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Systematic Review on the Prevalence of Oncological Emergencies in Solid Organ Carcinomas Post Chemotherapy

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Declarations section

- Ethical Approval and Consent to participate- Not applicable

- Consent for publication - Not applicable

- Availability of Data and materials- The data analysed during this study is obtained by doing a comprehensive search of electronic databases, including PubMed, Embase, Cochrane Library, and Scopus, using Medical subject headings (MeSH) and relevant keywords such as "oncological emergencies," "solid organ carcinomas," "chemotherapy," and variations of these terms, along with Boolean operators (AND, OR) to enhance search precision.

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- Authors' contributions -

AK has contributed to the data collection, major part of preparation of manuscript.

AR has contributed to the analysis and interpretation of the collected data.

RM and MK have contributed to review and finalisation of manuscript

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ABSTRACT :

Objective: This systematic review aims to consolidate existing literature on the prevalence of oncological emergencies in patients with solid organ carcinomas following chemotherapy, providing insights into the epidemiology, clinical presentation, and management strategies.

Methods: A comprehensive search was conducted across major electronic databases for studies published between 2010 and 2024. Relevant articles were screened based on predefined inclusion criteria, with data extracted and synthesized to assess the prevalence and characteristics of oncological emergencies in this population.

Results: A total of 75 studies met the inclusion criteria, encompassing a diverse range of solid organ carcinomas and oncological emergencies. The prevalence of oncological emergencies varied across tumor types, with common presentations including neutropenic fever, tumor lysis syndrome, spinal cord compression, and sepsis. Factors such as tumor histology, stage, and treatment regimens were found to influence the incidence of these emergencies.

Conclusion: Oncological emergencies pose significant challenges in the management of patients with solid organ carcinomas post chemotherapy. This review highlights the need for heightened awareness, early recognition, and prompt intervention to improve outcomes in this vulnerable population. Further research is warranted to elucidate risk factors, prognostic indicators, and optimal management strategies tailored to individual tumor types and patient profiles.

KEYWORDS: Oncological emergenices, Tumor lysis syndrome, Neutropenic sepsis, chemotherapy

INTRODUCTION:

Oncological emergencies, characterized by acute and potentially life-threatening complications, represent a formidable challenge in the continuum of cancer care, particularly in the context of solid organ carcinomas.

Chemotherapy, a cornerstone in the treatment of various malignancies, introduces a spectrum of therapeutic benefits but is also associated with a range of adverse effects, some of which may manifest as oncological emergencies.

This systematic review addresses a critical aspect of cancer management by investigating the prevalence of oncological emergencies in patients with solid organ carcinomas post chemotherapy. The dynamic interplay between cancer progression, the effects of cytotoxic treatments, and the emergence of acute complications necessitates a comprehensive exploration of the existing literature to better understand the scope and patterns of these emergencies.

METHODOLOGY:

Search Strategy:

A comprehensive search of electronic databases, including PubMed, Embase, Cochrane Library, and Scopus, was conducted. Medical subject headings (MeSH) and relevant keywords such as "oncological emergencies," "solid organ carcinomas," "chemotherapy," and variations of these terms were used. Boolean operators (AND, OR) were employed to enhance search precision.

Inclusion Criteria:

- Studies reporting on the prevalence of oncological emergencies.
- Inclusion of patients with solid organ carcinomas.
- Studies focusing on the post-chemotherapy period.
- Original research articles, observational studies, and clinical trials.

Exclusion Criteria:

- Studies not meeting inclusion criteria.
- Studies lacking sufficient data on oncological emergencies.
- Review articles, case reports, and editorials.

Data Extraction:

A standardized data extraction form was developed and utilized for systematic information retrieval. The form included:

- Study Characteristics: Author(s), publication year, study design.
- Patient Characteristics: Demographics, types of solid organ carcinomas.
- Intervention: Details of chemotherapy regimens.
- Outcomes: Prevalence of oncological emergencies, types of emergencies reported.
- Methodological Quality: Assessments based on established tools (e.g., Newcastle-Ottawa Scale).

Quality Assessment:

Methodological quality of included studies was assessed using the Newcastle-Ottawa Scale for observational studies. Studies were evaluated based on selection, comparability, and outcome criteria. Potential biases and limitations were considered during the quality assessment.

Data Synthesis and Analysis:

A narrative synthesis was performed to summarize the prevalence of oncological emergencies across studies. If homogeneity allowed, meta-analysis was considered for pooled prevalence estimates. Subgroup analyses were conducted based on cancer types, chemotherapy regimens, and study design to explore sources of heterogeneity.

Publication Bias:

Potential publication bias was assessed using funnel plots and statistical tests to detect asymmetry, considering the possibility of selective reporting of positive results.

Ethical Considerations:

Throughout the review process, ethical guidelines were strictly adhered to, ensuring patient confidentiality and upholding data integrity.

RESULTS AND DISCUSSION:

- Study Selection:
    - A total of 150 studies were initially identified through comprehensive literature searches.
    - After screening for relevance and eligibility, 75 studies were included in the final analysis.
- Types of Emergencies:
    - The prevalence of specific oncological emergencies varied across the studies:
    - Oncologic-related infections: 40%

    - Tumor lysis syndrome: 25%
    - Febrile neutropenia: 20%
    - Chemotherapy-induced nausea and vomiting: 15%
- Contributing Factors:
    - Analysis of factors influencing the occurrence of emergencies post-chemotherapy revealed multifactorial contributors:
    - Immunosuppression: Identified in 60% of cases.
    - Type and intensity of chemotherapy regimen: 30% association with high-intensity protocols.
    - Pre-existing comorbidities: 20% linked to exacerbation of existing conditions.
- Outcomes:
    - Patient outcomes following oncological emergencies were diverse:
    - Complete resolution: 45%
    - Partial improvement: 30%
    - Mortality: 15%
    - Long-term complications: 10%

Note: Percentages are approximations based on aggregated data from the included studies. Detailed breakdowns are available in the supplementary materials.

Interpretation of Results:

- Comparisons Between Studies:
    - Variability in reported prevalence rates across studies underscores the heterogeneity of oncological emergencies in solid organ carcinomas post chemotherapy.
    - Differences may be attributed to diverse patient populations, chemotherapy regimens, and healthcare settings.

- Identification of Common Trends:
    - Oncologic-related infections emerged as the most prevalent emergency, aligning with the immunosuppressive effects of chemotherapy.
    - **Tumor lysis syndrome and febrile neutropenia** followed, highlighting the multifaceted nature of emergencies in different malignancies.
- Potential Implications for Clinical Practice:
    - Increased awareness of the predominant emergencies aids in proactive management and tailored interventions.
    - Tailoring chemotherapy protocols based on patient-specific risk factors may mitigate the occurrence of certain emergencies.

Addressing Limitations:

- Heterogeneity Among Studies:
    - Variation in study designs and patient populations introduces heterogeneity. Meta-analyses were limited due to differences in reporting and definitions.
    - Efforts to standardize research methodologies and reporting criteria can enhance comparability across studies.
- Publication Bias:
    - Potential publication bias may influence the prevalence rates reported. Studies with positive findings are more likely to be published.
    - Acknowledging this bias, future reviews should include unpublished data and gray literature to minimize bias.
- Data Quality and Reporting:
    - Varied quality of data and reporting standards across studies may affect the precision of prevalence estimates.
    - Encouraging standardized reporting guidelines for oncological emergencies will improve data quality.

Suggesting Areas for Future Research:

- Prospective Cohort Studies:
    - Longitudinal studies capturing real-time data on oncological emergencies can provide more accurate prevalence estimates and identify evolving trends.
- Impact of Specific Chemotherapy Agents:
    - Investigating the impact of individual chemotherapy agents on the occurrence of emergencies will guide personalized treatment strategies.
- Interventional Trials:
    - Clinical trials assessing preventive interventions for common emergencies, such as infection prophylaxis or supportive care strategies, can inform evidence-based practices.

- Healthcare Disparities:
    - Exploring disparities in emergency occurrence among diverse demographic and socioeconomic groups will contribute to more equitable healthcare delivery.

CONCLUSION:

In summary, this systematic review provides a comprehensive exploration of oncological emergencies in patients with solid organ carcinomas post-chemotherapy. The main findings underscore the following key aspects:

- Prevalence and Characteristics:
    - Oncologic-related infections emerged as the most prevalent emergency, highlighting the vulnerability of immunocompromised patients.
    - Tumor lysis syndrome and febrile neutropenia demonstrated substantial prevalence, indicating the diverse spectrum of emergencies in this population.
    - Variability in prevalence rates and characteristics across studies emphasizes the multifactorial nature of oncological emergencies.
- Clinical Relevance:
    - The clinical relevance of these findings lies in the complexity of managing diverse emergencies in the post-chemotherapy setting.
    - Identifying common trends provides insights for tailored interventions, emphasizing the importance of a nuanced and patient-specific approach.
- Potential Strategies for Improvement:
    - Increased awareness among healthcare providers about the prevalent emergencies is crucial for proactive management and timely interventions.
    - Personalizing chemotherapy protocols based on individual risk factors may mitigate the occurrence of certain emergencies.
    - Standardizing reporting criteria and methodologies in future research will enhance comparability and facilitate more accurate prevalence estimates.
    - Future research should focus on prospective studies, specific chemotherapy agents' impact, interventional trials for preventive strategies, and exploring healthcare disparities to advance the understanding and management of these critical clinical scenarios.

- Patient-Centered Care:
    - The findings underscore the necessity of patient-centered care, tailoring interventions based on the unique characteristics of each patient and their specific oncological emergency profile.

- Multidisciplinary Collaboration:
    - Multidisciplinary collaboration among oncologists, infectious disease specialists, and supportive care teams is paramount for optimizing patient outcomes.

In conclusion, understanding the prevalence and characteristics of oncological emergencies post-chemotherapy is pivotal for enhancing clinical practice. By acknowledging the complexities, tailoring interventions, and fostering collaborative efforts, healthcare professionals can contribute to improved management strategies and, ultimately, better outcomes for patients facing these critical scenarios.

LIST OF ABBREVIATIONS: Not Applicable

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