

## RESEARCH ARTICLE

# Viral Hepatitis and Liver Cancer on the Island of Guam

RL Haddock<sup>1\*</sup>, YC Paulino<sup>2</sup>, R Bordallo<sup>3</sup>

### Abstract

Patient records from the Guam Cancer Registry were compared with patients listed in a health department viral hepatitis case registry and the numbers of liver cancer and viral hepatitis cases were compared by ethnicity. Hepatitis C was the form of viral hepatitis most common among liver cancer cases on Guam (63.3% of viral hepatitis-associated liver cancer cases). Since viral hepatitis is an important cause of liver cancer, studies such as the present one may provide the information necessary to establish programs (screening of populations at risk and infant vaccination in the case of hepatitis B, for example) that may lessen the impact of liver cancer in the future.

**Keywords:** Guam - hepatitis - liver cancer - preventive vaccination

*Asian Pacific J Cancer Prev*, **14** (5), 3175-3176

### Introduction

Guam is the southernmost island of the Mariana Archipelago in the Western Pacific ocean. It is the largest (approximately 212 sq. miles), tallest (1,332 feet), and most populous (159,358 in 2010) island of Micronesia (Cox et al., 1926; Carano, 1968; Guam State Data Center, 2012). After the liberation of Guam from Japanese occupation in 1944, the island experienced a rapid increase of in-migration by Filipinos and Asians, principally as contract workers, Micronesians from neighbor islands seeking jobs and educational opportunities not available at home, and Caucasians as teachers or other government employees and in the military. Today the island is populated principally by indigenous Chamorros, including part-Chamorro (42.15%), Filipinos (26.31%), Micronesians other than Chamorros (7.17%), Caucasians (6.79%), Asians (6.20%), and Others (11.38%) (Guam State Data Center, 2012).

The Guam Cancer Registry was established by legislative authority in 1998 and today is operated by the University of Guam under a Memorandum of Agreement with the Guam Department of Public Health and Social Services (Haddock, 2013). A registry of viral hepatitis cases was created by reviewing communicable disease reports dating back to 1970. New cases are added to the registry from clinical or laboratory reports if they have not been previously listed. It is recognized that most such cases do not represent recent infections but may have been acquired at a much younger age when typically vague symptoms did not result in a clinical diagnosis

### Materials and Methods

Data from cancer and hepatitis registries were

combined to compare the prevalence of viral hepatitis and the incidence of liver cancer among the ethnic groups represented on Guam. The IBM SPSS software (Version 20) was used for statistical analyses. Descriptive statistics were performed to describe the age, gender, and ethnic characteristics of the hepatitis cases in this population. The Pearson's chi-square test was used to compare the observed and expected counts of hepatitis cases, as well as liver cancer cases across the ethnic groups. The groups identified were Asian, Chamorro, Filipino, Micronesian, and White. The Chamorros included those from Guam and the Commonwealth of the Northern Mariana Islands. The Micronesian group included Chuukese, Kosraean, Marshallese, Palauan, Pohnpeian, and Yapese. The Asian group included Chinese, Japanese, Korean, Vietnamese, and Other Asian.

### Results

The mean age of the 3,437 hepatitis cases on Guam from 1970 to 2012 was 40.7±16.7 years old (Table 1). There were slightly more males than females. Approximately one-third (34.7%) of the cases were Chamorros. The ethnicity for about one-fifth of the cases was identified as Other or Unknown (21.2%), and thus these cases were excluded from further analyses.

Based on the Pearson chi-square test, the difference in proportion of hepatitis cases among the ethnic groups studied was statistically significant,  $\chi^2=676.3$ ,  $df=8$ ,  $p=0.000$  (Table 2). The Chamorros had the most cases of hepatitis A (5.2%) and Hepatitis C (19.6%), whereas the Micronesians had the highest cases of Hepatitis B (23.4%). The difference in proportion of liver cancer cases among Guam ethnic groups was also statistically significant,  $\chi^2=22.3$ ,  $df=4$ ,  $p=0.000$ . Hepatitis C was the

<sup>1</sup>Guam Department of Public Health and Social Services and University of Guam, <sup>2</sup>Cancer Research Center of Guam, <sup>3</sup>Guam Cancer Registry, University of Guam, Guam, USA \*For correspondence: [robhad@yahoo.com](mailto:robhad@yahoo.com)

**Table 1. Characteristics of Total Reported Hepatitis Cases on Guam, 1970-2012**

		Mean (Standard Deviation) Or Frequency (%) (n=3437)
Age	Years	40.7 (16.7)
Sex	Male	1753 (51.0)
	Female	1640 (47.7)
	Unknown gender	44 (1.3)

  

Ethnicity	No. (%)	Incidence*		
		A	B	C
Chamorro	1193 (34.7)	8.1	91.3	51.2
Micronesian	633 (18.4)	3.7	397.6	10.4
Filipino	567 (16.5)	5.7	68.1	9.7
Asian	210 (6.1)	5.2	97.7	36
White	106 (3.1)	2.4	29.8	19.6
Other	34 (1.0)	0	4.1	0.5
Unknown	694 (20.2)	-	-	-

\*Average annual incidence per 100,000 population of hepatitis case registry accessions of known ethnicity for the period 2001-2012

**Table 2. Guam Hepatitis and Liver Cancer Cases of Known Ethnicity, 1970-2012**

	Ethnicity percent (number)				
	Hepatitis A	Hepatitis B	Hepatitis C	Total	Liver Cancer
Chamorro	5.20% (134)	18.00% (464)	19.60% (506)	42.80% (1104)	1.50% (40)
Micronesian	0.50% (12)	23.40% (604)	0.50% (14)	24.40% (630)	0.20% (6)
Filipino	1.80% (46)	16.70% (430)	2.60% (68)	21.10% (544)	0.20% (6)
Asian	0.70% (17)	6.50% (168)	0.90% (23)	8.10% (208)	0.00% (1)
White	1.00% (25)	1.20% (31)	1.40% (35)	3.50% (91)	0.00% (0)

\*Based on the Pearson chi-square test, the difference in proportion of hepatitis cases among the ethnic groups is statistically significant,  $\chi^2=676.3$ ,  $df=8$ ,  $p=0.000$ . The difference in proportion of liver cancer cases among the ethnic groups is statistically significant,  $\chi^2=22.3$ ,  $df=4$ ,  $p=0.000$

**Table 3. Liver Cancer Cases by Associated Type of Hepatitis Virus**

Hepatitis Type	Number	Proportion (%)
Hepatitis A	1	1
Hepatitis B	20	33.3
Hepatitis C	38	63.3
Hepatitis, type not reported	1	1

\*Includes cases excluded from Table 2 because ethnicity was unknown or insufficient for statistical analysis

type of hepatitis most common among liver cancer cases (63.3% of viral hepatitis-associated liver cancer cases) (Table 3).

## Discussion

Causes for the striking ethnic differences in the prevalence of hepatitis A, B, and C are not known and clarification awaits further study. Ethnic differences in risk factors such as household crowding, food preparation techniques, unprotected sex, intravenous drug use, and infant care practices may play important roles. In

addition, more than 20% of the hepatitis registry cases were excluded from ethnicity analyses because the ethnic group they represented was too small for analysis or the ethnicity was unknown. However, our data are in line with the published figures for liver cancer incidence and mortality, with highest numbers for Micronesians followed by Chamorro populations (Haddock et al., 2006; 2009). It should also be noted that rates may be rising (Moore et al., 2010).

Acute hepatitis A is now rare on Guam. A policy of requiring all food handlers working in eating and drinking establishments to attend a course on food sanitation initiated in 1975 is believed to have contributed to this improvement. The last known outbreak of hepatitis A occurred in 1972 when 311 cases were reported. The highest incidence that year was in a village which had experienced a major sewage system failure and construction of a new sewage system aborted the outbreak (Haddock, 2010).

It is anticipated that the prevalence of hepatitis B among Guam residents will gradually decrease in the coming years due to a policy initiated in 1988 of providing hepatitis B vaccine to all infants born on Guam. In addition, as a “catch-up” effort, vaccination was offered to all children up to 6 years of age who had not been previously vaccinated (Haddock, 2010). Reducing the prevalence of hepatitis C will be more problematic and control of this disease may be tied to promoting changes in sexual activity or IV drug abuse.

In conclusion, infections of viral hepatitis are an important cause of liver cancer. Studies such as the present one may provide the information necessary to establish targeted programs (infant vaccination in the case of hepatitis B, for example) that will lessen the impact of liver cancer in future generations.

## References

- Guam State Data Center, Bureau of Statistics and Plans, Government of Guam (2010). Census of Population and Housing, Demographic Program Summary File: 2010. Hagatna, Guam, November 2012.
- Carano P, Sanchez PC (1968). A Complete History of Guam. Rutland, Vermont and Tokyo, Japan: Charles E. Tuttle.
- Cox LM, Dorn EJ, McIntosh KC, et al (1926). The Island of Guam. Washington, D.C. Government Printing Office.
- Haddock RL (ed) (2010). A History of Health on Guam. 3rd edition Hagatna, Guam: Guam Football (Soccer) League.
- Haddock RL (2013). Shining light on cancer in the Pacific HJMPH, **72**, 107-8
- Haddock RL, Talon RJ, Whippy HJD (2006). Ethnic disparities in cancer mortality among residents of Guam. *Asian Pac J Cancer Prev*, **7**, 411-4.
- Haddock RL, Whippy HJD, Talon RJ, Montano MV (2009). Ethnic disparities in cancer incidence among residents of Guam. *Asian Pac J Cancer Prev*, **10**, 57-62.
- Moore MA, Baumann F, Foliaki S, et al (2010). Cancer epidemiology in the Pacific Islands - past, present and future. *Asian Pac J Cancer Prev*, **11** *Asian Epidemiology Suppl*, 99-106.