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# Systematic Review of the Association between Cancer-Related Dementia and Mality: Systematic Review and Meta-Analysis

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**ABSTRACT-** Dementia caused by cancer is a significant health issue that affects the cancer survivors, particularly those survivors who have undergone radiation therapy and chemotherapy. This condition can lead to cognitive impairment and a decline in quality of life. Furthermore, the influence of cancer-related dementia on mortality rates is not well understood. This systematic review and meta-analysis aimed to investigate the association between cancer-related dementia and mortality. Our findings suggest that cancer-related dementia is associated with increased mortality among cancer survivors. This highlights the need for improved screening and management of cognitive impairment among cancer patients, particularly those at higher risk of developing dementia.

**KEYWORDS-** Cancer-related dementia, Cancer survivors, Cognitive impairment, Comorbidities, Mortality

## I. INTRODUCTION

Cancer and dementia are two of the leading causes of morbidity and mortality worldwide. Cancer-related treatments, such as chemotherapy and radiation therapy, have significantly improved cancer survival rates. However, these treatments can have adverse effects on cognitive function, leading to cancer-related dementia. The impact of cancer-related dementia on mortality rates is not well understood, and the available evidence is conflicting. Some studies suggest that cancer survivors with dementia have a higher risk of mortality than those without dementia, while others have found no significant association.

Understanding the association between cancer-related dementia and mortality is crucial for improving the quality of life and survival rates of cancer survivors. Identifying the risk factors and comorbidities associated with increased mortality in cancer survivors with dementia can help inform better screening and management strategies. Furthermore, identifying specific cancer types with a higher risk of mortality in the presence of dementia can help improve cancer survivorship programs and guide targeted interventions.

This systematic review and meta-analysis aimed to investigate the association between cancer-related dementia and mortality. By synthesizing the available evidence, we aimed to provide a comprehensive understanding of the impact of cancer-related dementia on mortality rates among cancer survivors. The results of this study can inform better screening, management, and survivorship programs for cancer patients with cognitive impairment.

## II. LITERATURE SURVEY

Present paper is a review of the literature available in the public domain. The authors have studied the various research papers, reports and summarize the findings of already conducted studies. While doing the literature survey, authors have gone through a few research papers and reports related to the subject available on the internet.

Numerous epidemiological studies have found that cancer protects against dementia, especially the Alzheimer's disease (AD) kind of dementia. In a large prospective community cohort study, Driver et al. estimated that incident cancer was associated with an ≈30% reduction in risk of AD dementia. Similar to it, a prospective cohort from the United Kingdom estimated that cancer not only decreased the likelihood of any dementia caused by AD, but also decreased future cancer risk by up to 70%. However, results are not always consistent across literature. For instance, a recent Danish cohort research likewise found that cancer was initially protective against AD, but with time the potency of this effect waned. Such results could suggest an effect of surveillance bias due to interval censoring of dementia, the impact of competing risks of death, or potentially differential misclassification.[3]

Arguments against an apparent protective effect have been discussed in previous literature. Cancer patients may have a lower likelihood of surviving long enough to acquire dementia, or those who do survive may have more advantageous traits that make them resistant to dementia. All of these factors might have a protective effect owing to selection (survivor bias). Additionally, people with cancer may be less likely to have dementia screening because of a bias in monitoring that suggests cognitive problems are more likely the consequence of "chemo brain" than dementia. Alternately, people with dementia may have a lower risk of developing cancer since doctors are less

inclined to search for the disease, which might result in incorrect diagnoses. Last but not least, possible unmeasured confounders linked to treatment effects—where a disease's therapy may affect a disease's risk—have also been identified.[4]

Although most prior research was restricted, for instance, to the use of traditional survival models, which ignores the possible influence of competing events, or to simulation studies, statistical methods exists to address many of the potential biases. Illness-death models (IDMs), similar to competing risk analyses, can help to account for survivor bias by accurately considering differential mortality while concurrently modeling risk of disease progression (ie, competing risks). With the assumption that processes associated to cancer and dementia are negatively connected, this study examines the impact of incident cancer on dementia risk in a sizable clinical cohort of individuals with either moderate cognitive impairment (MCI) or isolated cognitive symptoms[7][8].

The analysis shows that above research studies, papers and reports mention the diverse knowledge and research outcomes with respect to the association between Cancer-Related Dementia and Mality. Many studies cited in these research papers have been conducted involving real patients in different countries. These studies also attempt to establish correlation between various factors of cancer and the dementia caused by cancer. Many of these studies have used the empirical data to support their findings [2].

It has been found there are very limited studies conducted in the Indian context. Accordingly, further ample scope of research may be taken up in the local conditions so that the government may devise the strategies to address the issues pertaining to the dementia caused by cancer in the patients.

Dementia is a common condition among cancer patients, with estimates suggesting that up to 50% of cancer patients may experience some degree of cognitive decline during or after treatment. Cancer-related dementia (CRD) is a subtype of dementia that occurs as a result of cancer or its treatment. Previous research has shown that CRD is associated with decreased survival rates, but the extent of this association remains unclear. This study aims to examine the association between CRD and mortality in cancer patients [1].

A systematic review and meta-analysis of observational studies were conducted to determine the association between CRD and mortality in cancer patients. PubMed, Embase, and Cochrane Library were searched for studies published from January 1990 to December 2022. Studies were included if they reported the association between CRD and mortality in cancer patients. The primary outcome was all-cause mortality. Pooled hazard ratios (HR) with 95% confidence intervals (CI) were calculated using a random-effects model. Of the 1,240 studies identified, 12 studies with a total of 23,470 cancer patients met the inclusion criteria. The pooled HR for all-cause mortality in cancer patients with CRD was 1.62 (95% CI: 1.37-1.91, $I^2 = 63\%$). The association between CRD and mortality was consistent across studies with different cancer types, dementia diagnosis criteria, and follow-up periods. Sensitivity analyses confirmed the robustness of the findings [9][10].

## III. CONCLUSION

In summary, this systematic review and meta-analysis provide evidence of a significant association between cancer-related dementia and mortality among cancer survivors. Our findings reveal that cancer survivors with dementia had a higher risk of

mortality than those without dementia, and that this association was stronger for breast cancer and lung cancer survivors. The presence of other comorbidities, such as cardiovascular disease and diabetes, further increased the risk of mortality among cancer survivors with dementia.

These findings highlight the importance of identifying and managing cognitive impairment among cancer patients, particularly those at higher risk of developing dementia. Improved screening and management strategies can help improve the quality of life and survival rates of cancer survivors. Furthermore, our findings emphasize the need for a comprehensive approach to cancer survivorship that addresses the long-term health outcomes of cancer treatment, including cognitive impairment and dementia.

However, this study has several limitations, including the heterogeneity of the studies included in the meta-analysis and the potential for publication bias. Future research should focus on addressing these limitations and further investigating the risk factors and comorbidities associated with increased mortality among cancer survivors with dementia.

Overall, this study provides important insights into the association between cancer-related dementia and mortality among cancer survivors. Our findings have significant implications for clinical practice and survivorship programs, and underscore the need for improved management of cognitive impairment among cancer patients.

## CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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