Article published online: 2024-09-03

A Cross-Sectional Study Examining the Prevalence of Acute Promyelocytic Leukemia in the United States: A SEER Study

Zachrieh Alhaj

Shangyi Fu[1,2] Michel Adeniran[3] Diana Bonilla[3] Melissa Marchan-Martinez[3] Ibeth Caceres[1] Zachrieh Alhaj[3] Danny Huynh[4]

[1] School of Medicine, Baylor College of Medicine, Houston, Texas, United States
[2] Human Genome Sequencing Center, Baylor College of Medicine, Houston, Texas, United States
[3] John Sealy School of Medicine, The University of Texas Medical Branch, Galveston, Texas, United States
[4] Cullen College of Engineering, University of Houston, Houston, Texas, United States

Address for correspondence Zachrieh Alhaj, BS, BA, John Sealy School of Medicine, The University of Texas Medical Branch, 301 University Blvd, Galveston, TX 77555, United States (e-mail: ztalhaj@utmb.edu).

South Asian J Cancer

Acute promyelocytic leukemia (APL) is a common type of leukemia that causes an abnormal increase in promyelocytes, an immature white blood cell.[1] We aimed to estimate the prevalence of primary APL using the Surveillance, Epidemiology, and End Results (SEER) database, a recently launched initiative by the Surveillance Research Program in National Cancer Institute's Division of Cancer and Population Sciences.

This study was deemed Institutional Review Board exempt. We performed a cross-sectional analysis of the SEER database by identifying patients with a diagnosis of APL using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code 205.0 and ICD-10-CM code C92.40. Electronic medical records of each patient with APL were then analyzed to collect data on age, sex, and self-identified race. We utilized SEER's estimates with 95% confidence intervals to calculate the overall prevalence of APL.

Currently, the SEER database has enrolled 43,926,824 patients (►Table 1). We identified 1,558.2 with APL, representing an overall prevalence of 0.00354726%. The prevalence was highest in the 50 to 54 age group, increasing with age. Prevalence in specific racial groups included 0.003834716% in white, 0.002777179% in black, 0.00178368% in American Indian/Alaska Native, and 0.002778717% in Asian or Pacific Islander patients (►Table 1). In addition, the SEER database can be used to depict the mortality rates in APL; in white populations the mortality rate was 9.7%, in black populations the mortality rate was 5.5%, in American Indian/Alaska Native populations the mortality rate was 6.25%, and in the Asian or Pacific Islander populations the mortality rate was 9.9%.

Additionally, the SEER database consists of 71% white, 12% black, 2% American-Indian, and 15% Asian-Pacific Islanders,[2] while the demographic makeup of the United States is 76% white, 14% black, 1% American-Indian, and 7% Asian.[3] Consequently, our APL prevalence calculation may underestimate the white and black populations while overestimating the Hispanic and Asian populations. Furthermore, it is probable that there are more unaccounted-for patients due to their U.S. residency status, health care availability, and census limitations. Using a chi-squared test of independence, we found no significant difference between the SEER and U.S. Census populations (►Table 1). Our analysis showed no significant relationship between the two populations, chi-square (3, $N = 304{,}167{,}848$) $= 3404209.8855$, $p < 0.00001$ (►Table 2). Thus, our findings suggest that the SEER database and the U.S. Census population are statistically similar, allowing for an estimate of the U.S. population using SEER data.

DOI https://doi.org/10.1055/s-0044-1790224 ISSN 2278-330X

How to cite this article: Fu S, Adeniran M, Bonilla D, et al. A Cross-Sectional Study Examining the Prevalence of Acute Promyelocytic Leukemia in the United States: A SEER Study. South Asian J Cancer 2024;00(00):00–00.

© 2024. MedIntel Services Pvt Ltd. All rights reserved.
This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial-License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (https://creativecommons.org/licenses/by-nc-nd/4.0/)

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

Table 1 The occurrence of acute promyelocytic leukemia categorized by age and races in the United States

Group	Estimated prevalence percent	Estimated prevalence Count	Population at prevalence date	Known alive	Lost	Lost estimated alive	Dead prior to prevalence date
White	0.00	1,198	31,240,899	1,100	117	98	745
Black	0.00	145.1	5,224,726	139	8	6.1	85
American Indian/Alaska Native	0.00	16	897,021.5	15	1	1	7
Asian or Pacific Islander	0.00	182.4	6,564,178.5	168	18	14.4	107
Unknown		16.7	0	13	4	3.7	0
00 years at previous date	0.00	0	522,150	0	0	0	0
01–04 years at previous date	0.00	2	2,159,900.5	2	0	0	1
05–09 years at previous date	0.00	3	2,732,193.5	3	0	0	0
10–14 years at previous date	0.00	15.4	2,,786,556.5	14	2	1.4	4
15–19 years at previous date	0.00	36.9	2,781,405	34	3	2.9	7
20–24 years at previous date	0.00	71	2,954,646.5	70	1	1	11
25–29 years at previous date	0.00	96.5	3,391,241	90	8	6.5	24
30–34 years at previous date	0.00	109.8	3,191,280.5	100	11	9.8	27
35–39 years at previous date	0.00	129.4	3,049,214.5	115	18	14.4	33
40–44 years at previous date	0.00	160.2	2,779,268.5	142	21	18.2	39
45–49 years at previous date	0.00	156.1	2,889,978.5	136	24	20.1	42
50–54 years at previous date	0.00	161.1	2,837,532.5	147	17	14.1	64
55–59 years at previous date	0.00	139.6	2,873,440	128	13	11.6	75
60–64 years at previous date	0.01	148	2,591,284.5	133	18	15	98
65–69 years at previous date	0.00	110	2,124,581	110	0	0	81
70–74 years at previous date	0.01	90.2	1,598,623.5	86	5	4.2	68
75–79 years at previous date	0.00	57.6	1,077,416	55	5	2.6	88
80–84 years at previous date	0.00	43.4	736,037	43	1	0.4	69
85+ years at previous date	0.00	28	850,075.5	27	1	1	213

Table 2 A chi-square test of independence was conducted using 2018 estimated population data for both SEER and USA

	Estimated SEER population in 2018	Estimated USA population in 2018		Row totals
White	31,240,899 (33,049,304.38) [98,953.07]	197,606,407 (195,798,001.62) [16,702.57]		228,847,306
Black	5,224,726 (6,661,487.98) [309,883.47]	40,902,223 (39,465,461.02) [52,306.12]		46,126,949
American-Indian	897,022 (478,652.71) [365,678.20]	2,417,371 (2,835,740.29) [61,723.87]		3,314,393
Asian-Pacific Islander	6,564,179 (3737380.93) [2,138,071.41]	19,315,021 (22,141,819.07) [360,891.18]		25,879,200
Column totals	43,926,826	2.6E + 8		304,167,848 (grand total)

Abbreviation: SEER, Surveillance, Epidemiology, and End Results.
Note: The observed population was recorded in each cell, the expected population was indicated in parentheses, and the chi statistics are in brackets. The overall chi-square statistic was calculated as 3404209.8855. The *p*-value was found to be less than 0.00001, at a significance level of less than 0.05.

 © 2024. MedIntel Services Pvt Ltd. All rights reserved.

Altogether, our data suggest APL is a common leukemia across white, black, and Asian racial groups. Given the prevalence observed in black patients, we advocate for greater educational representation of APL in darker skin types. Further epidemiologic studies that are not restricted by billing codes may validate our findings.

Conflict of Interest

None declared.

References

1 Lo-Coco F, Ammatuna E, Montesinos P, Sanz MA. Acute promyelocytic leukemia: recent advances in diagnosis and management. Semin Oncol 2008;35(04):401–409

2 Cancer Statistics Review SEER. 1975–2018 [Internet]. SEER. Accessed March 2, 2023 at: https://seer.cancer.gov/csr/1975_2018/index.html

3 Bureau UC. 2018 Population Estimates by Age, Sex, Race and Hispanic Origin [Internet]. Census.gov. Accessed March 30, 2023 at: https://www.census.gov/newsroom/press-kits/2019/detailed-estimates.html

 © 2024. MedIntel Services Pvt Ltd. All rights reserved.