

Association of Comorbidities with Different Types of Cancer

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ABSTRACT

OBJECTIVE: The objective is to understand how common comorbid conditions, such as cardiovascular disease, diabetes, and chronic respiratory issues, effect the cancer and causes complexities.

INTRODUCTION: Comorbidities the presence of one or more additional disease or disorder in conjunction with primary disease – primary observed in cancer. Conditions like diabetes, cardiovascular, hypertension are frequently encounter alongside cancer.

In cancer, the comorbidities are especially relevant as they can affect the cancer treatment, increase the risk of complications, and also affect the survival rate

METHODOLOGY: The review explores the impact of various comorbidities associated with cancer. The purpose is to understand how common comorbid conditions, such as cardiovascular disease, diabetes, and chronic respiratory issues, effect the cancer and causes complexities of care in oncology.

To gather relevant studies, search was conducted across major academic databases, including PubMed, Google Scholar, and the Journal of Clinical Oncology archives. Search terms included “cancer comorbidities”, “association of comorbidities with different types of cancer”, “prevalence of comorbidities in cancer”. The review does not seek to cover every available study, efforts were made to include samples of articles, and understanding of the topic.

In conclusion, this review aims on topic cancer and comorbidities, highlighting the importance of a multidisciplinary approach to cancer care.

EPIDEMIOLOGY: The epidemiology of comorbidities in cancer explores how often does the comorbidities co-exist with the cancer and the factors that drives these conditions.

CONCLUSION: In conclusion, this review aims on topic cancer and comorbidities, highlighting the importance of a multidisciplinary approach to cancer care.

KEYWORDS: Comorbidities, Cancer, specific comorbidities and associated cancer, Multidisciplinary Treatment.

INTRODUCTION

Cancer is a disease characterized by uncontrolled multiplication and spread of abnormal cells in a body. Oncology is the branch that deals with the study, treatment, diagnosis and prevention of cancer. Cancer is the second most common cause of death in the developed nation and one in the three people will be diagnosed with cancer during their lifetime.

The increasing incidence of cancer globally has brought increased attention to comorbidities.

Comorbidities the presence of one or more additional disease or disorder in conjunction with primary disease – primary observed in cancer. Conditions like diabetes, cardiovascular, hypertension are frequently encounter alongside cancer.

In cancer, the comorbidities are especially relevant as they can affect the cancer treatment, increase the risk of complications, and also affect the survival rate ^[1]. Different types of cancer are related to different comorbidities. For example – Lung cancer associated with COPD (Chronic Obstructive Pulmonary Disorder), a link largely attributed to smoking as a common risk factor ^[2].

METHODOLOGY

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SPECIFIC COMORBIDITIES AND ASSOCIATED CANCERS

1. **Diabetes:** Association with cancers such as pancreatic, liver and colorectal cancer ^[3].
2. **Cardiovascular Disease:** CVD (Cardiovascular Disease) is generally associated with breast cancer, prostate cancer, due to cardio-toxic effects of certain chemotherapeutic agents such as, “anthracyclines” ^[4].
3. **Chronic Obstructive Pulmonary Disease (COPD):** COPD are at increased risk for patients suffering from lung cancer as chemotherapy and radiation may worsen the condition.
4. **Autoimmune Diseases:** Patients with autoimmune disease as such rheumatoid arthritis may have increased risk of lymphoma cancers and patients may face unique challenges due to immunosuppressive nature ^[5].
5. **HIV/AIDS:** Patients with HIV/AIDS may have risk of certain cancer such as Non-Hodgkin Lymphoma ^[6].
6. **Hypertension:** Hypertension is also common comorbid that is associated with cancer such as breast, cancer ^[7].

EPIDEMIOLOGY OF ASSOCIATION OF COMORBIDITIES WITH DIFFERENT TYPES OF CANCER

The relationship between cancer and various comorbidities is complex, with epidemiological data indicating that comorbid conditions are common among cancer patients and can significantly impact disease, treatment options, and outcomes. Comorbidities such as cardiovascular disease, diabetes, chronic respiratory conditions, coexist with cancer, and their prevalence often varies by cancer type. Understanding this association through an epidemiological view provides insight into both cancer risk factors and the disease management in affected populations. The epidemiology of comorbidities in cancer explores how often does the comorbidities co-exist with the cancer and the factors that drives these conditions.

PREVALENCE OF COMORBIDITIES ASSOCIATED WITH DIFFERENT TYPES OF CANCER

Prevalence of few Comorbidities Associated with Different Types of Cancer

1. Breast Cancer

- Obesity: Approximately 30% of breast cancer patients are obese ^[8].
- Diabetes: Approximately 25% of breast cancer patients are diabetic ^[9].
- Hypertension: Approximately 20% of breast cancer patients suffer from hypertension ^[10].
- Cardiovascular Disease: Approximately 15% of breast cancer patients suffer from cardiovascular diseases ^[11].

2. Lung Cancer

- Chronic Obstructive Pulmonary Disease (COPD): Approximately 50% of lung cancer patients suffer from Chronic Obstructive Pulmonary Disease ^[12].
- Cardiovascular Disease: Approximately 60% of lung cancer patients suffer from cardiovascular disease ^[13].
- Diabetes: Approximately 20% of lung cancer patients are diabetic ^[14].
- Obesity: Approximately 15% of lung cancer patients are obese ^[15].

3. Colorectal Cancer

- Obesity: Approximately 35% of colorectal cancer patients are obese ^[16].
- Diabetes: Approximately 30% of colorectal cancer patients are diabetic ^[17].
- Hypertension: Approximately 25% of colorectal cancer patients suffer from hypertension ^[18].
- Cardiovascular Disease: Approximately 20% of colorectal cancer patients suffer from cardiovascular disease ^[19].

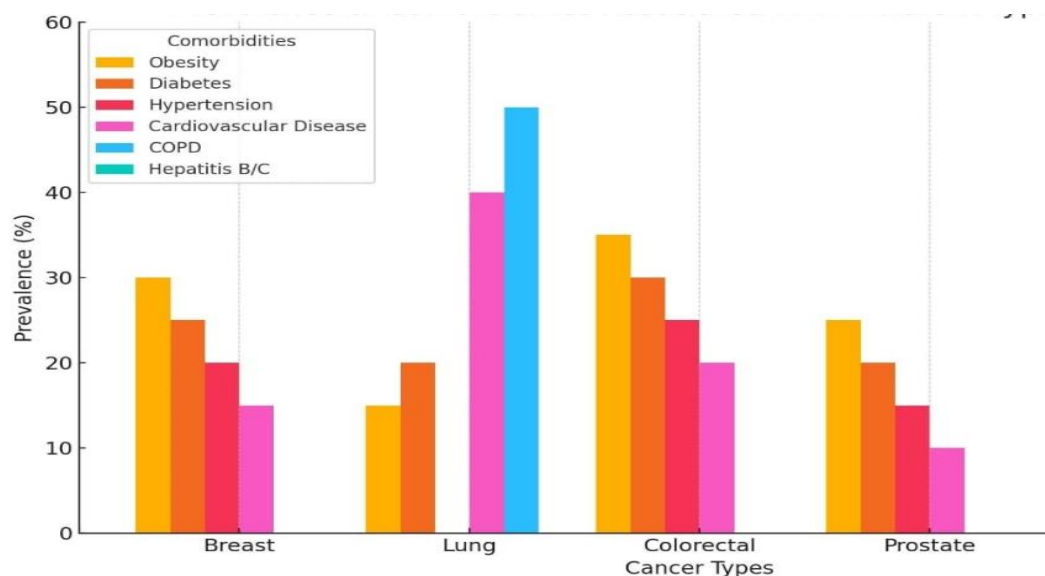


Figure 1: Prevalence of few Comorbidities Associated with Different Types of Cancer

RISK FACTORS

The Association of comorbidities with different types of cancer is influenced by several factors such as lifestyle, environmental factors, biological and treatment-related.

1. **Shared Risk Factors:** Many cancers and comorbidities have shared risk factors.

- **Gene Mutations:** Over 90% of tumours are found to contain some form of genetic mutation. Some of

these changes are hereditary

- **Obesity:** Obesity is as risk factor for cancer like breast, colon, and liver cancer. As well as for comorbidities such as heart disease, type II diabetes, and high blood pressure, can be reduced by good diet plan and by healthy lifestyle.
- **Tobacco:** Tobacco is a major cause of cancer .Tobacco use causes lung cancer and smoking is linked to both lung cancer and cardiovascular diseases^[20]
- **Alcohol Consumption:** Consuming excess alcohol increases the chances of the mouth, throat, oesophagus, larynx, liver, and breast cancer. The more one consumes, the higher the risk.
- 2. **Infectious Agents:** HIV /AIDS can lead to immune suppression and increase susceptibility of cancer.
- 3. **Chronic inflammation:** Associated with autoimmune diseases, such as rheumatoid arthritis, can cancer risk due to continuous tissue damage.
- 4. **Immunosuppression:** People who gave through organ transplants are given drugs to suppress their immune systems so that the organ will not be rejected by the body. These “immunosuppressive” medications weaken the immune system’s ability to detect and destroy cancer cells ^[21].
- 5. **Age-related factor:** Both cancers and comorbidities are prone in increasing age – adults. As aging weaken the immune system, hence making the adults more prone to diseases ^[22].

IMPACT OF CANCER TREATMENTS ON COMORBIDITIES

1. **Chemotherapy – Induced Cardio toxicity:** Chemotherapy drugs, like Doxorubicin are known for their cardio-toxic effects, it can worsen pre-existing cardiovascular disease, especially in older adults.
2. **Radiation Therapy and Pulmonary Fibrosis:** Radiation treatment, particularly in breast cancers and lung cancer can lead to pulmonary fibrosis and other respiratory complications, especially in patients with pre-existing lung conditions like chronic obstructive pulmonary disease.
3. **Increased Infection Risk from Immunotherapy:** Immunotherapy is a promising cancer treatment, but it can exacerbate autoimmune comorbidities and increase the risk of infections.
4. **Gastrointestinal Complications:** Radiation therapy targeting abdominal or pelvic regions for colorectal or cervical cancer can lead to gastrointestinal complications like diarrhoea, inflammation, which can exacerbate inflammatory bowel disease ^[23].

Multidisciplinary Treatment

Since, the cancer treatments such as radiations, chemotherapy, impacts the comorbid conditions so the “Multidisciplinary Treatment” is a significant approach. As the name suggests “Multidisciplinary”, it emphasizes on team of Cardiologist, pulmonologists, endocrinologists.

Collaboration with Multidisciplinary Teams

Cancer patients with comorbidities, personalized and collaborative care is essential. The treatment team often includes oncologists, cardiologists, nephrologists, endocrinologists and pulmonologists - Multidisciplinary Teams.

Oncologists develop cancer treatment plans, often involving chemotherapy, radiation or immunotherapy that may disturb the treatment for comorbid conditions. So in such cases the “Multidisciplinary Teams” come into scene where teams (from different department) may adjust medications to avoid adverse interactions like Cardiologists and endocrinologist may adjust the medications to avoid certain adverse interactions. Hence, collaborative decisions balances the treatment plan focusing on making it effective and protecting the patient from adverse effects.

Personalized Treatment Plans

Treatment plans are made according to the patient's overall health status, considering both the comorbid conditions and cancer severity. The personalized treatment plan aims to minimize the adverse effects on the comorbidities. Continuous monitoring of both cancer and comorbid must be done. Psychologists and counselors assist with mental health challenges, such as anxiety, depression.

This Multidisciplinary, patient –centered approach ensures that treatment is effective and possible for individuals with cancer and comorbidities.

Monitoring of the Treatment

Continuous monitoring of both cancer and comorbid must be done. As monitoring of treatment is essential for better patient healthcare. The monitoring of both the cancer and comorbid condition conditions treatment is essential and crucial to maintain the overall health of the patient and survivability.

Multidisciplinary Treatment in India

India has seen growth in multidisciplinary approaches, especially in tertiary hospitals and in major cancer centers.

Some of the tertiary hospitals that follow the multidisciplinary treatment in India , AIIMS(All India Institute of Medical Sciences) , Tata Memorial Hospital, Apollo Cancer Institute- Chennai, Hyderabad, HCG Cancer Centre, Bengaluru.

GAPS IN LITERATURE AND FUTURE RESEARCH DIRECTIONS

GAPS IN THE LITERATURE

1. **Limited Longitudinal Studies:** Many studies are cross-sectional, hence indicating comorbidities at one point in time. There is a need for longitudinal studies that track changes in comorbidities over time.
2. **Limited Study of Diverse Populations:** Many studies may focus primarily on specific populations (e.g., older adults, specific groups) while neglecting others. Research is needed to be done across diverse demographic groups, such as various age groups, different social-economic groups.
3. **Economic Effect:** Economics of managing cancer patients with comorbidities is limited.

FUTURE RESEARCH DIRECTIONS

1. **Longitudinal Studies:** Longitudinal studies must be conducted across multiple centers to investigate the long-term effects of comorbidities on cancer outcomes.
2. **Diverse Population Studies:** Studies that include a wider demographic range on how different populations experience comorbidities in relation to cancer, must be conducted.
3. **Economic Measure:** The Cost-effectiveness analyses to be done to understand the economic implications of managing cancer patients with comorbidities

CONCLUSION

In conclusion, the association of comorbidities with different types of cancer, research shows that comorbid conditions significantly impact or effect the cancer outcomes. Comorbidities can affect and influence the cancer progress, and the treatment options. People suffering from common comorbidities such as cardiovascular disease, diabetes, chronic respiratory disorders, and obesity are at increased risk of developing certain cancers.

The presence of these conditions may complicate cancer treatment by limiting therapeutic choices or reducing tolerance of patients.

The type of comorbid conditions can vary, and these variations highlight the importance of personalized care. For example, cardiovascular comorbidities are often associated with breast and prostate cancers. While metabolic disorders, including diabetes, are more commonly linked/associated with pancreatic and liver cancers as the prevalence of diabetes is increasing worldwide, hence those with diabetes are at higher risk of common cancers (pancreatic, liver cancer)

The association between comorbidities and cancer highlights the need for a better understanding of how these conditions interact to influence cancer risk, treatment outcomes, and overall patient health.

By adopting a multidisciplinary approach and implementing personalized treatment strategies, healthcare providers can improve cancer management and enhance patient quality of life.

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