World Journal of Clinical Oncology

Submit a Manuscript: https://www.f6publishing.com

World J Clin Oncol 2024 June 24; 15(6): 745-754

DOI: 10.5306/wjco.v15.i6.745

ISSN 2218-4333 (online)

ORIGINAL ARTICLE

Retrospective Study Characteristics and distinct prognostic determinants of individuals with hepatosplenic T-cell lymphoma over the past two decades

Ayrton Bangolo, Pierre Fwelo, Shraboni Dey, Tanni Sethi, Sowmya Sagireddy, Jawaria Chatta, Ashish Goel, Sneha Nagpaul, Eric Pin-Shiuan Chen, Chiranjeeve Saravanan, Sheeja Gangan, Joel Thomas, Sarah Potiguara, Vignesh K Nagesh, Daniel Elias, Charlene Mansour, Prajakta H Ratnaparkhi, Priyanshu Jain, Midhun Mathew, Taylor Porter, Shadiya Sultan, Shailaja Abbisetty, Linh Tran, Megha Chawla, Abraham Lo, Simcha Weissman, Christina Cho

Specialty type: Oncology

Provenance and peer review: Invited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's classification Scientific Quality: Grade C Novelty: Grade C Creativity or Innovation: Grade C Scientific Significance: Grade B

P-Reviewer: Huang M, China

Received: February 23, 2024 Revised: May 1, 2024 Accepted: May 21, 2024 Published online: June 24, 2024 Processing time: 121 Days and 19.6 Hours



Ayrton Bangolo, Shraboni Dey, Tanni Sethi, Jawaria Chatta, Ashish Goel, Sneha Nagpaul, Eric Pin-Shiuan Chen, Chiranjeeve Saravanan, Sheeja Gangan, Joel Thomas, Sarah Potiguara, Vignesh K Nagesh, Daniel Elias, Charlene Mansour, Prajakta H Ratnaparkhi, Priyanshu Jain, Midhun Mathew, Taylor Porter, Shadiya Sultan, Shailaja Abbisetty, Linh Tran, Megha Chawla, Simcha Weissman, Department of Internal Medicine, Palisades Medical Center, North Bergen, NJ 07047, United States

Pierre Fwelo, Department of Epidemiology, Human Genetics, and Environmental Sciences, UTHealth School of Public Health, Houston, TX 77030, United States

Sowmya Sagireddy, Abraham Lo, Department of Medicine, Palisades Medical Center, North Bergen, NJ 07047, United States

Christina Cho, Stem Cell Transplantation and Cellular Therapy, John Theurer Cancer Center, Hackensack, NJ 07601, United States

Corresponding author: Ayrton Bangolo, Doctor, MBBS, MD, Doctor, Department of Internal Medicine, Palisades Medical Center, 7600 River Road, North Bergen, NJ 07047, United States. ayrtonbangolo0@gmail.com

Abstract

BACKGROUND

Hepatosplenic T-cell lymphoma (HSTCL) is a rare and aggressive peripheral Tcell lymphoma with historically dismal outcomes, representing less than one percent of non-Hodgkin lymphomas. Given its rarity, the true incidence of HSTCL is unknown and most data have been extrapolated through case reports. To the best of our knowledge, the largest and most up to date study addressing the epidemiology and outcomes of patients with HSTCL in the United States covered a period from 1996 to 2014, with a sample size of 122 patients.

AIM

To paint the most updated epidemiological picture of HSTCL.



WJCO | https://www.wjgnet.com

METHODS

A total of 186 patients diagnosed with HSTCL, between 2000 and 2017, were ultimately enrolled in our study by retrieving data from the Surveillance, Epidemiology, and End Results database. We analyzed demographics, clinical characteristics, and overall mortality (OM) as well as cancer-specific mortality (CSM) of HSTCL. Variables with a *P* value < 0.01 in the univariate Cox regression were incorporated into the multivariate Cox model to determine the independent prognostic factors, with a hazard ratio of greater than 1 representing adverse prognostic factors.

RESULTS

Male gender was the most represented. HSTCL was most common in middle-aged patients (40-59) and less common in the elderly (80+). Non-Hispanic whites (60.75%) and non-Hispanic blacks (20.97%) were the most represented racial groups. Univariate Cox proportional hazard regression analysis of factors influencing all-cause mortality showed a higher OM among non-Hispanic black patients. CSM was also higher among non-Hispanic blacks and patients with distant metastasis. Multivariate Cox proportional hazard regression analysis of factors affecting CSM revealed higher mortality in patients aged 80 or older and non-Hispanic blacks.

CONCLUSION

Overall, the outlook for this rare malignancy is very grim. In this retrospective cohort study of the United States population, non-Hispanic blacks and the elderly had a higher CSM. This data highlights the need for larger prospective studies to investigate factors associated with worse prognosis in one ethnic group, such as treatment delays, which have been shown to increase mortality in this racial/ethnic group for other cancers.

Key Words: Extra nodal lymphoma; Mortality; Survival; Racial disparity; Age

©The Author(s) 2024. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Hepatosplenic T-cell lymphoma (HSTCL) is an uncommon and highly aggressive form of non-Hodgkin lymphoma that carries a very poor prognosis. Very little is known about the survival outcomes of patients with HSTCL given its rarity. This study will be the most updated and largest study on the survival outcomes of patients with HSTCL. We found that older age and Non-Hispanic black ethnicity are the single most important factors for poor prognosis.

Citation: Bangolo A, Fwelo P, Dey S, Sethi T, Sagireddy S, Chatta J, Goel A, Nagpaul S, Chen EPS, Saravanan C, Gangan S, Thomas J, Potiguara S, Nagesh VK, Elias D, Mansour C, Ratnaparkhi PH, Jain P, Mathew M, Porter T, Sultan S, Abbisetty S, Tran L, Chawla M, Lo A, Weissman S, Cho C. Characteristics and distinct prognostic determinants of individuals with hepatosplenic T-cell lymphoma over the past two decades. World J Clin Oncol 2024; 15(6): 745-754 URL: https://www.wjgnet.com/2218-4333/full/v15/i6/745.htm DOI: https://dx.doi.org/10.5306/wjco.v15.i6.745

INTRODUCTION

Hepatosplenic T-cell lymphoma (HSTCL) is a malignancy derived from T cells expressing the gamma/delta T-cell antigen and more recently alpha/beta antigen that affects mainly the liver and fills the sinusoids, or the red pulp of the spleen[1-3]. The disease is often diagnosed in relatively younger patients with a history of immunodeficiency, autoimmune disease and or the use of immunosuppressive therapy[1]. However, the majority of cases of HSTCL occur de novo. Discontinuation of immunotherapy does not appear to affect tumor progression[1].

Systemic B symptoms (fever, weight loss, night sweats), abdominal discomfort due to hepatosplenomegaly, and clinical features of cytopenia are often present at diagnosis[4]. Hemophagocytic syndrome can be observed with a rapid disease progression[5,6]. Lymph nodes are not often involved, making it difficult to diagnose the malignancy which can mimic infectious etiologies or other malignant disorders. Diagnosis is made in most cases by liver and/or bone marrow biopsy, or splenectomy[7]. Given its rarity and paucity of clinical trials, the treatment is mostly extrapolated from clinical trials of other peripheral T-cell lymphomas[8]. A satisfactory response to induction chemotherapy has been observed, however, most patients tend to relapse[9,10].

Only a few studies have addressed the overall epidemiology of HSTCL[11-13]. However, there is still a paucity of conclusive data and a lack of adequately powered studies properly defining epidemiology characteristics, survival outcomes, and prognostic factors of patients with HSTCL over the past 2 decades. This is especially important with the more recent emergence of hematopoietic stem cell transplants in the management of this fatal malignancy [14,15].

Using a nationally representative and most up to date database available, we evaluated the independent prognostic factors amongst patients with HSTCL, to help fill in the existing gap of literature on the subject. Furthermore, we aimed to establish patient populations that are predisposed to have a poorer prognosis. In our examination of HSTCL, we have

WJCO https://www.wjgnet.com

identified a significantly higher cancer-specific mortality (CSM) among non-Hispanic blacks, a finding unprecedented in the existing literature on this disease. This calls for a comprehensive multidisciplinary approach to explore the underlying causes of this disparity in CSM. Our study not only sheds light on these urgent issues but also sets the stage for both retrospective and prospective research aimed at uncovering the mechanisms behind these prognostic differences.

MATERIALS AND METHODS

Study design

A population-based retrospective cohort study of patients with HSTCL was conducted using the Surveillance, Epidemiology, and End Results (SEER) research plus data, 18 registries, Nov 2020 submission database (http://www.seer. cancer.gov). The SEER Program is one of the largest and most authoritative sources of the cancer-related dataset in the United States, which is sponsored by the United States National Cancer Institute. The SEER 18 database collects cancer incidence, patients' clinicopathological features, and survival data from 18 population-based cancer registries and covers nearly 28% of the United States population[16].

Data selection

Inclusion criteria: All patients with HSTCL diagnosed from 2010 to 2017 were selected in our cohort from the SEER database based on: (1) Primary site [c42.2, c22.0]; and (2) histological type [ICD-O-3: 9716,9702). The above-mentioned ICD-9, ICD-10, and/or ICD-0-3 codes were used to extract data regarding these patients from the SEER database. This database is a critical resource for research, particularly for rare cancers like HSTCL, because it aggregates data from diverse demographics and geographical locations across the United States, enhancing the representativeness and generalizability of the findings. The database is updated regularly, ensuring that the data reflect recent diagnostic, treatment, and survival trends.

Exclusion criteria: We excluded patients with an unknown age at diagnosis, race, or stage of HSTCL.

Study variables

Main exposure: All the variables included in this cohort except year of diagnosis were used as main predictors of prognosis.

Outcomes: Overall mortality (OM): Patients who died of any causes at the end of the study were categorized as "yes", and those who did not were categorized as "no". Cancer-specific mortality: Patients who died of HSTCL at the end of the study were categorized as "yes", and those who died of other causes were classified as "no".

Survival months: For OM, survival time was calculated from the date of diagnosis to the date of death, or the date of last follow-up (December 31, 2017) as reported in the SEER registry. For the CSM, survival time was calculated from the date of diagnosis to the date of HSTCL related death, or the date of last follow-up as recorded in the SEER registry.

Sociodemographic and tumor characteristics: Variables such as age at diagnosis, gender, race (White, Black, and others), origin (Non-Hispanic and Hispanic), stage at diagnosis (localized, regional, and distant), geographic residential area, yearly income, marital status, year of diagnosis, surgery and radiation were extracted.

Statistical analysis

Cox proportional hazard regression model is based on the assumption that hazard rates are proportional over time. Variables with value < 0.1 in the univariate Cox regression model were incorporated into the multivariate Cox proportional analysis to determine the independent prognostic factors associated with OM and CSM, with a hazard ratio > 1 representing adverse prognostic factors. All tests were two-sided, with a confidence interval set as 95% and *P* value < 0.05 deemed statistically significant. All statistical tests were performed by using Software STATA 18.0.

RESULTS

Our study included a total of 186 patients with a primary diagnosis of HSTCL. Table 1 summarizes the baseline characteristics of patients included in our cohort. A male predominance (68.82%) was observed in our cohort. Most patients were diagnosed between the ages of 40- and 59-years-old (36.02%), while non-Hispanic whites (60.75%) and non-Hispanic blacks (20.97) comprised most of the cohort. The most commonly identified demographic features of diagnosed patients included being diagnosed at later stages (69.35%), coming from counties in metropolitan areas of 1 million persons (63.44%), having an annual income of \$75000+ (46.24%), and being married (44.09%). Systemic B symptoms were reported by up to 34.41% of patients and cancer directed surgery was performed in up to 37.63% of patients.

A crude analysis of factors associated with OM and CSM among United States patients between 2000 and 2017 is demonstrated in Table 2. Non-Hispanic blacks had the highest OM. non-Hispanic blacks and those diagnosed at a later stage had the highest CSM. Advanced age, marital status, B symptoms or surgery did not affect the OM nor the CSM.

Zaishidena® WJCO | https://www.wjgnet.com

Characteristics	n	%
Total	186	100
Gender		
Female	58	31.18
Male	128	68.82
sge at diagnosis, yr		
0-39	63	33.87
40-59	67	36.02
60-79	44	23.66
80+	12	6.45
Race		
Non-Hispanic white	113	60.75
Non-Hispanic black	39	20.97
Hispanic	15	8.06
Other	19	10.22
Tumor stage		
Localized	44	23.66
Regional	13	6.99
Distant	129	69.35
iving area		
Counties in metropolitan areas of 1 million persons	118	63.44
Counties in metropolitan areas of 250000 to 1 million persons	38	20.43
Counties in metropolitan areas of 250000 persons	17	9.14
Nonmetropolitan counties	13	6.99
ncome per year		
\$ < \$55000	22	11.83
\$55000-64999	33	17.74
\$65000-74999	45	24.19
\$75000+	86	46.24
Aarital status		
Married	82	44.09
Single/unknown	78	41.94
Divorced/separated	14	7.53
Widowed	12	6.45
adiation		
No	173	93.01
Yes	13	6.99
urgery		
No	116	62.37
Yes	70	37.63

No	122	65.59
Yes	64	34.41
Year of diagnosis		
2000	1	0.54
2001	6	3.23
2002	5	2.69
2003	11	5.91
2004	10	5.38
2005	5	2.69
2006	11	5.91
2007	7	3.76
2008	8	4.30
2009	12	6.45
2010	11	5.91
2011	14	7.53
2012	10	5.38
2013	16	8.60
2014	12	6.45
2015	14	7.53
2016	14	7.53
2017	19	10.22

Table 3 summarizes the results of multivariate cox proportional hazard regression analyses of characteristics influencing OM and CSM of patients with HSTCL diagnosed between 2000 and 2017. Age 80+ and non-Hispanic blacks had the highest CSM. Once again, we found that advanced age, marital status, annual income, tumor stage, B symptoms or surgery did not affect either the OM or the CSM.

DISCUSSION

Non-Hispanic blacks were found to have a higher CSM. To the best of our knowledge, our cohort is the first to make this observation in HSTCL. HSTCL are extremely rare and there is a serious paucity of data in the epidemiologic profile of this malignancy. In this United States population-based study, we found a male and non-Hispanic Whites predominance. Elderly patients were also found to have a worse CSM. Advanced age, marital status, annual income, tumor stage, B symptoms or surgery did not affect the mortality.

Most patients in our cohort were diagnosed between the ages of 40 and 59; these findings are different from the series of Master et al[17] where most patients were diagnosed between 25-44 years of age. A male predominance was observed in our cohort which is congruent with the literature[18,19]. Our cohort was predominantly white, findings that also mirror the literature^[13].

Splenomegaly is present in all patients with HSTCL[20,21]. The benefits of a splenectomy in the survival of patients with HSTCL remain controversial with conflicting data[21,22]. A single institution observation at mayo clinic did not find any survival benefits of the splenectomy [21], while the study by Gumbs et al [22] found substantial benefits of splenectomy especially in patients with severe thrombocytopenia as this intervention led to resolution of the thrombocytopenia and allowed patients to tolerate more aggressive therapies. Up to a third of patients in our cohort underwent a splenectomy. However, this intervention did not seem to affect either OM or CSM.

Most diagnoses of HSTCL were made in metropolitan areas where higher income seemed to correlate with increased incidence compared to lower income. Metropolitan areas tend to be better served with more advanced medical expertise, and given the rarity and nonspecific presentation of HSTCL, patients with higher income will be more likely to afford the extensive medical evaluation required to make the diagnosis.

Systemic B symptoms of fever, night sweats, or weight loss have been reported in 80% of patients with HSTCL[23]. The prognostic value of B symptoms in non-Hodgkin lymphomas remains unclear with opposing data. Studies by Coiffier et al[24], and Anderson et al[25], found worse prognosis in patients with systemic B symptoms, whereas studies by Portlock et al[26], and McLaughlin et al[27], were unable to confirm this prognostic value. Up to a third of patients in our cohort had documented systemic B symptoms. However, the systemic B symptoms did not appear to affect OM or CSM.

Raishidene® WJCO | https://www.wjgnet.com

Table 2 Crude analysis of factors associated with all-cause mortality and hepatosplenic T-cell lymphoma mortality among patients between 2000 and 2017

InsuleInferenceInferenceInferenceMain0.800.51.300.900.51.50Autoreal dignosis yr0.800.51.200.900.61.104.9300.800.51.200.800.941.104.9300.800.51.200.850.04.014.940.000.800.51.200.850.04.016.970.900.51.200.800.94.106.970.900.94.100.800.94.108.941.000.900.94.100.800.94.108.941.000.900.94.100.800.94.109.941.010.900.94.100.900.	Characteristics	Overall mortality crude proportional hazard ratio (95% confidence interval)	HSTCL crude proportional hazard ratio (95% confidence interval)
Male090,065-130090,065-130Automote, yr0-301(eference)0-30000,051-120000,041.110-30000,051.20000,041.110-300.000,051.200.000,051.200-300.000,051.200.000,051.200-300.000,051.200.000,051.200-400.000,051.200.000,051.20Nor-Hispanic Walk100.000,051.20Nor-Hispanic Walk10,062.000.200,052.000-ber0.000,052.000.200,052.000-ber0.000,052.000.200,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber0.000,052.000.000,052.000-ber <td< td=""><td>Gender</td><td></td><td></td></td<>	Gender		
Apple at diagnosis, yr 1 (reference) 1 (reference) 0-99 1 (reference) 0.00 (035.122) 0.00 (035.01.63) 0-90 0.50 (05-1.64) 0.50 (05-1.64) 0.50 (05-1.64) 0-90 0.50 (05-1.64) 0.50 (05-1.64) 0.50 (05-1.64) 0-10 0.50 (05-1.64) 0.50 (05-1.64) 0.50 (05-1.64) 0-10 0.50 (05-1.64) 0.50 (05-1.64) 0.50 (05-1.64) 0-10 0.50 (05-1.64) 0.50 (05-1.64) 0.50 (05-1.64) Nor-Hispanic Multe 1 1.60 (05-1.64) 0.50 (05-1.64) Nor-Hispanic Multe 1 (reference) 1.60 (06-1.04) 0.50 (05-1.64) Other 1 (50 (05-2.64) 1.60 (05-2.04) 0.50 (05-2.04) Destina Interpolitan areas of 1 millin 1.60 (05-2.04) 1.20 (05-2.04) Destina Interpolitan areas of 2 millin 1.50 (05-2.04) 1.20 (05-2.04) Persons 1.30 (05-2.01) 1.20 (05-2.04) 1.20 (05-2.04) Normerbrop Oltan areas of 2 millin 1.50 (05-2.04) 1.20 (05-2.04) 1.50 (05-2.04) Seston 0.40000 1.20 (05-2.04) 1.2	Female	1 (reference)	1 (reference)
1-3 1 (rénered) 1 (rénered) 40-59 0.80 (0.53-1.2) 0.69 (0.44-1.1) 40-79 0.56 (0.59-1.5) 0.85 (0.50-1.4) 84 1.00 (0.63-37) 1.44 (0.57.3.6) Non-Hispanic Multe 1.07 (0.27.3.07) 2.41 (0.47.3.29) Non-Hispanic Multe 1.07 (0.27.3.07) 2.41 (0.47.3.29) Other 1.40 (0.72.28) 2.41 (0.47.3.29) Other 1.60 (0.92.28) 2.41 (0.47.3.29) Other 1.60 (0.92.28) 2.41 (0.47.3.29) Other 1.60 (0.92.28) 2.41 (0.42.4.3) Default 1.26 (0.92.28) 2.41 (0.42.4.3) Default 1.26 (0.92.28) 2.41 (0.42.4.20) Utring area 1.26 (0.92.4.30) 2.61 (0.92.4.30) Default 1.26 (0.92.24) 2.01 (0.94.2.12) Utring area 1.19 (0.62.20) 1.06 (0.92.01) Counties in metropolitan areas of 25000 (0.76 (0.92.4.30) 1.20 (0.92.2.0) Nome Hispolitan areas of 25000 (0.76 (0.92.4.30) 1.20 (0.92.2.0) Station Counties in metropolitan areas of 25000 (0.76 (0.92.4.30) 1.20 (0.92.2.0)	Male	0.96 (0.65-1.39)	0.99 (0.65-1.52)
4.5.9 0.60 (0.57.12) 0.69 (0.51.12) 60-79 0.69 (0.51.12) 0.69 (0.51.12) 60-79 0.69 (0.51.12) 0.69 (0.51.12) 60-79 0.69 (0.51.12) 0.69 (0.51.12) 60-79 0.69 (0.51.22) 0.69 (0.51.12) 60-79 0.60 (0.53.71) 0.60 (0.53.71) 60-70 1.60 (0.65.37) 2.40 (0.67.37) Nort-Hispanic Mark 1.60 (0.52.36) 1.60 (0.63.13) Other 0.50 (0.52.26) 1.60 (0.62.43) Outer stage 1.20 (0.57.26) 1.20 (0.62.43) Datant 1.20 (0.57.26) 1.20 (0.62.43) Outer stimetropolitan arcos of 1 millio 1.06 (0.52.43) 1.20 (0.52.43) Outer stimetropolitan arcos of 2 5000 1.20 (0.52.43) 1.20 (0.52.43) Normetropolitan arcos of 2 5000 1.20 (0.52.26) 1.20 (0.52.05) Normetropolitan arcos of 2 5000 1.20 (0.52.05) 1.20 (0.52.05) Normetropolitan arcos of 2 5000 1.20 (0.52.05) 1.20 (0.52.05) Normetropolitan arcos of 2 500 (0.60	Age at diagnosis, yr		
AppAppAppAppab-701,60,083-37)1,40,073-36)Be-1,00,083-37)2,44,057-3,65Be-1,00,073-3052,44,027-3,25App-Itspanic Malk1,97 (1273,07)2,44,10,47-3,25App-Itspanic Malk1,97 (1273,07)2,44,10,47-3,25Other1,46,071-2,301,41,00,64,313Other1,26,052-2,601,63,062-4,30Touror stage11,664ence)1,664ence)Appioral1,26,057-2,601,63,062-4,30Destant1,26,057-2,601,63,062-4,30Destant1,26,057-2,601,63,062-4,30Destant1,26,057-2,601,69,041-1,17Councies in metropolitan areas of 2,50001,02,042-1,21Councies in metropolitan areas of 2,50001,02,042-1,21Councies in metropolitan areas of 2,50001,02,042-1,21Councies in metropolitan areas of 2,50001,02,045-2,54Councies in metropolitan areas of 2,50001,02,042-1,21Councies in metropolitan areas of 2,50001,02,042-1,21Socool-Appy1,04,072,71Councies in metropolitan areas of 2,50001,02,045-2,54Appiore1,02,045-2,54Appiore1,02,045-2,54Appiore1,04,072,71Appiore1,02,042,12Appiore1,04,072,71Appiore1,02,045-2,54Appiore1,22,036-2,104Appiore1,22,036-2,104Appiore1,22,036-2,104Appiore1,22,036-2,104Appiore1,22,036-2,104	0-39	1 (reference)	1 (reference)
AutomationAutomationB011,00,085,37Kace1,00,085,307Non-Hispanic While1,00,072,370°Non-Hispanic Black1,97,1273,07°Cher1,44,071-289Other1,63,096-280Other1,63,096-280Collizof1,00,085,000Duror stage1Localizof1,00,072,000Begional1,28,057-280Deland1,28,057-280Deland1,28,057-280Deland1,28,057-280Deland1,20,024-030°Deland1,20,024-030°Countes in metropolitan areas of 1 million1,00,042-130Countes in metropolitan areas of 200001,00,042-130Countes in metropolitan areas of 200001,00,052-291Soutonetropolitan areas of 20001,00,052-291Soutonetropolitan areas of 20001,00,052-291Sout	40-59	0.80 (0.53-1.22)	0.69 (0.44-1.11)
Kee 1 (reference) 1 (reference) Non-Hispanic white 1 (reference) 2.34 (1.47.3.72) ¹ Hispanic 1.44 (0.71-2.89) 1.41 (0.64.3.13) Other 1.65 (0.86-2.86) 1.62 (0.86-3.40) Turner stage 1 1.62 (0.86-3.40) Localized 1 (reference) 1.62 (0.86-3.40) Distant 1.26 (0.87-2.86) 1.62 (0.86-3.40) Distant 1.26 (0.87-2.86) 1.32 (0.24-4.02) Distant 1.26 (0.87-2.86) 1.32 (0.24-4.02) Distant 1.26 (0.87-2.86) 1.32 (0.24-4.02) Countes in metropolitan areas of 1 million pressor 1 (reference) Persons 1.02 (0.49-2.12) 1.92 (0.49-2.12) Southes in metropolitan areas of 250000 1.90 (0.85-2.90) 1.92 (0.49-2.12) Nonmetropolitan areas of 250000 1.90 (0.85-2.90) 1.92 (0.49-2.12) Southes in metropolitan areas of 250000 1.42 (0.85-2.90) 1.92 (0.85-2.90) Southes in metropolitan areas of 250000 1.82 (0.85-2.90) 1.92 (0.85-2.90) Southes in metropolitan areas of 250000 1.92 (0.85-2.90) 1.92 (0.	60-79	0.95 (0.59-1.54)	0.85 (0.50-1.45)
Non-Hispanic whileI (nérence)I (nérence)Non-Hispanic black97(127-30)24(147-32)Hispanic14(071-28)14(0.64-313)Other16(08-26)16(0.68-30)Turur stage11/(nérence)Localized1 (nérence)1.6(0.68-30)Destant23(0.372-86)1.6(0.68-430)Destant23(0.372-86)1.6(0.68-430)Destant1.6(0.69-243)2.3(0.244.02)Destant1.6(nérence)1.6(nérence)Stant1.6(nérence)1.6(nérence)Counties in metropolitan areas of 2500003.7(0.46-116)0.69(0.41-117)Sersons1.9(0.65-24)0.6(0.49-212)Counties in metropolitan areas of 2500001.9(0.65-23)0.2(0.49-212)Sersons1.9(0.65-24)1.2(0.59-250)Sersons1.9(0.65-24)1.9(0.65-250)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-24)1.9(0.65-26)Sersons1.9(0.65-26)1.9(0.65-26)Sersons <td>80+</td> <td>1.60 (0.68-3.77)</td> <td>1.44 (0.57-3.65)</td>	80+	1.60 (0.68-3.77)	1.44 (0.57-3.65)
Non-Hispanic black 197 (127-30) ¹ 2.4 (1.47-32) ¹ Hispanic 144 (0.71-2.89) 1.41 (0.64-3.13) Other 1.65 (0.96-2.86) 1.62 (0.86-3.04) Tumor stage 1 1.62 (0.87-3.04) Localized 1.02 (0.87-2.86) 1.63 (0.62-4.30) Detant 2.23 (1.244-02) ¹ 1.63 (0.62-4.30) Detant 1.64 (0.62-4.30) 2.23 (1.244-02) ¹ Loring area 1.64 (0.62-4.30) 2.33 (1.244-02) ¹ Counties in metropolitan areas of 25000 b 1.05 (0.67-2.48) 0.69 (0.41-1.17) Counties in metropolitan areas of 25000 b 1.90 (0.62-2.90) 0.69 (0.41-1.17) Fundior persons 1.90 (0.62-2.90) 1.02 (0.49-2.12) Counties in metropolitan areas of 25000 b 1.90 (0.62-2.90) 1.02 (0.49-2.12) Counties in metropolitan areas of 25000 b 1.90 (0.62-2.90) 1.02 (0.49-2.12) Station counties 1.91 (0.62-2.90) 1.92 (0.62-2.90) Station counties 1.92 (0.62-2.90) 1.92 (0.62-2.90) Station counties 1.62 (0.62-4.90) 1.92 (0.62-2.90) Station counties 1.62 (0.62-4.90) <td>Race</td> <td></td> <td></td>	Race		
Hispanic Other144 (071-2.8)141 (064-3.1)Other1.65 (0.96-2.8)1.62 (0.86-3.0)Turor stage11.64 (nerence)I.calized1.64 (nerence)1.63 (0.62-4.30)Distant1.54 (0.97-2.4)2.23 (1.24-4.02)Distant1.54 (0.97-2.4)2.23 (1.24-4.02)Living area	Non-Hispanic white	1 (reference)	1 (reference)
Other162(08-2.8)162(08-3.4)Tumor stage1(reference)1(reference)Regional128 (05.72.80)163 (0.62.4.30)Distart124 (0.97-2.43)223 (12.44.02)Distart154 (0.97-2.43)223 (12.44.02)Utring area11(reference)Counties in metropolitan areas of 1 million1 (reference)Counties in metropolitan areas of 25000003 (0.62-1.10)0.69 (0.41-1.17)Counties in metropolitan areas of 2500001.9 (0.63-2.24)0.69 (0.41-1.07)Counties in metropolitan areas of 2500001.9 (0.63-2.04)1.20 (0.492-2.12)Counties in metropolitan areas of 2500001.9 (0.63-2.04)1.20 (0.492-2.12)Station1.9 (0.65-2.04)1.20 (0.52-2.04)1.20 (0.52-2.04)Station1.9 (0.65-2.04)1.20 (0.51-2.04)1.20 (0.51-2.04)Station1.2 (0.76-1.64)1.2 (0.51-2.04)1.20 (0.62-2.04)Maried1.9 (0.62-2.04)1.20 (0.62-2.04)1.20 (0.62-2.04)Station1.9 (0.62-2.04)1.20 (0.62-2.04)1.20 (0.62-2.04)Maried1.9 (0.62-2.04)1.20 (0.62-2.04)1.20 (0.62	Non-Hispanic black	1.97 (1.27-3.07) ^b	2.34 (1.47-3.72) ^b
Importance Inderence Inderence Lecalized Inderence Inderence Legional 1.28 (0.57-2.86) 1.63 (0.62-4.30) Datam 1.26 (0.97-2.40) 2.20 (2.24.40) Live 2.20 (2.24.40) 2.20 (2.24.40) Live Inderence Inderence Counties in metropolitan areas of 1000 Inderence Inderence Counties in metropolitan areas of 25000 Inderence Inderence Counties in metropolitan areas of 25000 1.20 (0.65-2.2) Inderence Counties in metropolitan areas of 25000 1.20 (0.65-2.2) Inderence Second 1.20 (0.65-2.2)	Hispanic	1.44 (0.71-2.89)	1.41 (0.64-3.13)
Land (réference) (réference) kegional 128(0572.86) 16.3(0.624.30) btant 126(0.972.40) 223(124.40) btant 223(124.40) 223(124.00) btant 16ference) 23(124.00) btant 10/0572.40) 10/0572.40) countes in metropolitan areas of 20000 10/0652.20) 0.60(0.41.10) countes in metropolitan areas of 20000 13(0.652.20) 0.20(0.492.12) countes in metropolitan areas of 20000 13(0.652.20) 0.20(0.492.12) countes in metropolitan areas of 20000 1.20(0.572.00) 0.20(0.592.50) countes in metropolitan areas of 20000 1.20(0.572.00) 0.20(0.592.50) countes in metropolitan areas of 20000 1.20(0.572.00) 1.20(0.572.00) countes in metropolitan areas of 20000 1.20(0.572.00) 1.20(0.572.00) counter year if efference 1.20(0.572.00) 1.20(0.572.00) counter year if efference 1.20(0.572.00) 1.20(0.572.00) forgot Area 1.20(0.572.00) 1.20(0.572.00) 1.20(0.572.00) forgot Area	Other	1.65 (0.96-2.86)	1.62 (0.86-3.04)
Regional 1.28 (0.57-2.66) 1.63 (0.624.30) Distant 1.54 (0.97-2.45) 2.23 (1.24-4.02) ¹ Living area Image of the second seco	Tumor stage		
Data 1,4 (0,97,2.4) 2,2 (1,24,0.) ⁶ Living area	Localized	1 (reference)	1 (reference)
Living area 1 (reference) 1 (reference) Persons 1 (reference) 069 (0.41-10) Counties in metropolitan areas of 250000 0.73 (0.46-1.6) 0.69 (0.41-107) Porties in metropolitan areas of 250000 1.9 (0.53-2.4) 0.69 (0.41-107) Nommetropolitan oreas of 250000 1.9 (0.53-2.4) 0.69 (0.41-107) Nommetropolitan areas of 250000 1.9 (0.53-2.4) 0.20 (0.59-2.5) Nommetropolitan counties 1.40 (0.52-0.5) 1.20 (0.59-2.5) Nommetropolitan areas of 250000 1.6 (reference) 1.20 (0.59-2.5) S5000 1.6 (reference) 1.20 (0.51-2.0) S5000-46999 1.60 (0.52-0.5) 1.20 (0.51-2.0) S5000-46999 1.60 (0.51-0.5) 1.20 (0.51-2.0) S7000+ 1.60 (0.51-0.5) 1.20 (0.51-0.5) Married 1.00 (0.51-0.5) 1.20 (0.51-0.5) Married 1.20 (0.51-0.5) 1.20 (0.51-0.5) Ivital status 1.20 (0.51-0.5) 1.20 (0.51-0.5) Ivital status 1.20 (0.51-0.5) 1.20 (0.52-0.5) Ivital status 1.20 (0.51-0.5) 1.20 (0.51-0.5) Ivital status 1.20 (0.51-0.5) 1.20 (0.51-0.5) </td <td>Regional</td> <td>1.28 (0.57-2.86)</td> <td>1.63 (0.62-4.30)</td>	Regional	1.28 (0.57-2.86)	1.63 (0.62-4.30)
Counties in metropolitan areas of 1 millio1 (reference)1 (reference)Counties in metropolitan areas of 2500000.73 (0.46-1.16)0.69 (0.41-1.7)Counties in metropolitan areas of 2500000.71 (0.63-2.4)1.02 (0.49-2.12)Counties in metropolitan counties1.43 (0.76-2.70)1.22 (0.59-2.56)Nomer or per1.43 (0.76-2.70)1.22 (0.59-2.56)s < \$55000	Distant	1.54 (0.97-2.43)	2.23 (1.24-4.02) ^b
persons Non-Response	Living area		
1 million persons 1.19 (0.63-2.24) 1.02 (0.49-2.12) persons 1.43 (0.76-2.70) 1.22 (0.59-2.56) hormetropolitan counties 1.43 (0.76-2.70) 1.22 (0.59-2.56) hormetropolitan counties 1.43 (0.76-2.70) 1.22 (0.59-2.56) horme per year 1 1.25 (0.59-2.61) \$55000-64999 1.26 (0.65-2.45) 1.39 (0.65-2.99) \$65000-74999 1.26 (0.65-2.45) 1.22 (0.59-2.61) \$75000+ 0.82 (0.45-1.49) 1.02 (0.51-2.03) Married 1 (reference) 1.02 (0.51-2.03) Married 1 (reference) 1.02 (0.51-2.03) Divorced/separated 1.12 (0.76-1.64) 1.32 (0.86-2.04) Divorced/separated 1.49 (0.8-2.85) 1.82 (0.72-4.65) Kidation 1.82 (0.72-4.65) 1.82 (0.72-4.65) Retaitation 1.80 (0.84-1.8) 1.82 (0.72-4.65) Retaitation 1.92 (0.37-1.58) 0.81 (0.38-1.75)	Counties in metropolitan areas of 1 million persons	1 (reference)	1 (reference)
persons Nome tropolitan counties 1.43 (0.76-2.70) 1.22 (0.59-2.56) Nome tropolitan counties 1.43 (0.76-2.70) 1.22 (0.59-2.56) Income per year 1 1 (reference) 1 (reference) \$ < \$55000	Counties in metropolitan areas of 250000 to 1 million persons	0.73 (0.46-1.16)	0.69 (0.41-1.17)
Income per year I (reference) I (reference) \$ < \$55000	Counties in metropolitan areas of 250000 persons	1.19 (0.63-2.24)	1.02 (0.49-2.12)
\$ <\$5001(reference)1(reference)\$5000-64999126 (0.52-245)1.39 (0.65-2.99)\$65007-749901.81 (0.63-2.00)1.25 (0.59-2.61)\$7500+0.82 (0.51-2.90)1.02 (0.51-2.03)\$7500+0.82 (0.51-2.90)1.02 (0.51-2.03)\$7500+1.92 (0.65-2.91)1.02 (0.51-2.03)\$7500+1.92 (0.76-1.64)1.02 (0.51-2.03)\$7100+1.92 (0.76-1.64)1.32 (0.86-2.04)\$7100+1.92 (0.82-3.51)1.32 (0.82-3.51)\$7100+1.92 (0.82-3.51)1.52 (0.72-4.65)\$7100+1.92 (0.92-1.53)1.62 (0.72-4.65)\$7100+1.92 (0.72-1.53)1.92 (0.72-1.65)\$7100+1.92 (0.72-1.53)1.92 (0.72-1.65)	Nonmetropolitan counties	1.43 (0.76-2.70)	1.22 (0.59-2.56)
\$5500-64999 1.26 (0.65-2.45) 1.39 (0.65-2.99) \$6500-74999 1.18 (0.63-2.0) 1.25 (0.59-2.61) \$7500+ 0.82 (0.45-1.49) 1.02 (0.51-2.03) Married 1.02 (0.51-2.03) Married 1 (reference) 1.02 (0.51-2.03) Single/unknown 1.12 (0.76-1.64) 1.02 (0.56-2.04) Divorced/separated 1.49 (0.8-2.85) 1.77 (0.88-3.56) Widowed 1.98 (0.89-4.38) 1.82 (0.72-4.65) Rutiation 1.82 (0.72-4.65) 1.82 (0.72-4.65) No 1 (reference) 1 (reference) Yes 0.77 (0.37-1.58) 0.81 (0.38-1.75)	Income per year		
\$6500-74999 1.18 (0.63-2.0) 1.25 (0.59-2.61) \$75004 0.82 (0.45-1.49) 1.02 (0.51-2.03) Married 1 1 Married 1 (reference) 1 Single/unknown 1.12 (0.76-1.64) 1.32 (0.86-2.04) Divorced/separated 1.49 (0.8-2.85) 1.77 (0.88-3.56) Widowed 1.98 (0.89-4.38) 1.82 (0.72-4.65) Radiation	\$ < \$55000	1 (reference)	1 (reference)
\$7500+ 0.82 (0.45-1.49) 1.02 (0.51-2.03) Marital status I Inference Inference Married 1 (reference) 1 (reference) Inference) Single/unknown 1.12 (0.76-1.64) 1.32 (0.86-2.04) Divorced/separated 1.49 (0.8-2.85) 1.77 (0.88-3.56) Widowed 1.98 (0.89-4.38) 1.82 (0.72-4.65) Ratiation Inference) Inference) No 1 (reference) 0.81 (0.38-1.75) Yes 0.77 (0.37-1.58) 0.81 (0.38-1.75)	\$55000-64999	1.26 (0.65-2.45)	1.39 (0.65-2.99)
Marital status 1 (reference) 1 (reference) Married 1 (reference) 1 (reference) Single/unknown 1.12 (0.76-1.64) 1.32 (0.86-2.04) Divorced/separated 1.49 (0.8-2.85) 1.77 (0.88-3.56) Widowed 1.98 (0.89-4.38) 1.82 (0.72-4.65) Radiation volume volume No 1 (reference) 1 (reference) Yes 0.77 (0.37-1.58) 0.81 (0.38-1.75)	\$65000-74999	1.18 (0.63-2.20)	1.25 (0.59-2.61)
Married1(reference)1(reference)Single/unknown1.12 (0.76-1.64)1.32 (0.86-2.04)Divorced/separated1.49 (0.8-2.85)1.77 (0.88-3.56)Widowed1.88 (0.89-4.38)1.82 (0.72-4.65)No1.9 (reference)1.97 (0.37-1.58)Yas0.77 (0.37-1.58)0.81 (0.38-1.75)	\$75000+	0.82 (0.45-1.49)	1.02 (0.51-2.03)
Single/unknown 1.12 (0.76-1.64) 1.32 (0.86-2.04) Divorced/separated 1.49 (0.8-2.85) 1.77 (0.88-3.56) Widowed 1.98 (0.89-4.38) 1.82 (0.72-4.65) Radiation 1 1 No 1 (reference) 1 (reference) Yes 0.77 (0.37-1.58) 0.81 (0.38-1.75)	Marital status		
Divorced/separated 1.49 (0.8-2.85) 1.77 (0.88-3.56) Widowed 1.98 (0.89-4.38) 1.82 (0.72-4.65) Radiation 1 1 No 1 (reference) 1 (reference) Yes 0.77 (0.37-1.58) 0.81 (0.38-1.75)	Married	1 (reference)	1 (reference)
Widowed 1.98 (0.89-4.38) 1.82 (0.72-4.65) Radiation I (reference) I (reference) Yes 0.77 (0.37-1.58) 0.81 (0.38-1.75)	Single/unknown	1.12 (0.76-1.64)	1.32 (0.86-2.04)
RadiationNo1 (reference)Yes0.77 (0.37-1.58)Surgery	Divorced/separated	1.49 (0.8-2.85)	1.77 (0.88-3.56)
No 1 (reference) 1 (reference) Yes 0.77 (0.37-1.58) 0.81 (0.38-1.75) Surgery Surgery Surgery Surgery	Widowed	1.98 (0.89-4.38)	1.82 (0.72-4.65)
Yes 0.77 (0.37-1.58) 0.81 (0.38-1.75) Surgery	Radiation		
Surgery	No	1 (reference)	1 (reference)
	Yes	0.77 (0.37-1.58)	0.81 (0.38-1.75)
No 1 (reference) 1 (reference)	Surgery		
	No	1 (reference)	1 (reference)

 Jaisbideng®
 WJCO
 https://www.wjgnet.com

Yes	0.76 (0.53-1.09)	0.72 (0.48-1.09)
B symptoms		
No	1 (reference)	1 (reference)
Yes	1.23 (0.85-1.80)	1.14 (0.75-1.75)

 $^{b}P < 0.01.$

HSTCL: Hepatosplenic T-cell lymphoma.

Table 3 Multivariate cox proportional hazard regression analyses of factors affecting all-cause mortality and hepatosplenic T-celllymphoma related mortality among patients between 2000 and 2017

Characteristics	Overall mortality adjusted proportional hazard ratio (95% confidence interval)	HSTCL adjusted proportional hazard ratio (95% confidence interval)
Gender		
Female	1 (reference)	1 (reference)
Male	0.79 (0.48-1.29)	0.83 (0.49-1.41)
Age at diagnosis, yr		
0-39	1 (reference)	1 (reference)
40-59	0.60 (0.32-1.13)	0.62 (0.30-1.26)
60-79	1.32 (0.67-2.58)	1.65 (0.78-3.49)
80+	2.98 (0.88-10.09)	4.72 (1.14-19.54) ^a
Race		
Non-Hispanic white	1 (reference)	1 (reference)
Non-Hispanic black	1.61 (0.89-2.89)	2.02 (1.08-3.79) ^a
Hispanic	1.87 (0.73-4.78)	1.90 (0.69-5.28)
Other	1.59 (0.79-3.19)	1.49 (0.67-3.37)
Tumor stage		
Localized	1 (reference)	1 (reference)
Regional	0.69 (0.24-2.01)	1.17 (0.33-4.19)
Distant	1.03 (0.57-1.87)	1.85 (0.87-3.89)
Living area		
Counties in metropolitan areas of 1 million persons	1 (reference)	1 (reference)
Counties in metropolitan areas of 250,000 to 1 million persons	1.19 (0.69-2.07)	1.05 (0.55-2.02)
Counties in metropolitan areas of 250000 persons	1.07 (0.44-2.60)	0.68 (0.24-1.94)
Nonmetropolitan counties	2.71 (0.78-9.39)	2.36 (0.50-11.09)
Income per year		
\$ < \$55000	1 (reference)	1 (reference)
\$55000-64999	2.72 (0.82-9.07)	2.54 (0.58-11.08)
\$65000-74999	1.75 (0.53-5.85)	1.04 (0.23-4.63)
\$75000+	1.46 (0.43-4.96)	1.23 (0.28-5.53)
Marital status		
Married	1 (reference)	1 (reference)
Single/unknown	0.83 (0.48-1.44)	0.94 (0.51-1.75)

Bangolo A et al. Epidemiology of HSTCL

Divorced/separated	1.33 (0.61-2.90)	1.79 (0.77-4.19)
		· · ·
Widowed	1.19 (0.39-3.62)	1.01 (0.26-3.87)
Radiation		
No	1 (reference)	1 (reference)
Yes	0.86 (0.35-2.10)	1.07 (0.38-3.01)
Surgery		
No	1 (reference)	1 (reference)
Yes	0.83 (0.49-1.40)	0.97 (0.54-1.76)
B symptoms		
No	1 (reference)	1 (reference)
Yes	1.66 (0.85-3.24)	2.21 (0.99-4.89)

 $^{a}P < 0.05.$

HSTCL: Hepatosplenic T-cell lymphoma

Non-Hispanic blacks were found to have a higher CSM. Since the lack of documentation of outcomes in non-Hispanic blacks and given the growth of the Hispanic population in the United States, it is imperative to understand the difference for personalized medicine. Extrapolating data from other cancer areas, several factors have explained higher CSM in non-Hispanic black patients. The study by Fwelo et al^[28] in breast cancer found that non-Hispanic black women were more likely to undergo treatment delays compared their non-Hispanic White counterparts, and the variations in treatment, socioeconomic status, and clinicopathological factors significantly explained 70% of the excess Breast cancer specific mortality among non-Hispanic Blacks compared to their non-Hispanic White counterparts^[29]. A study by Yabe *et al*^[6], supported the novel suggestions that HSTCL patients can be stratified into 2 prognostic groups, with an elevated serum bilirubin level, αβ T-cell receptor (TCR) expression, and trisomy 8 correlating with a poorer prognosis. Perhaps most non-Hispanic black patients belong to the group classified by Yabe *et al*^[6] as the poorer prognostic group. A multidisciplinary team effort is needed to better understand the reason for this poorer CSM in non-Hispanic Blacks. This study paves the way for future retrospective and prospective studies focusing in part on factors that can potentially explain this variation.

Certain limitations must be considered when interpreting the results of this study. Information gathered on patients that underwent chemotherapy was not complete as the information available was reported as either "yes" or "no/ unknown". As a result, that information could not be used in our cohort. Furthermore, the SEER database publicly available does not provide information on comorbidities. However, this study has the merit of collecting data from the largest cancer database in the USA. Furthermore, we were also able to enroll an adequate sample size despite the rarity of the pathology.

CONCLUSION

The elevated CSM rates observed among non-Hispanic Black individuals and older populations over 80 years highlighted in our study bring to the forefront significant disparities in health outcomes. This discrepancy necessitates a deeper investigation into potential causative factors, which may include socioeconomic constraints, unequal access to medical resources, and inherent differences in disease biology. Socioeconomic issues, such as delays in treatment coupled with lower income levels and limited access to high-quality healthcare, can significantly influence survival outcomes across racial lines. Additionally, the accessibility and quality of healthcare services, which vary dramatically with race and age, can affect the timeliness and efficacy of treatment options available to patients. Moreover, biological factors, like distinctive genetic markers and TCR expressions, may also contribute to prognostic differences. These complexities demand a multidisciplinary approach for a fuller understanding and addressing these health inequities. Our study emphasizes the critical need for extensive, targeted research to dissect these multifaceted causes of health disparities, advocating for future studies that not only validate these findings but also examine potential interventions aimed at reducing these disparities. Through such efforts, we can move closer to achieving personalized medicine that caters effectively to the diverse needs of all population segments, thereby improving overall health outcomes.

FOOTNOTES

Author contributions: Bangolo A designed research; Bangolo A, Fwelo P performed research; Bangolo A, Fwelo P, Lo A, Weissman S, Cho C analyzed data; Bangolo A, Fwelo P, Dey S, Sethi T, Sagireddy S, Chatta J, Goel A, Nagpaul S, Chen EPS, Saravanan C, Gangan S, Thomas J, Potiguara S, Nagesh VK, Elias D, Mansour C, Ratnaparkhi PH, Jain P, Mathew M, Porter T, Shadiya Sultan, Abbisetty S, Tran L, Chawla M, Lo A, Weissman S, Cho C wrote the paper.



Institutional review board statement: The SEER Dataset was a public-use dataset, of which the need for IRB approval was waived.

Informed consent statement: The SEER Dataset was a public-use dataset, of which the informed consent was waived.

Conflict-of-interest statement: No potential conflict of interest was reported by the authors.

Data sharing statement: The data used and/or analyzed in this study are available in the Surveillance, Epidemiology, and End Results (SEER) Database of the National Cancer Institute (http://seer.cancer.gov).

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: https://creativecommons.org/Licenses/by-nc/4.0/

Country of origin: United States

ORCID number: Ayrton Bangolo 0000-0002-2133-2480.

S-Editor: Qu XL L-Editor: A P-Editor: Zhao YQ

REFERENCES

- 1 Tefferi A, Longo DL. Less Common Lymphoid and Myeloid Malignancies. In: Loscalzo J, Fauci A, Kasper D, Hauser S, Longo D, Jameson JL, editors. Harrison's Principles of Internal Medicine, 21e. NY: McGraw-Hill Education, 2022. Available from: https://accessmedicine. mhmedical.com/content.aspx?bookid=3095§ionid=265413562
- Gaulard P, Bourquelot P, Kanavaros P, Haioun C, Le Couedic JP, Divine M, Goossens M, Zafrani ES, Farcet JP, Reyes F. Expression of the 2 alpha/beta and gamma/delta T-cell receptors in 57 cases of peripheral T-cell lymphomas. Identification of a subset of gamma/delta T-cell lymphomas. Am J Pathol 1990; 137: 617-628 [PMID: 1698028]
- Swerdlow SH, Campo E, Pileri SA, Harris NL, Stein H, Siebert R, Advani R, Ghielmini M, Salles GA, Zelenetz AD, Jaffe ES. The 2016 3 revision of the World Health Organization classification of lymphoid neoplasms. Blood 2016; 127: 2375-2390 [PMID: 26980727 DOI: 10.1182/blood-2016-01-643569]
- Bron D, De Leval L, Michiels S, Wittnebel S; EuroBloodNet for rare diseases. Hepatosplenic T-cell lymphoma: treatment challenges. Curr 4 Opin Oncol 2021; 33: 406-411 [PMID: 34409955 DOI: 10.1097/CCO.000000000000775]
- Nosari A, Oreste PL, Biondi A, Costantini MC, Santoleri L, Intropido L, Muti G, Pungolino E, Gargantini L, Morra E. Hepato-splenic 5 gammadelta T-cell lymphoma: a rare entity mimicking the hemophagocytic syndrome. Am J Hematol 1999; 60: 61-65 [PMID: 9883807 DOI: 10.1002/(sici)1096-8652(199901)60:1<61::aid-ajh10>3.0.co;2-l]
- Yabe M, Medeiros LJ, Tang G, Wang SA, Ahmed S, Nieto Y, Hu S, Bhagat G, Oki Y, Patel KP, Routbort M, Luthra R, Fanale MA, Bueso-6 Ramos CE, Jorgensen JL, Vega F, Chen W, Hoehn D, Konoplev S, Milton DR, Wistuba I, Li S, You MJ, Young KH, Miranda RN. Prognostic Factors of Hepatosplenic T-cell Lymphoma: Clinicopathologic Study of 28 Cases. Am J Surg Pathol 2016; 40: 676-688 [PMID: 26872013 DOI: 10.1097/PAS.00000000000614]
- 7 Cho MW, Chin BB. (18)F-FDG PET/CT findings in hepatosplenic Gamma-Delta T-cell lymphoma: case reports and review of the literature. Am J Nucl Med Mol Imaging 2018; 8: 137-142 [PMID: 29755847]
- Abouyabis AN, Shenoy PJ, Sinha R, Flowers CR, Lechowicz MJ. A Systematic Review and Meta-Analysis of Front-line Anthracycline-Based 8 Chemotherapy Regimens for Peripheral T-Cell Lymphoma. ISRN Hematol 2011; 2011: 623924 [PMID: 22084700 DOI: 10.5402/2011/623924]
- Garcia-Sanchez F, Menárguez J, Cristobal E, Cantalejo A, Gil J, Algara P, Vicario JL. Hepatosplenic gamma-delta T-cell malignant 9 lymphoma: report of the first case in childhood, including molecular minimal residual disease follow-up. Br J Haematol 1995; 90: 943-946 [PMID: 7669677 DOI: 10.1111/j.1365-2141.1995.tb05221.x]
- Cooke CB, Krenacs L, Stetler-Stevenson M, Greiner TC, Raffeld M, Kingma DW, Abruzzo L, Frantz C, Kaviani M, Jaffe ES. Hepatosplenic 10 T-cell lymphoma: a distinct clinicopathologic entity of cytotoxic gamma delta T-cell origin. Blood 1996; 88: 4265-4274 [PMID: 8943863 DOI: 10.1182/blood.V88.11.4265.bloodjournal88114265]
- Li Y, Chen K, Zuo C, Zeng R, He Y, Chen X, Xiao L, Zhou H. Survival Analysis of Hepatosplenic T Cell Lymphoma: A Population-Based 11 Study Using SEER. Int J Gen Med 2021; 14: 8399-8411 [PMID: 34819748 DOI: 10.2147/IJGM.S335464]
- Dhruvika M, Radivoyevitch T, Hill BT, Dean RM, Pohlman B, Jagadeesh D. Outcomes in Patients with Enteropathy-Associated T-Cell 12 Lymphoma (EATL) and Hepatosplenic T-Cell Lymphoma (HSTCL): A Population Based Analysis Using the SEER Data. Blood 2017; 130: 2805
- 13 Bangolo AI, Dey S, Mehta R, Jarri AI, Lee SH, Weissman SI, Cho C. Epidemiology and Independent Prognostic Factors of Patients with Hepatosplenic T-Cell Lymphoma over the Past 2 Decades. Blood 2023; 142: 6271-6271 [DOI: 10.1182/blood-2023-185003]
- 14 Smith SM, Burns LJ, van Besien K, Lerademacher J, He W, Fenske TS, Suzuki R, Hsu JW, Schouten HC, Hale GA, Holmberg LA, Sureda A, Freytes CO, Maziarz RT, Inwards DJ, Gale RP, Gross TG, Cairo MS, Costa LJ, Lazarus HM, Wiernik PH, Maharaj D, Laport GG, Montoto S, Hari PN. Hematopoietic cell transplantation for systemic mature T-cell non-Hodgkin lymphoma. J Clin Oncol 2013; 31: 3100-3109 [PMID: 23897963 DOI: 10.1200/JCO.2012.46.0188]
- Du J, Yu D, Han X, Zhu L, Huang Z. Comparison of Allogeneic Stem Cell Transplant and Autologous Stem Cell Transplant in Refractory or 15 Relapsed Peripheral T-Cell Lymphoma: A Systematic Review and Meta-analysis. JAMA Netw Open 2021; 4: e219807 [PMID: 34042995 DOI: 10.1001/jamanetworkopen.2021.9807



- Duggan MA, Anderson WF, Altekruse S, Penberthy L, Sherman ME. The Surveillance, Epidemiology, and End Results (SEER) Program and 16 Pathology: Toward Strengthening the Critical Relationship. Am J Surg Pathol 2016; 40: e94-e102 [PMID: 27740970 DOI: 10.1097/PAS.000000000000749]
- 17 Master SR, Koshy NV, Mills GM, Mansour RP, Shi R. Hepatosplenic T-cell lymphoma (HSTL): A SEER data analysis. J Clin Oncol 2017; **35**: e19035-e19035 [DOI: 10.1200/JCO.2017.35.15_suppl.e19035]
- Durani U, Go RS. Incidence, clinical findings, and survival of hepatosplenic T-cell lymphoma in the United States. Am J Hematol 2017; 92: 18 E99-E101 [PMID: 28263402 DOI: 10.1002/ajh.24711]
- 19 Pro B, Allen P, Behdad A. Hepatosplenic T-cell lymphoma: a rare but challenging entity. Blood 2020; 136: 2018-2026 [PMID: 32756940 DOI: 10.1182/blood.2019004118]
- 20 McKinney M, Moffitt AB, Gaulard P, Travert M, De Leval L, Nicolae A, Raffeld M, Jaffe ES, Pittaluga S, Xi L, Heavican T, Iqbal J, Belhadj K, Delfau-Larue MH, Fataccioli V, Czader MB, Lossos IS, Chapman-Fredricks JR, Richards KL, Fedoriw Y, Ondrejka SL, Hsi ED, Low L, Weisenburger D, Chan WC, Mehta-Shah N, Horwitz S, Bernal-Mizrachi L, Flowers CR, Beaven AW, Parihar M, Baseggio L, Parrens M, Moreau A, Sujobert P, Pilichowska M, Evens AM, Chadburn A, Au-Yeung RK, Srivastava G, Choi WW, Goodlad JR, Aurer I, Basic-Kinda S, Gascoyne RD, Davis NS, Li G, Zhang J, Rajagopalan D, Reddy A, Love C, Levy S, Zhuang Y, Datta J, Dunson DB, Davé SS. The Genetic Basis of Hepatosplenic T-cell Lymphoma. Cancer Discov 2017; 7: 369-379 [PMID: 28122867 DOI: 10.1158/2159-8290.CD-16-0330]
- Bojanini L, Jiang L, Tun AJ, Ayala E, Menke DM, Hoppe B, Kharfan-Dabaja MA, Tun HW, Alhaj Moustafa M. Outcomes of Hepatosplenic 21 T-Cell Lymphoma: The Mayo Clinic Experience. Clin Lymphoma Myeloma Leuk 2021; 21: 106-112.e1 [PMID: 33160933 DOI: 10.1016/j.clml.2020.09.013
- Gumbs AA, Zain J, Neylon E, MacGregor-Cortelli B, Patterson M, O'Connor OA. Importance of early splenectomy in patients with 22 hepatosplenic T-cell lymphoma and severe thrombocytopenia. Ann Surg Oncol 2009; 16: 2014-2017 [PMID: 19408055 DOI: 10.1245/s10434-009-0470-0]
- Wong KF, Chan JK, Matutes E, McCarthy K, Ng CS, Chan CH, Ma SK. Hepatosplenic gamma delta T-cell lymphoma. A distinctive 23 aggressive lymphoma type. Am J Surg Pathol 1995; 19: 718-726 [PMID: 7755158 DOI: 10.1097/00000478-199506000-00013]
- Coiffier B, Bosly A, Caligaris-Cappio F, Gisselbrecht C, Patte C, Schaadt M, Symann M. European School of Oncology: management of non-24 Hodgkin's lymphomas: conclusions of the European School of Oncology Meeting, 1986. Eur J Cancer Clin Oncol 1987; 23: 1691-1695 [PMID: 3322847 DOI: 10.1016/0277-5379(87)90451-2]
- Anderson T, DeVita VT Jr, Simon RM, Berard CW, Canellos GP, Garvin AJ, Young RC. Malignant lymphoma. II Prognostic factors and 25 response to treatment of 473 patients at the National Cancer Institute. Cancer 1982; 50: 2708-2721 [PMID: 7139564 DOI: 10.1002/1097-0142(19821215)50:12<2708::AID-CNCR2820501203>3.0.CO;2-G
- Portlock CS, Rosenberg SA. No initial therapy for stage III and IV non-Hodgkin's lymphomas of favorable histologic types. Ann Intern Med 26 1979; 90: 10-13 [PMID: 369420 DOI: 10.7326/0003-4819-90-1-10]
- McLaughlin P, Fuller LM, Velasquez WS, Sullivan-Halley JA, Butler JJ, Cabanillas F. Stage I-II follicular lymphoma. Treatment results for 27 76 patients. Cancer 1986; 58: 1596-1602 [PMID: 3756784 DOI: 10.1002/1097-0142(19861015)58:8<1596::AID-CNCR2820580803>3.0.CO;2-G]
- Fwelo P, Nwosu KOS, Adekunle TE, Afolayan O, Ahaiwe O, Ojaruega AA, Nagesh VK, Bangolo A. Racial/ethnic and socioeconomic 28 differences in breast cancer surgery performed and delayed treatment: mediating impact on mortality. Breast Cancer Res Treat 2023; 199: 511-531 [PMID: 37052762 DOI: 10.1007/s10549-023-06941-z]
- Bangolo A, Fwelo P, Nwosu KO, Adekunle TE, Afolayan O, Ahaiwe O, Ojaruega AA, Nagesh V, Jarri A, Dey S, Chacko AA, Gupta B, Atoot 29 A. Racial/ethnic and socioeconomic differences in breast cancer surgery performed and delayed surgical treatment: Mediating impact on mortality. J Clin Oncol 2023; 41: 585-585 [DOI: 10.1200/JCO.2023.41.16_suppl.585]



WJCO | https://www.wjgnet.com



Published by Baishideng Publishing Group Inc 7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA Telephone: +1-925-3991568 E-mail: office@baishideng.com Help Desk: https://www.f6publishing.com/helpdesk https://www.wjgnet.com

