disturbances in these vulnerable groups³. Sleep disorders can manifest in different ways, such as insomnia, fatigue, pain, anxiety, depression, and restless leg syndrome, among others. Of these, insomnia appears to be the most prevalent³. Unfortunately, despite its prevalence and clinical significance, insomnia is frequently overlooked in cancer practice and is rarely included as part of routine patient screening. Psychological interventions are not typically offered to patients with cancer, and patients may also fail to report it, assuming it to be a normal and temporary reaction to a cancer diagnosis or treatment⁴. The evidence-based effectiveness of therapeutic strategies using drugs to treat sleep disorders is now well-known, as are treatments involving sleep hygiene education, stimulus control, and some relaxation techniques⁵. In this study, we aim to evaluate and synthesize non-pharmacologic interventions found in the literature and tested to improve sleep quality and associated benefits in cancer patients.

MATERIALS AND METHODS

Databases such as PubMed, Google Scholar, MEDLINE, CINAHL, and Embase were searched to find relevant literature. The articles were selected using keywords such as cancer, neoplasm, oncology, sleep-wake disorders, sleep disturbance, sleep problem, strategies, treatment, and intervention, with the Boolean operators AND and OR. Only articles written in English about sleep interventions for improving sleep quality in cancer patients and testing non-pharmacological interventions were included. The authors selected as many relevant studies as possible related to the study objective, excluding studies involving pediatric patients, children, and interventions unrelated to sleep improvement in cancer. There were no time or geographic restrictions in this review.

The screening method involved examining the titles, abstracts, and full texts, and deleting duplicates to determine the relevant articles. The PRISMA study selection process was used to access relevant information for the review⁶. The selected literature was thoroughly read to determine the findings, and a complete review of all collected literature was carried out with utmost attention.

RESULTS

The search strategy for interventions to improve sleep quality through the five selected databases (PubMed, Google Scholar, MEDLINE, CINAHL, and Embase) resulted in a total of 316 papers assessed. After removing 51 duplicates and selecting eligible articles, 236 papers were rejected due to lack of relevance, and a total of twenty-nine (N = 29) articles were included in the review. The study selection procedure flow diagram is depicted in Figure 1.

Table 1 reports a non-pharmacologic interventions summary extracted from the included articles.

Figure 2 expresses graphically the types of cancer percentage of the included studies' topics. Among the various types of cancer analysed by the included studies, in addition to the most represented breast cancer, were found the label "various cancer", including tumours such as liver and stomach cancer, among others.

Supplementary Table 1 reports the main characteristics of the studies included in the review. It's split to be viewed concisely by showing the year and publication, title with authors, article objective, results, and type of neoplasm.

Fig. 1. PRISMA flow diagram of the study selection process.

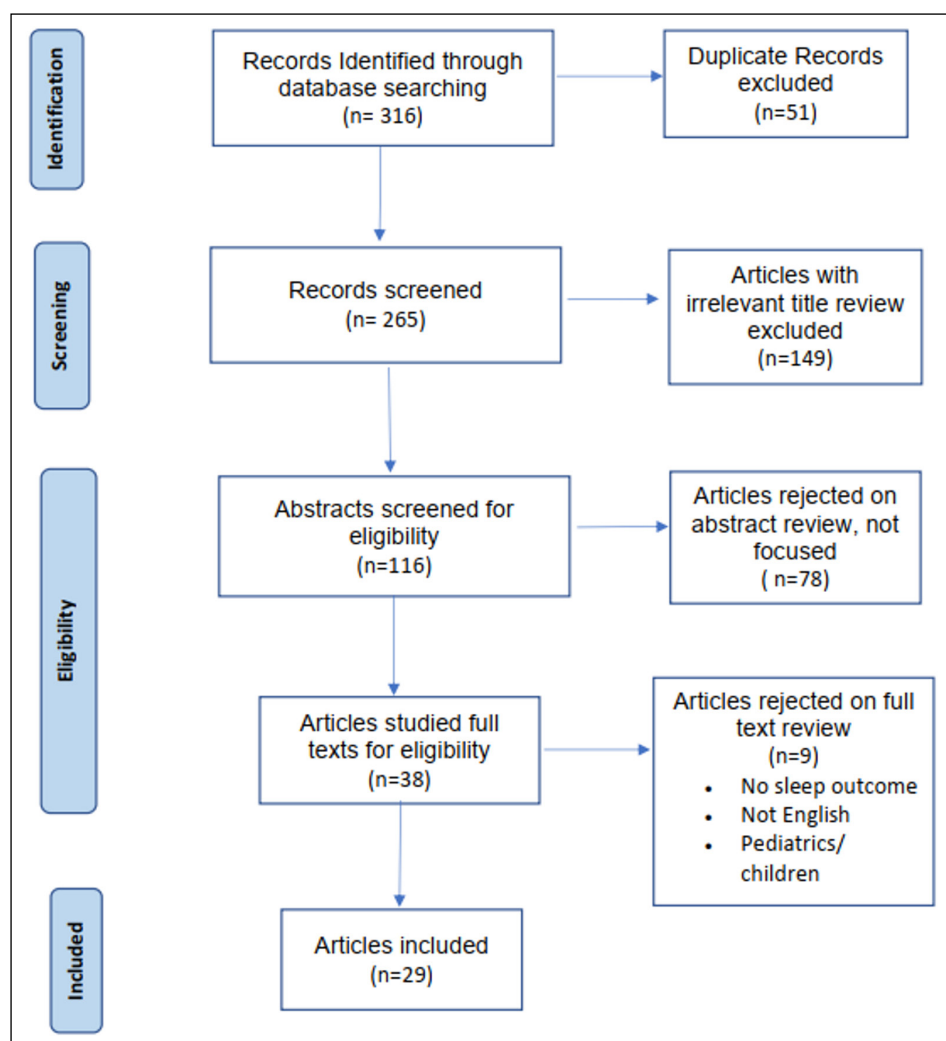


TABLE 1. Summary of non-pharmacologic interventions.

Non-pharmacologic interventions	Improved sleep quality	No significant benefit	Total
<i>Music</i> ^{7,8}	2	/	2
<i>Aromatherapy</i> ⁹⁻¹¹	3	/	3
<i>Cognitive Behaviour Therapy</i> ¹²⁻¹⁸	7	/	7
<i>Massage therapy</i> ¹⁹	1	/	1
<i>Acupuncture</i> ²⁰⁻²⁴	4	1	5
<i>Acupressure</i> ²⁵⁻²⁷	3	/	3
<i>Tai chi</i> ^{28,29}	2	/	2
<i>Qigong</i> ^{30,31}	1	1	2
<i>Yoga</i> ^{32,33}	/	2	2
<i>Exercise</i> ^{34,35}	1	1	2
Total	24	5	29

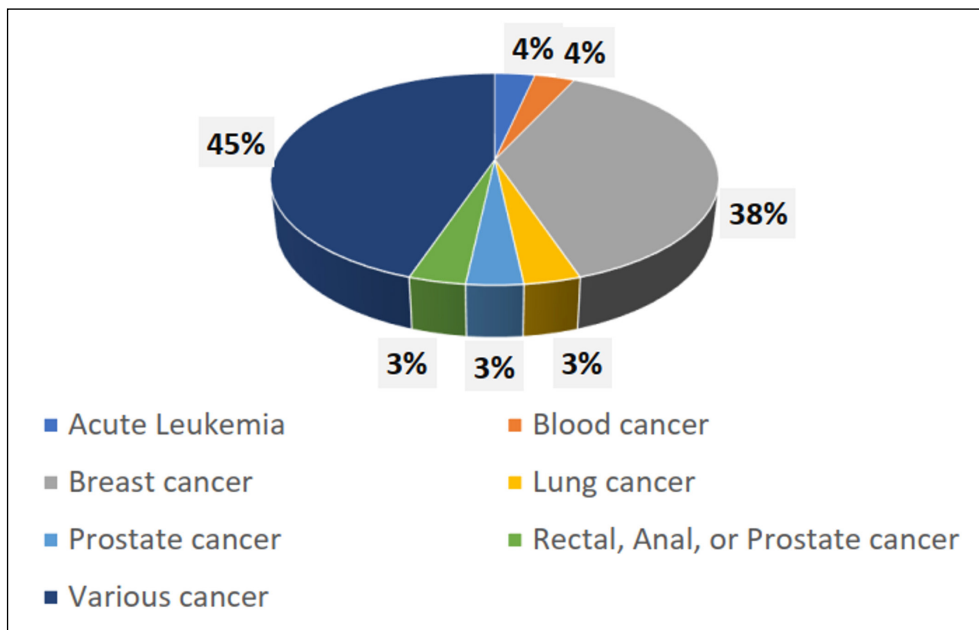


Fig. 2. Types of cancer.

DISCUSSION

This review aimed to assess non-pharmacologic interventions for improving sleep quality and associated benefits in cancer patients.

Literature about the Complementary Alternative Medicine (CAM) in cancer patients was increased in the last decades. CAM refers to a diverse set of health care practices and therapies that are not considered part of conventional medicine but are used alongside it. CAM includes a wide range of therapies, such as herbal and dietary supplements, mind-body practices, massage, acupuncture, and others³⁶⁻³⁹. The majority of the studies analysed were conducted on breast cancer and various cancer groups. Cognitive Behavioral Therapy (CBT) was the most extensively studied intervention and showed significant improvement in the quality of sleep in cancer patients.

However, a study by Ivers et al¹² found that Video Cognitive Behavioral (VCBT-I) was more cost-effective than professionally-based CBT-I (PCBT-I) but marginally less effective in lowering ISI scores at post-treatment and 3-month follow-up. Acupuncture and acupressure interventions demonstrated a remarkable enhancement in cancer patients' sleep quality, but a study by Wan et al²⁶ found no evidence that acupuncture or auricular acupressure helped cancer survivors sleep better in short- or long-term effects.

Mindfulness-based interventions, including Qigong, Tai Chi, Yoga, and Aerobic exercise, showed benefits in cancer patients' sleep quality,

but some studies found no significant improvement. Indeed, the study by Chandwani et al³² did not find any significant difference in mental health or sleep quality in breast cancer patients undergoing radiotherapy who practiced yoga compared to the control group. The study by Felbel et al³³ found very low-quality evidence that yoga improves general sleep quality, and the relevance of yoga as adjuvant therapy for hematological malignancies remains uncertain.

In terms of exercise, Schumacher et al³⁵ found no improvement in sleep quality in prostate cancer patients, while Nourizadeh et al³⁴ found improvement in sleep quality in breast cancer patients.

Meng et al³¹ found no significant improvement in fatigue or sleep disturbance with qigong compared to the control group, while aromatherapy was shown to significantly improve sleep quality in cancer patients, with lavender essential oil having the best result among single essential oils. Compound essential oils, on the other hand, did not show improvement in sleep quality. Music therapy was also found to benefit cancer patients by improving sleep quality with minimal risk to the patients. Also physical activity could improve cancer symptoms⁴⁰.

The study by Miladinia et al¹⁹ suggests that massage therapy can be beneficial for acute leukemia patients undergoing chemotherapy, and nurses can play a crucial role in implementing non-pharmacological approaches to improve the mental and physical condition of their patients. Nursing involves building a close relationship with patients and providing care that goes beyond

just administering medication. This highlights the importance of incorporating non-pharmacological interventions in cancer care and the vital role that nurses play in patient care.

It's important to acknowledge the limitations of any study, and the authors of this study have rightly pointed out that their review is not a systematic review and, therefore, did not assess the risk of bias in the included studies. Systematic reviews are considered to be the gold standard in research synthesis, as they use rigorous and transparent methods to identify, appraise, and synthesize all relevant research on a particular topic. Additionally, while the studies included in this review suggest that non-pharmacological interventions can be beneficial for cancer patients with sleep disturbances, more research is needed to confirm these findings and to identify the most effective interventions for different types of cancer and cancer treatments. It is also important to note that non-pharmacological interventions should not replace pharmacological treatments when they are necessary and appropriate and should always be used under the guidance of healthcare professionals.

CONCLUSIONS

The number of cancer patients has increased over the years, and various treatments have been developed to treat cancer, leading to higher survival rates. However, disorders, particularly sleep disruption, persist. Due to the side effects of pharmacological treatments, many cancer patients try nonpharmacological sleep remedies. Several approaches have emerged that enable and ensure an improvement in sleep quality. The most well-known and validated is CBTI, which has also become the gold standard for insomnia, although it has been less tested with emerging approaches such as digital technologies for managing and caring for cancer patients³⁶.

In conclusion, cancer survival rates are increasing, and researchers and healthcare professionals should aim not only for survival but also for enabling cancer patients to live comfortably once again after treatment, specifically without the incidence of side effects such as insomnia, pain, anxiety, and so on, which contribute to a lower quality of life. In this study, most nonpharmacological interventions showed a good effect in promoting the quality of sleep in cancer patients with little or no risk to patients. More studies with rigorous designs and larger sample populations are necessary to verify the efficacy of nonpharmacological interventions.

AVAILABILITY OF DATA AND MATERIAL:

The datasets generated and/or analyzed during the current study are available upon request.

CONFLICTS OF INTEREST:

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHORSHIP:

Substantial contribution to research design: MDM, NG and EDS; Acquisition, analysis and interpretation of data: NP, BE, FS, GL, ADL and SD; Draft of the paper and critical revision: NP, MC and EDS; Approval of the submitted and final versions: all authors.

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