Cholangiocarcinoma in Pacific Islanders Compared to Asians

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Abstract

Pacific Islanders represent a minority population with a disproportionate amount of risk factors for cholangiocarcinoma, including chronic liver disease, obesity, and diabetes mellitus, compared to other populations in the United States, but are poorly studied independently from Asians. Thus, this study aimed to characterize cholangiocarcinoma in a group of Pacific Islanders compared to Asians. This study retrospectively assessed a population of 40 Pacific Islander and 215 Asian cholangiocarcinoma patients from Hawai'i's primary liver transplant center from 1993 to 2020. Overall, Pacific Islanders were younger at diagnosis and had a higher prevalence of obesity compared to Asians. There were no differences in hepatitis B or C infection, tumor markers, extrahepatic cholangiocarcinoma to intrahepatic cholangiocarcinoma ratio, or surgical resection. When divided into extrahepatic and intrahepatic cholangiocarcinoma, the extrahepatic cholangiocarcinoma cohort reflected the Pacific Islanders' younger age, higher proportion of obesity, and larger tumor size. The Pacific Islanders in the intrahepatic cholangiocarcinoma cohort had a greater prevalence of obesity and significantly more multifocal tumor presentation compared to Asians. Ultimately, Pacific Islanders presented younger, with higher body mass index, and with more advanced cholangiocarcinoma when divided into extrahepatic and intrahepatic types, but experienced no differences in receipt of surgical resection or 5-year survival compared to Asians. Awareness of cholangiocarcinoma occurrence in younger Pacific Islanders and assessment of premalignant biliary or hepatic pathologies may aid in the earlier identification and intervention of cholangiocarcinoma in Pacific Islanders.

Keywords

cholangiocarcinoma, healthcare disparities, Pacific Islanders, survival

Acronyms and Abbreviations

AFP = alpha fetoprotein
AJCC = American Joint Committee on Cancer
ALT = alanine aminotransferase
API = Asian Pacific Islander
AST = aspartate aminotransferase
BMI = body mass index
CA = Carbohydrate Antigen
CCA = cholangiocarcinoma
CEA = Carcinoembryonic Acid
CI = confidence interval
ECC = extrahepatic cholangiocarcinoma
HBV/HCV = hepatitis B/hepatitis C
HCC = hepatocellular carcinoma
ICC = intrahepatic cholangiocarcinoma
INR = international normalized ratio
PI = Pacific Islander
PT = prothrombin time
SEER = Surveillance, Epidemiology, and End Results
US = United States

Introduction

Cholangiocarcinoma (CCA) is a heterogeneous group of biliary cancers categorized into intrahepatic (ICC) and extrahepatic (ECC) types. Most patients with CCA face a poor prognosis, presenting at advanced stages and with a median survival that is less than 2 years after diagnosis.[1] The incidence of CCA is highest in Asian countries such as South Korea, Thailand, and Japan, but is increasing in the United States (US).[2,3] Within the US, Asian/Pacific Islanders (APIs) had the highest incidence for ICC, ECC, and hepatocellular carcinoma (HCC) from 2000 to 2009.[4] Pacific Islanders (PIs) comprise 1.5 million or 0.4% of the US population and are represented in majority by Native Hawaiians, Samoans, and Guamanians.[5] PIs, especially Samoans, have as much as an 8-fold increase in incidence and more than twice the mortality of liver and intrahepatic bile duct cancer compared to Non-Hispanic whites.[5]

Risk factors for CCA include male sex, older age, cirrhosis, viral hepatitis, diabetes mellitus, obesity, smoking, choledochal cysts, hepatolithiasis, primary sclerosing cholangitis, and other chronic liver diseases, but there may be geographic variations in these risk factors.[6-9] The higher incidence in Asia is attributed to widespread liver fluke infections, while in western countries, metabolic conditions including obesity and diabetes mellitus have been associated with a 50% increase in risk for ICC.[10,11]

With higher reported rates of smoking, alcohol consumption, diabetes mellitus, liver disease, and obesity compared to other racial groups, PIs bear many of the described risk factors for CCA development.[5] While PIs have been previously identified as a high-risk group for developing HCC, receiving less cancer screening and having the lowest 5-year survival rates, little is known about CCA in PIs as a separate population from Asians.[12,13] The high risk for CCA in PIs, in the context of APIs being the racial group with the highest incidence for CCA and HCC in the US, suggests the significance of identifying disparities within this typically aggregated population. Analyzing PIs and Asians as separate populations may advance our understanding of CCA presentations in PIs to inform physicians how to approach diagnosis and treatment in this understudied group. This study aims to characterize the presentation, treatment, and outcome of CCA in PIs compared to Asians in Hawai'i.

Methods

This study is a retrospective review of a prospectively collected database of 255 cases of CCA between August 1993 and February 2020. This study was approved by the Institutional Review Board at the University of Hawai‘i.

All patients were referred to a group of surgeons who are associated with Hawai‘i’s only liver transplant program and a dedicated liver center. From 1993–2011, these were located at St. Francis Medical Center, but from 2012 to present, these have been relocated to Queen’s Medical Center; each was the only tertiary referral centers (during the specific time frame) for liver and biliary disease for the State of Hawai‘i as well as for the US territories, including American Samoa, Guam, the Federated States of Micronesia, and the Northern Mariana Islands. Patients may include foreign nationals from Japan, Korea, China, and the Philippines who may have traveled to Hawai‘i to receive medical care.

The data collected included demographic information of age, sex, ethnicity, and birthplace. Ethnicity was determined by patient self-report at the initial consultation. Patients were classified as “PI” if they were Hawaiian, Chamorro Samoan, Tongan, Micronesian, or Marshallese. Patients of mixed race (more than 1 ethnicity) were deemed “PI” if they were at least 50% of 1 of these PI ethnicities. Patients who were Filipino were considered to be “Asian” along with those who were Japanese, Chinese, Korean, or Southeast Asian.

Medical history data obtained included the presence of diabetes mellitus, hypertension, hyperlipidemia, inflammatory bowel disease, primary sclerosing cholangitis, and pancreatitis. Patients’ histories of smoking or significant alcohol use (defined as 2 or more alcoholic beverages for 10 years) were noted. At the initial visit, height and weight were determined to calculate body mass index (BMI). Patients with BMI of 30 kg/m^2 or higher were categorized as “obese.”

Laboratory data were recorded at initial diagnosis, which included bilirubin, aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase, albumin, prothrombin time (PT) with international normalized ratio (INR), creatinine, and platelet count. Hepatitis B (HBV) and C (HCV) serologies and tumor markers of alpha fetoprotein (AFP), Carcinoembryonic Acid (CEA), and Carbohydrate Antigen (CA) 19-9 were collected. “Elevated AFP” was defined as greater than or equal to 10 ng/mL. “Elevated CEA” was defined as greater than or equal to 5 units/mL. “Elevated CA 19-9” was included as greater than 37 units/mL and also defined a category as “CA 19-9 above 1000 units/mL”. Tumor characteristics included tumor type: ICC vs ECC and tumor location; proximal, middle, or distal for those patients with ECC. Tumor size, number, and American Joint Committee on Cancer (AJCC) stage were noted when available. Finally, whether or not the patient underwent surgical intervention was noted. Surgical resections were defined as a liver resection with or without bile duct resection and portal node dissection for patients with ICC. For ECC patients, surgical resections included bile duct resections and liver resections for proximal and middle lesions and pancreaticoduodenectomy for distal lesions.

Additional clinical and pathologic data, as well as vital status and survival information were obtained through linkage with the Hawai‘i Tumor Registry, the state cancer registry of the National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) program. Survival duration was based on the period from the date of cancer diagnosis to the date of death (all causes) or date of last follow-up.

Statistics

Patients were divided into 2 groups: PIs vs Asians. Categorical variables including sex, birthplace, BMI, smoking and alcohol history, hypertension, diabetes mellitus, hyperlipidemia, HBV and HCV infection, inflammatory bowel disease, and other cancer diagnoses were compared using chi-square analysis with statistical significance as $P < .05$. Numerical values were compared using Student’s t-test. Statistical Package for Social Science (SPSS) version 27 was utilized to determine significance. Data was reported separately for ECC and ICC. SPSS was also used to identify predictors of receiving a definitive surgical resection and 1-year survival with multinomial logistic regression. Univariate analysis was completed, and those factors that had a $P < .100$, as well as age and sex, were used for the multivariate analysis.

Survival analysis was performed with R version 3.4.1 (The R foundation for Statistical Computing, Vienna, Austria) as well as EZR version 1.36 (Division of Hematology, Saitama Medical Center, Jichi Medical University, Japan).[14] The Kaplan-Meier survival curve was used to compare median survival between PIs and Asians for the entire cohort. A subgroup analysis was performed for ICC and ECC.

Results

In the entire cohort of 255 patients with CCA, 40 patients were PI, and 215 were Asian. The mean age of the cohort was 66.8 years, 73.7% were older than 60 years, and 58.0% were men. Overall, the comorbidities in this cohort included obesity (22.5%), smoking (54.8%), alcohol use (31.0%), HBV (14.8%), HCV (6.7%), diabetes mellitus (25.6%), hypertension (55.2%), and hyperlipidemia (49.0%). In terms of CCA type, 46.3% of the patients had ICC, and 53.7% had ECC.

PIs vs Asians

The characteristics of PIs compared to Asians are detailed in Table 1. PIs presented at a younger mean age (61.3 vs 67.8

years; $P<.001$) and were more likely to be obese (55% vs 16%; $P<.001$). There was no difference in smoking history, alcohol history, diabetes, hypertension, hyperlipidemia, other malignancies, HBV or HCV infection, or the presence of inflammatory bowel disease. No difference was observed in laboratory values, including tumor markers: elevated AFP, CEA, and CA 19-9, or liver function and serum tests: bilirubin, AST, ALT, alkaline phosphatase, albumin, creatinine, or platelets. There was no difference in the distribution between ECC and ICC in PIs when compared to Asians.

ECC

The ECC cohort consisted of 137 patients, which included 25 PIs and 112 Asians. 58% were men and 80% were older than 60 years, with a mean age of 69.3 years. The comorbidities in this population included obesity (22%), smoking (56%), alcohol use (34%), diabetes mellitus (26%), hypertension (45%), HBV (9%), and HCV (3%). Of the total population with ECC, 55%, 11%, and 45% of tumor locations were proximal, middle, and distal, respectively, and 33% underwent surgical resection.

Table 2 compares the comorbidities, laboratory values, and tumor characteristics between PIs and Asians with ECC and ICC. Of the ECC patients, PIs had a significantly lower proportion of patients over age 60 years (60% vs 85%; $P=.005$) and higher rates of obesity (53% of PIs vs 14% of Asians, $P<.001$). No significant differences were observed in other risk factors, including smoking or alcohol history, diabetes mellitus, hypertension, hyperlipidemia, other malignancies, sclerosing cholangitis, HBV, HCV, or inflammatory bowel disease. There was no difference in laboratory values, including elevated AFP, CEA, CA 19-9, bilirubin, AST, ALT, alkaline phosphatase, albumin, creatinine, or platelets. Regarding tumor characteristics, 64%,

Table 1. Risk Factors, Comorbidities, and Laboratory Values of Pacific Islanders and Asians in the Cholangiocarcinoma Cohort[a,b]

Characteristic	Pacific Islander (n=40) n (%)	Asian (n=215) n (%)	*P* Value
Age 60 years or older	25 (62)	163 (75.8)	.079
Male	26 (65)	122 (56.7)	.33
BMI above 30	17/31 (54)	25/156 (16)	<.001
Smoking	18/39 (46)	120/213 (56.3)	.24
Alcohol history	14 (35)	65/212 (30.7)	.59
Diabetes mellitus	11/39 (28)	52/207 (25.1)	.69
Hypertension	20/39 (51)	116/207 (56.0)	.58
Hyperlipidemia	14/27 (51)	64/132 (49)	.98
Presence of a second cancer	6 (15)	36/211 (17.1)	.75
Inflammatory bowel disease	0	1/208 (0)	.66
Elevated AFP	3/16 (18)	16/110 (15)	.66
Elevated CEA	6/26 (23)	56/143 (39)	.118
Elevated CA 19-9	24/33 (72)	131/177 (74)	.88
CA 19-9 >1000 units/mL	5/32 (15)	47/177 (27)	.188
Elevated CEA or CA 19-9	28/34 (82)	148/192 (77)	.50
Hepatitis B surface Ag positive	5/32 (15)	22/150 (15)	.89
Hepatitis B core Ab positive	11/30 (36)	32/126 (25)	.79
Hepatitis C positive	2/32 (6)	10/147 (7)	.91
Tumor size >5 cm	10/26 (38)	67/144 (47)	.45
Surgical resection	11 (27)	62 (28.8)	.86
ECC:ICC	25:15	112:103	.23
Mean age (years)	61.3	67.8	<.001
Mean BMI	31.5	25.1	<.001
Mean tumor size (cm)	4.88	5.60	.27

Abbreviations: AFP, alpha fetoprotein; BMI, body mass index; CA, Carbohydrate Antigen; CEA, Carcinoembryonic Acid; ECC, extrahepatic cholangiocarcinoma; ICC, intrahepatic cholangiocarcinoma.

[a] Total sample size (N=255).

[b] For some characteristics, percentage represents the numerator divided by total number in subgroup.

8%, and 28% of the total ECC PI population and 53%, 12%, and 35% of the total Asian population had proximal, middle, and distal tumors, respectively. PIs had a larger mean tumor size (3.9 vs 2.2 cm; $P = .040$) and a higher proportion of tumors larger than 5cm (15% vs 2%; $P = .042$). No significant differences in tumor location and surgical resection were observed between these 2 populations.

Table 2. Risk Factors and Comorbidities of Pacific Islanders and Asians with Extrahepatic Cholangiocarcinoma and Intrahepatic Cholangiocarcinoma[a]

Characteristic	Pacific Islander	Asian	*P* Value
Extrahepatic cholangiocarcinoma[b]	**n=25 n (%)**	**n=112 n (%)**	
Age 60 years or older	15 (60)	95 (85)	.005
Male	17 (68)	63 (56)	.28
BMI above 30	10/19 (53)	10/74 (14)	<.001
Smoking	11/24 (46)	64/110 (58)	.27
Alcohol history	8 (32)	38/110 (35)	.81
Diabetes mellitus	6/24 (25)	28/107 (26)	.91
Hypertension	10/24 (42)	54/107 (50)	.44
Hepatitis B surface Ag positive	2/17 (12)	5/60 (8)	.66
Hepatitis B core Ab positive	6/16 (38)	10/50 (20)	.155
Hepatitis C positive	1/17 (6)	1/56 (2)	.36
Tumor size >5 cm	2/13 (15)	1/51 (2)	.041
Surgical resection	9 (36)	36 (32)	.71
Mean age (years)	61.2	71.1	<.001
Mean BMI	30.6	24.5	<.001
Mean tumor size (cm)	3.90	2.20	.040
Intrahepatic cholangiocarcinoma[c]	**n=15 n (%)**	**n=103 n (%)**	
Age 60 years or older	10 (67)	68 (66)	.96
Male	9 (60)	59 (57)	.84
BMI greater than 30	7/12 (58)	15/82 (18)	.002
Smoking	7 (47)	56 (54)	.58
Alcohol history	6 (40)	27/102 (26)	.28
Diabetes mellitus	5 (33)	24/100 (24)	.44
Hypertension	10 (67)	62/100 (62)	.73
Hepatitis B surface Ag positive	3 (20)	17/90 (19)	.92
Hepatitis B core Ab positive	5/14 (36)	22/76 (29)	.61
Hepatitis C positive	1 (7)	9/91 (10)	.69
Tumor size >5 cm	8/13 (62)	66/90 (73)	0.38
Single tumor	9/13 (69)	85/91 (93)	.006
Surgical resection	2 (13)	26 (25)	.31
Mean age (years)	61.4	64.3	.44
Mean BMI	32.8	25.6	<.001
Mean tumor size (cm)	5.93	7.51	.180

Abbreviations: BMI, body mass index.
aFor some characteristics, percentage represents the numerator divided by total number in subgroup.
bTotal sample size (N=137).
cTotal sample size (N=118).

ICC

Of the 118 patients with ICC, 15 patients were PI, and 103 were Asian. The ICC cohort had 58% men and a mean age of 63.9 years, with 66% over 60 years. Risk factors and comorbidities included obesity (23%), smoking (53%), alcohol use (28%), diabetes mellitus (25%), hypertension (63%), HBV (19%), and HCV (9%). Tumor characteristics in this cohort include 90% of patients with a single tumor, a mean tumor size (largest lesion) of 7.33 cm, and 31% with surgical resection of tumors. Table 2 compares the risk factors, comorbidities, laboratory studies, and tumor characteristics between PIs and Asians with ICC. The only notable differences were that PIs were more likely to be obese (58% vs 18%; $P = .002$) and have fewer presentations with a single tumor than multiple tumors compared to Asians (69% vs 93%; $P = .006$).

Predictors of Surgical Resection

Table 3 describes the odds ratios of risk factors, comorbidities, and laboratory values as predictors of undergoing surgical resection. Factors predictive of undergoing surgical resection on univariate and multivariate analysis included having a single tumor and having ECC (compared with ICC). Elevated CA 19-9 and CEA were predictive of not receiving surgical resection.

Survival

Risk factors, comorbidities, and laboratory values were analyzed as predictors of 1-year survival in the total CCA cohort (Table 4). Being male significantly predicted 1-year survival, while hypertension was associated with less 1-year survival on univariate and multivariate analyses.

As shown in Figure 1, the median survival for PIs in the overall CCA cohort (18 months; 95% CI, 15–27 months) was similar to Asians (17 months; 95% CI, 16–20 months). When divided into ECC and ICC, PIs and Asians had no significant difference in median survival in both ECC (19 months; 95% CI, 13–31 months vs 17 months; 95% CI, 15–19 months) and ICC cohorts (18 months, 95% CI, 14–34 months vs 19 months; 95% CI, 16–27 months).

Table 3. Predictors of Undergoing Surgical Resection in the Cholangiocarcinoma Cohort[a,b]

Characteristic	Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Age 60 years or older	0.58 (0.24-1.37)	0.59 (0.32-1.20)
Male	1.57 (0.68-3.64)	1.24 (0.59-2.59)
Pacific Islander	0.79 (0.27-2.32)	
BMI above 30	0.91 (0.34-2.49)	
Smoking	0.56 (0.25-1.30)	
Alcohol history	2.02 (0.82-4.97)	1.52 (0.68-3.38)
Diabetes mellitus	0.99 (0.41-2.40)	
Hypertension	0.83 (0.38-1.83)	
Hyperlipidemia	1.09 (0.44-2.69)	
Presence of a second cancer	0.43 (0.15-1.26)	
Hepatitis B surface Ag positive	0.76 (0.22-2.63)	
Hepatitis B core Ab positive	0.52 (0.17-1.54)	
Hepatitis C positive	4.14 (0.67-25.5)	
Elevated CA 19-9	**0.35 (0.14-0.86)**	**0.31 (0.14-0.72)**
CA 19-9 >1000 units/mL	0.36 (0.11-1.17)	0.35 (0.11-1.05)
Elevated CEA	**0.30 (0.10-0.92)**	**0.38 (0.14-0.99)**
Tumor size >5 cm	0.68 (0.21-2.24)	0.90 (0.32-2.52)
Single tumor	**4.50 (1.19-17.02)**	**3.373 (1.11-12.61)**
ICC (vs ECC)	**0.73 (0.17-0.31)**	**0.11 (0.03-0.39)**

Abbreviations: AFP, alpha fetoprotein; BMI, body mass index; CA, Carbohydrate Antigen; CEA, Carcinoembryonic Acid; CI, confidence interval; ECC, extrahepatic cholangiocarcinoma; ICC, intrahepatic cholangiocarcinoma.
[a] Total sample size (N=255).
[b] Bolded values are significant to $P < .05$.

Table 4. Predictors of One-Year Survival in the Cholangiocarcinoma Cohort[a,b]		
Characteristic	**Crude Odds Ratio (95% CI)**	**Adjusted Odds Ratio (95% CI)**
Age 60 years or older	0.74 (0.37-1.52)	0.75 (0.30-1.88)
Male	**2.57 (1.39-4.74)**	**3.27 (1.42-7.51)**
Pacific Islander	1.63 (0.65-4.13)	
BMI above 30	1.44 (0.59-3.55)	
Smoking	1.31 (0.72-2.39)	
Alcohol history	1.78 (0.88-3.60)	
Diabetes mellitus	1.06 (0.53-2.14)	
Hypertension	**0.53 (0.28-0.99)**	**0.38 (1.57-0.91)**
Hyperlipidemia	1.05 (0.50-2.20)	
Presence of a second cancer	0.90 (0.41-1.96)	
Hepatitis B surface Ag positive	0.66 (0.27-1.65)	
Hepatitis B core Ab positive	0.45 (0.20-1.00)	0.44 (0.19-1.03)
Hepatitis C positive	3.76 (0.47-29.9)	
Elevated CA 19-9	0.86 (0.40-1.84)	
CA 19-9 >1000 units/mL	0.73 (0.36-1.51)	
Elevated CEA	1.40 (0.66-2.95)	
Tumor size >5 cm	0.98 (0.49-1.97)	
Single tumor	0.31 (0.04-2.50)	
ICC (vs ECC)	1.04 (0.57-1.90)	
Surgical resection	1.51 (0.76-3.01)	

Abbreviations: AFP, alpha fetoprotein; BMI, body mass index; CA, Carbohydrate Antigen; CEA, Carcinoembryonic Acid; CI, confidence interval; ECC, extrahepatic cholangiocarcinoma; ICC, intrahepatic cholangiocarcinoma.
aTotal sample size (N=255).
bBolded values are significant to $P < .05$.

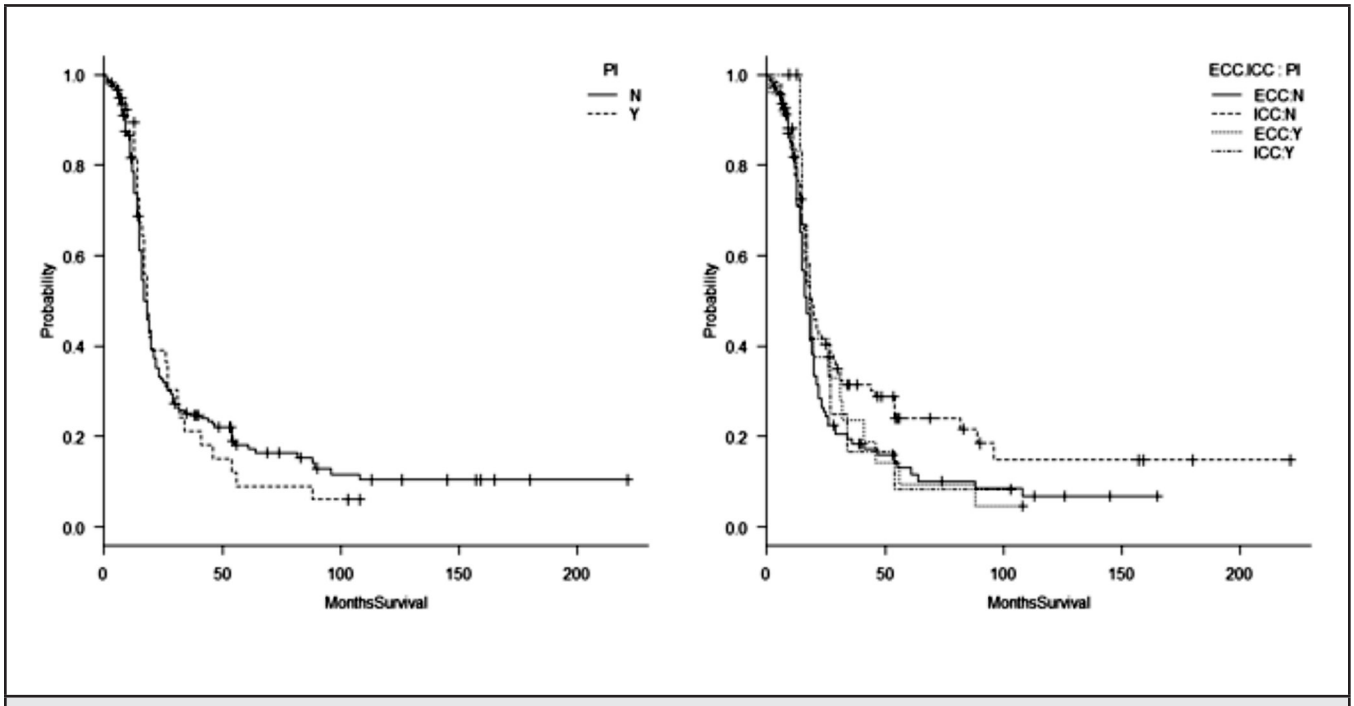

Figure 1. Kaplan-Meier Survival Comparing Pacific Islanders and Asians

Abbreviations: ECC, extrahepatic cholangiocarcinoma; ICC, intrahepatic cholangiocarcinoma; PI, Pacific Islander.

Discussion

In this study, the team determined PIs to have a slightly different presentation compared to Asians, but this did not prevent them from the opportunity for surgical resection. Though the "Asian Pacific Islander" group is documented to have a generally lower cancer incidence relative to whites, the consistent aggregation of Asians and PIs may be masking the disparities between these 2 populations.[16] The unique ethnic makeup in Hawai'i, with an Asian population of 38% and Pacific Islander population of 10%, and the high incidence of CCA in Asians suggests the utility of the comparison between Asians and PIs in this study.[10] Prior studies have demonstrated that PIs have disparities in risk factors for all cancers, including a higher prevalence of obesity, smoking, alcohol use, diabetes mellitus, and cholesterol intake compared to Asians.[15-18] These disparities, along with their underutilization of cancer prevention services, may contribute to PIs' higher incidence of cancer compared to Asians.[5,16]

Particularly in HCC, our team has previously reported that PIs presented with a significantly higher mean BMI, younger age, and significantly fewer liver transplantations compared to Asians.[12] Consistent with those risk factors, this study found PIs were significantly younger and more likely to be obese than Asians; however, this did not correlate to fewer curative surgeries in this CCA cohort.

Though well established as a risk factor for HCC, viral hepatitis has been considered in fewer studies as a strong risk factor for CCA and more so for ICC.[19-21] Our team has previously identified higher rates of HCV in the PI population compared to Asians in an HCC population.[12,22] The present study did not find HBV or HCV to be higher in PIs in this CCA population. Over a third of PIs were positive for HBV core antibody—a prevalence non-significantly higher than Asians. The small sample size, especially of PIs with ICC, may be contributing to these findings. It is possible that younger PIs were more likely to have been vaccinated for HBV than older PIs, and patients with only partial PI ethnicity may have had less vertical transmission.

Our cohort also demonstrated that both Asians and PIs had more ECC than ICC. The ratios of ECC:ICC of Asians in this CCA cohort closely correlated with recently reported incidence ratios in East Asia, which was close to 1:1. Florio et al analyzed the global trends of ECC and ICC incidence from 1993 to 2012 and demonstrated the ECC:ICC ratios of the US, China, Japan, and South Korea to be 0.79:1, 0.9:1, 0.9:1, and 0.79:1, respectively.[3]

PIs also presented with more advanced CCA at diagnosis. PIs with ECC were more likely to have larger tumors, and PIs with ICC had more multifocal disease. Despite this, PIs were just as likely to receive definitive surgical resection. On the multivariate analysis, multifocality, ICC, and elevated tumor markers were predictive of not receiving surgical resection. Other studies have shown large tumors were associated with worse survival outcomes after surgical resection, as they have been associated with higher positive tumor resection margins and poor differentiation.[23] Multifocality is also associated with higher recurrence rates and shorter overall survival after curative-intent surgical treatment of ICC.[24,25] Previous studies by our group have shown a more advanced presentation of HCC in PIs, which affected candidacy for transplant and ultimately their survival.[12]

Regardless of their more advanced presentation of CCA at diagnosis, PIs demonstrated comparable surgical resection as well as 5-year survival outcomes compared to Asians. Early survival was better in men and worse in patients with hypertension; PI ethnicity did not affect early survival. It is unclear why men had better early survival in our study, but there were no sex differences in overall survival. Other studies have suggested that women, younger age, nonsmoking status, and ECC were associated with better prognosis.[26-28] Many studies found that the outcome in ECC is mostly dependent on treatment, with surgical resection offering the best chance of long-term survival, but this study did not find surgical resection to be predictive of early survival.[29-33]

This study is limited in that it is a single-center study with relatively small sample size. This study also spans nearly 3 decades, and data from the earliest cases were not complete, especially concerning the tumor markers and survival information. In addition, treatment has likely improved and changed over time. Greater awareness of hepatobiliary cancers and development of expertise may have allowed for an earlier referral to this tertiary center allowing for more surgical treatment in the more recent years.

Despite these limitations, this is likely one of the largest studies of this rare cancer in this particular ethnic group. PIs represent the fastest-growing ethnic group—increasing in size 3 times faster than the rest of the US population.[5] This study assesses this understudied population whose CCA presentation has not previously been characterized. PIs have been previously documented to have a higher risk factor profile for CCA and have been grouped with Asians to represent the racial group with the highest CCA and HCC in the nation, but are rarely studied separately. The results of this study indicated that PIs with CCA presented at a younger age and had a higher prevalence of obesity, but they are just as likely to receive potentially curative surgery and survive as Asians. Larger studies in this population will be needed to develop more definitive conclusions and strategies to promote earlier detection of CCA. However, health care providers should consider CCA in the differential diagnosis of jaundice or a newly discovered liver mass and recognize that this may occur at a younger age in PIs.

Conflict of Interest

None of the authors identify any conflict of interest.

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