SEASONAL VARIATION IN ACUTE MYELOID LEUKEMIA MORTALITY IN THE UNITED STATES (1999–2020): A CDC WONDER-BASED ANALYSIS

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Introduction

- AML is a rapidly progressive malignancy with high mortality.
- Seasonal mortality variation is known in other diseases but underexplored in AML.
- Existing studies: Mostly focus on diagnosis incidence, not mortality, with inconsistent findings.

Aim

Investigate the presence and extent of seasonal variation in acute myeloid leukemia (AML) related mortality across the United States over a 21-year period (1999–2020) using nationally representative data from the CDC WONDER database.

Objectives

Quantify average monthly AML mortality rates over the study period.
Assess for statistically significant seasonal patterns in mortality using chi-square testing.
Conduct subgroup analysis by sex to evaluate differential seasonal trends in male and female populations.

Methods

We extracted U.S. mortality data from CDC WONDER (2000–2022).
• AML deaths identified using ICD-10 code C92.0.
• Deaths grouped by month; averages calculated over 23 years.
• Chi-square test assessed non-uniformity in seasonal trends.
• Subgroup analysis conducted by sex.

References

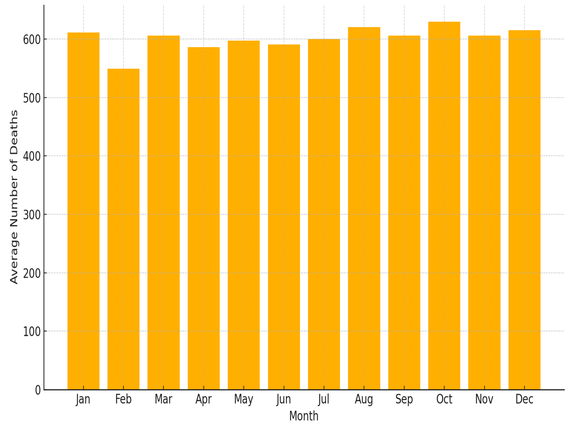
1. Westerbeek A, et al. *Br J Cancer*. 1998;77(5):825-830.
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Results

• Total AML deaths (1999-2020): 171,699
• Peak mortality: December (663 avg deaths)
• Lowest mortality: July (597 avg deaths)
• Overall Chi-square: $\chi^2 = 175.8$, $p < 0.00001$

• Subgroup Analysis:
  - Males: $\chi^2 = 114.3$, $p < 0.00001$
  - Females: $\chi^2 = 66.9$, $p < 0.00001$

Figure 1: Average Monthly AML deaths in the US 1999-2020



Summary

AML mortality shows significant seasonal variation.
• Winter peaks and summer troughs observed.
• Trend persists across sexes; more pronounced in males.
• Findings may reflect seasonal infections, immunity, or access to care.
• Implications: Proactive care planning and further etiologic research.

Discussion

Confirms statistically significant seasonal AML mortality variation.
Comparison with prior studies:
Westerbeek et al. – Childhood leukemia diagnosis clustering (UK)
Eren et al. – No seasonal pattern in diagnosis (Turkey)
Borchmann et al. – Seasonal incidence/mortality in HL (Global)
Potential mechanisms:
Seasonal infections
Impaired immunity
Health system disruptions
Recommends improved winter care planning and further etiologic research.

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