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REVIEW ARTICLE

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Immunological and metabolic importance of palliative medicine in nutritional therapy: a systematic review

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Abstract

Introduction: In the palliative care (PC) setting, levels of nutritional knowledge, emotional support, and the impact and severity of the disease can influence important immunological and metabolic responses in patients. Furthermore, the spiritual and religious (S/R) impact associated with an adequate diet for energy homeostasis is evident. **Objective:** To describe, through a systematic review, the immunological and metabolic importance of palliative medicine in nutritional therapy. **Methods:** The systematic review guidelines of the PRISMA Platform were followed. The search was conducted from June to August 2025 in the Scopus, Embase, PubMed, Science Direct, Scielo, and Google Scholar databases. Study quality was based on the GRADE instrument, and risk of bias was analyzed according to the Cochrane tool. **Results and Conclusion:** A total of 91 articles were found. A total of 24 articles were fully evaluated, and 14 were included and developed in this systematic review study. Using the Cochrane risk-of-bias tool, the overall assessment revealed six studies with a high risk of bias and 29 studies that did not meet the GRADE and AMSTAR-2 criteria. Most studies presented homogeneous results, with X^2=73.7%>50%. The conclusion is that there is still a shortage of clinical trials on home-based PC for geriatric cancer patients, resulting in poor information and a lack of evidence. Home-based interventions appear feasible and have a positive effect on pain control and functional status, but more high-quality studies are needed. Spiritual care may be particularly important during times of illness, suffering, or near the end of life, when patients seek comfort. Patients in PC

are complex, with multiple clinical, psychological, social, and spiritual problems. Using a multidisciplinary approach, especially appropriate nutritional therapy, can improve the quality of life of patients and their families. It is essential to train, expand, and integrate PC teams, allowing patients a better quality of life until their death.

Keywords: Nutrology. Palliative care. Spirituality/ Religiosity. Quality of life. Metabolism.

Introduction

In the context of palliative care, levels of nutritional knowledge, the level of emotional support, and the impact and severity of the disease can influence important immunological and metabolic responses in patients. Furthermore, the spiritual and religious implications (S/R) linked to an appropriate diet for energy homeostasis are evident **[1-3]**.

In this context, three-dimensional printing (3DP) enables the production of highly personalised and cost-effective devices in a relatively short time, which can be particularly valuable for physicians treating patients with palliative care intent who require quick and effective solutions for managing their patients' specific needs, including the relief of distressing symptoms. 3DP has demonstrated success in overcoming difficulties with conventional approaches and in treating medical conditions that require highly personalised solutions **[4]**.

Furthermore, S/R is multidimensional in nature and is associated with enteral/parenteral nutritional therapy and the inherent protection against disease and improved overall quality of life. However, a number of untouched aspects of religiosity need to be further investigated before introducing religiosity in its fully functional form into the domain of healthcare **[2-5]**. The aspects of S/R constitute one of the eight core domains of palliative care. Several studies have demonstrated that S/R are important factors influencing medical decision-making in the case of a terminal illness with a patient in nutritional care **[3,5]**.

It is observed that about half of outpatients express a desire to interact with their doctors regarding S/R beliefs in a near-death scenario. Lack of S/R support is widespread in cancer patients, which is associated with a significantly lower quality of life compared to those whose spiritual needs are adequately addressed **[3-8]**. Despite the overwhelming evidence on the positive impact of appropriate end-of-life care on S/R, its routine incorporation into clinical practice is lacking **[9-12]**. Although there is abundant data on the spiritual aspects of end-oflife care, a gap has been identified in the literature in peer-reviewed scientific publications when it comes to addressing religious beliefs at the end of life **[13]**.

Nutritional support and S/R are important elements of palliative care, as inadequate hydration and malnutrition outcomes in skin and muscle loss, vulnerability to the development of pressure ulcers, infection, and respiratory problems frequently occur. The criteria for nutritional intervention are a body mass index (BMI) less than 18.5 kg/m^2, unintentional weight loss greater than 10% in the last 3 to 6 months, a BMI less than 20 kg/m^2, and involuntary weight loss greater than 5% in the last 3-6 months **[14]**.

Thus, the present study, described through a systematic review, studied the immunological and metabolic importance of palliative medicine in nutritional therapy.

Methods

Study Design

This study followed an international model for systematic review, adhering to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Available at: http://www.prisma-statement.org/?AspxAutoDetectCookieSupport=1. Accessed on: July 18, 2025. The methodological quality standards of AMSTAR-2 (Assessing the methodological quality of systematic reviews) were also followed. Available at: https://amstar.ca/. Accessed on: July 18, 2025.

Data Sources and Search Strategy

The literature search process was conducted from June to August 2025 and developed using Scopus, Embase, PubMed, Web of Science, Lilacs, Ebsco, Scielo, and Google Scholar, encompassing scientific articles from various periods to the present day. The following descriptors were used (DeCS/MeSH Terms): "Nutrology. Palliative care. Spirituality/Religiosity. Quality of life. Metabolism", and using the Boolean operator "and" between MeSH terms and "or" between historical findings.

Study Quality and Risk of Bias

Quality was classified as high, moderate, low, or very low regarding the risk of bias, clarity of comparisons, precision, and consistency of analyses. The most evident highlight was for systematic review articles or meta-analyses of randomized clinical trials, followed by randomized clinical trials. Low quality of

evidence was attributed to case reports, editorials, and brief communications, according to the GRADE instrument. The risk of bias was analyzed according to the Cochrane instrument through the analysis of the Funnel-Plot (Sample size versus Effect size), using Cohen's d test.

Results and Discussion

Summary of Findings

A total of 91 articles were submitted to eligibility analysis, with 14 final studies selected to compose the results of this systematic review. The listed studies presented medium to high quality (Figure 1), considering the level of scientific evidence of studies such as meta-analyses, consensus, randomized clinical trials, and prospective and observational studies. Biases did not compromise the scientific basis of the studies. According to the GRADE instrument, most studies showed homogeneity in their results, with X^2=73.7%>50%. Considering the Cochrane tool for risk of bias, the overall assessment resulted in 6 studies with a high risk of bias and 29 studies that did not meet the GRADE and AMSTAR-2 criteria.

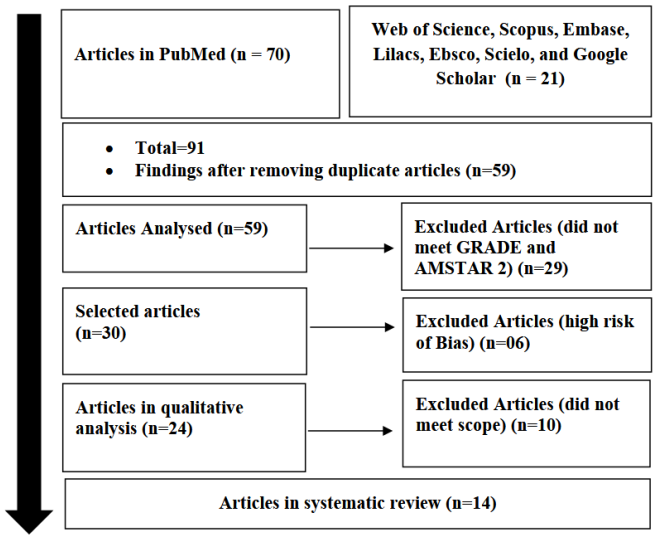

Figure 1. Flowchart showing the article selection process. Source: Own authorship.

Figure 2 presents the results of the risk of bias of the studies using the Funnel Plot, showing the calculation of the Effect Size (Magnitude of the difference) using Cohen's d test. The precision (sample size) was determined indirectly by the inverse of the standard error (1/Standard Error). This graph showed symmetrical behavior, both between studies with small sample sizes (lower precision, n=10 studies), which are shown at the bottom of the graph, and in studies with larger sample sizes, which are shown at the top (n=7 studies).

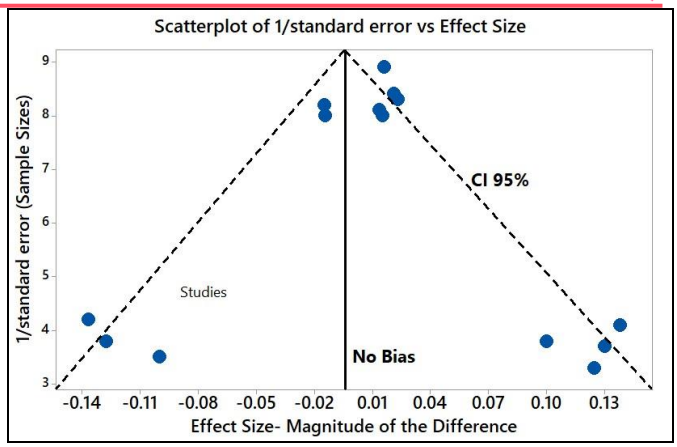

Figure 2. The symmetrical funnel plot does not suggest a risk of bias among the small sample size studies shown at the bottom of the graph. Studies with high confidence and high recommendation are shown above the graph (n=14 studies). Source: Own authorship.

Nutrology and Palliative Care

Within the broad spectrum of cancer treatment, nutrition and palliative care play a fundamental role in supporting patients throughout their journey. Evidence indicates that cancer and anticancer treatments frequently cause malnutrition and muscle loss, which can exacerbate symptoms, impair immune function, and hinder recovery. Therefore, adequate nutritional support is crucial to maintain strength, control symptoms, and optimize treatment tolerance in cancer patients. Several factors influence nutritional needs and dietary recommendations, including the type of cancer, palliative care, spirituality/religiosity (S/R), and the individual characteristics of the patient **[15]**.

In this scenario, due to the urgent need to develop palliative care services for geriatric patients with advanced cancer, an overview of the available information on home-based palliative care interventions would be valuable. The authors Vlachopoulos et al. (2025) **[16]** analyzed 10 articles including 871 patients. Four studies evaluated exercise interventions, two evaluated multicomponent home care models, two focused on supervisory services, and two had nutrition and activity components. Eight studies reported improved outcomes in specified or mixed geriatric cancer populations. However, there is still a scarcity of clinical trials on home-based palliative care for geriatric cancer patients, resulting in poor information and a lack of evidence. Home interventions appear feasible and have a positive effect on pain control and functional status, but more high-quality studies are needed.

It is recognized that health is not only physical but also includes emotional, mental, and spiritual dimensions. Spiritual care can be particularly important during times of illness, suffering, or near the end of

life, when patients seek comfort, meaning, and connection to their beliefs or faith. Integrating spiritual care and measuring spirituality and the level of spiritual care are important strategies to improve spiritual care among healthcare professionals **[17]**.

A study of patients with advanced cancer showed a significantly increased probability of quality of life in patients who received spiritual support provided mainly by religious communities **[9]**. Furthermore, patients who received S/R care from a medical team had higher rates of palliative care utilization, fewer ICU deaths, and underwent fewer aggressive interventions. Spiritual support from a medical team is also associated with better quality of life near death and lower care costs **[10,11,18]**.

It is observed that in palliative care, both physical complaints and emotional, social, and spiritual aspects are considered. Nutritional care should also be considered in palliative support. The objectives of nutritional support in patients in palliative care differ from the common ones, aiming to improve quality of life, survival, or both. The decision should be based on consideration of prognosis (survival time), quality of life, and risk-benefit ratio. With regard to oral nutrition (with or without oral supplements), the idea of "comfort feeding" prevails, based on oral feeding until discomfort arises. There is no evidence on the benefit of specific nutrients, although omega-3 fatty acids may have some positive effects in cancer patients. As for nutritional support (enteral or parenteral), there is no scientific evidence, so the decision needs to be agreed upon according to the wishes and beliefs of the patient and their family, and based on a consensus with the interdisciplinary team on the objectives of this support **[19]**.

Furthermore, quality of life tests are the basis for evaluating the condition of cancer patients, allowing valuable information to be obtained from patients not only about disease symptoms and adverse treatment effects, but also about the assessment of psychological, social, and spiritual aspects. Taking into account the patient's quality of life assessment during the course of the disease has a positive effect on the well-being of patients, their families, and their caregivers, as well as on satisfaction with interdisciplinary and holistic oncology care. A population-based, multi-area cross-sectional study was conducted among cancer patients in the study to assess their quality of life. The method used in the study was the clinical interview. Quality of life was measured using the EQ-5D-5L Quality of Life Questionnaire, the Karnofsky Performance Status, our own symptom checklist, the Edmonton Symptom Assessment, and the Visual Analogue Scale. In the subjective assessment of fitness, after using the Karnofsky fitness index, it was shown that 28% (95% CI (confidence interval): 27-30) of patients reported being able to perform normal physical activity. In the assessment of the profile, quality of life, and psychometric properties of the EQ-5D-5L, it was shown that patients presented the most serious problems in terms of self-care (81%, 95% CI: 76-89) and feelings of anxiety and depression (63%, 95% CI: 60-68). Therefore, cancer hurts patients' quality of life, depending on whether the patient and their family members practice S/R or whether the patient is on adequate nutritional therapy **[20]**.

It is observed that religious and spiritual interventions may affect the prevention of Alzheimer's disease. It has been shown that Kirtan Kriya meditation mitigates the deleterious effects of chronic stress on cognition, reverses memory loss, and creates psychological and spiritual well-being, which may reduce several risk factors for Alzheimer's disease. Authors Khalsa and Newberg (2021) **[21]** detailed a new concept in medicine called Spiritual Fitness, a fusion of stress reduction, basic well-being, and psycho/spiritual well-being to prevent Alzheimer's disease. Religious and spiritual practices, including Kirtan Kriya, are crucial components in developing better cognition and well-being, which may help prevent and, in some cases, reverse cognitive decline.

One study analyzed the various practices classified as complementary and alternative medicine (CAM) and examined the benefits and uncertainties regarding nutritional supplements in patients with hematological diseases. The high prevalence of CAM use is considered, especially among cancer survivors, particularly patients with hematological malignancies and survivors of allogeneic stem cell transplantation, many of whom believe that the supplements are anticancer/antitoxic agents, despite the scarcity of evidence to support any benefit and the enormous cost to the individual. CAM constitutes various nutritional practices and behaviors, including prayer, relaxation, spiritual healing, nutritional supplements, meditation, religious counseling, massage, and support groups **[22]**.

The study also analyzed the spirituality of patients, the relationship between spirituality and physical pain, and the association between spirituality and quality of life (QoL) among patients undergoing oncological chemotherapy and those undergoing nutritional therapy. Spirituality was defined as a sense of meaning in a person's existence and life, peace of mind, and strength and comfort derived from faith. A

cross-sectional questionnaire was distributed to 176 adult cancer patients who received chemotherapy between May and September 2011 at an outpatient clinic in rural Japan. Spirituality was measured using the Functional Assessment of Chronic Disease Therapy-Spiritual Wellbeing Scale (FACIT-Sp-12). Demographic data on performance status, cancer stage, age, marital status, occupational status, family members, pain intensity, and other concerning symptoms were collected. The relationship between patients' spirituality subscale scores and QoL was assessed using a structural equation model. Results: Two subscales of the FACIT-Sp-12, meaning/peace and faith, were moderately to strongly associated with age, appetite, and QoL scores. Although physical pain was significantly related to the QoL score (p=0.002), it was not related to the FACIT-Sp-12 score (p=0.427). These results indicated that patients with higher spiritual scores and intense pain enjoyed life more than patients with lower spiritual scores and intense pain. Furthermore, two subscales of the FACIT-Sp-12 had a direct effect on QoL. Therefore, spirituality was strongly associated with QoL. Younger patients (<50 years) and patients with stage I cancer need additional assistance to meet their spiritual needs. To maintain the spiritual well-being of cancer patients, interventions should facilitate nutritional support for patients and adequately address their spirituality **[23]**.

Finally, the goal of palliative care is to improve the quality of life of patients and their families through the involvement of a multidisciplinary team. Palliative care can improve symptom control and end-of-life care, especially when strongly based on appropriate nutritional therapy **[1-3]**.

Conclusion

It was concluded that there is still a scarcity of clinical trials on home-based palliative care for geriatric cancer patients, resulting in poor information and a lack of evidence. Home-based interventions appear feasible and have a positive effect on pain control and functional status, but more high-quality studies are needed. Spiritual care can be particularly important during times of illness, suffering, or near the end of life, when patients seek comfort. Patients in palliative care are complex, with multiple clinical-psychological-social-spiritual problems. The use of a multidisciplinary approach, especially appropriate nutritional therapy, can improve the quality of life of patients and families. It is essential to train, expand, and integrate palliative care teams, allowing patients a better quality of life until their death.

CRediT

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The authors declare no conflict of interest.

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