

PREVALENCE OF ANTIBODIES TO THE HEPATITIS C VIRUS AMONG ARAB AND CHALDEAN AMERICANS IN SOUTHEAST MICHIGAN, USA

Objective: The prevalence of antibodies to the hepatitis C virus (anti-HCV) in the United States is estimated to be 1.6%. There are no published studies on the prevalence of anti-HCV among the Arab/Chaldean American population in the United States.

Design: Retrospective review of data collected during an HCV public awareness program conducted by the Arab American and Chaldean Council. Inclusion criteria were that subjects had to be of Arab/Chaldean descent, born in an Arab country, and test positive or negative for anti-HCV using the "Home Access Hepatitis C Test."

Main Outcome Measures: The overall estimated prevalence of anti-bodies to HCV was 5.4% among Arab/Chaldean Americans residing in southeast Michigan.

Results: Four hundred and eighty four participants were tested for anti-HCV. The estimated prevalence among Chaldeans was 2% vs 5.9% among Arabs, which varied according to their country of origin. Anti-HCV positive results were more common in participants with a history of hepatitis (30.4%), jaundice (21.1%), blood transfusion (14.6%), treatment by non-sterile injection (13.6%), and tattoo/body piercing (10%). On binary logistic regression analysis, significant predictors for positive anti-HCV included history of hepatitis (OR: 19, 95% CI 2.58–139.93), blood transfusion (OR: 4.7, 95% CI 1.09–20.56), tattoo or body piercing (OR: 4.2, 95% CI 1.02–17.13).

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Conclusion: To our knowledge, this is the first study to report the estimated prevalence of anti-HCV and risk factors among the Arab and Chaldean Americans in the United States. The estimated prevalence of anti-bodies to HCV is 5.4% in this population, a rate that is more than triple the national average. Because of the relatively small sample size and limited geographic region, more studies are needed to evaluate the true prevalence of HCV antibodies in this and other ethnic minority population. (*Ethn Dis.* 2013;23[1]:18–21)

Key Words: Hepatitis C, Arab American, Chaldean American, Ethnicity, Risk Factors

We attempted to estimate the prevalence of anti-HCV among the Arab/Chaldean American population residing in southeast Michigan (SE MI).

INTRODUCTION

The prevalence of antibodies to the hepatitis C virus (anti-HCV) in the United States is approximately 1.6% (equating to about 4.1 million anti-HCV positive persons).¹ The prevalence of positive HCV RNA is approximately 1.3% (or about 3.2 million persons who are HCV RNA-positive).¹ Survival is decreased in patients with HCV, especially in those who have developed cirrhosis. In 2007, the age-adjusted mortality rate among patients with HCV in the United States was higher than that seen for HIV (4.6 deaths per 100,000 persons per year vs 4.2 deaths per 100,000 persons per year, respectively). In addition, 73% of the deaths were in patients between the ages of 45 and 65 years.²

In 1999, the World Health Organization (WHO) estimated that 170 million individuals were chronically infected with HCV worldwide,³ with at least 21.3 million HCV carriers in the eastern Mediterranean countries, which is close to the number of carriers estimated in the Americas (13.1 million) and Europe (8.9 million) combined. Indeed, one of the highest rates of prevalence of HCV infection

(14.7%) has been reported from Egypt.⁴ Data suggest that parenteral anti-schistosomiasis therapy played a major role in the spread of HCV throughout Egypt.⁵ Countries in the Middle East may have some additional risk factors for HCV transmission, such as reusing needles for medical therapy and shaving at community barbers that may increase their risk.⁶

Given that minorities in general have less access to health care,⁷ the additional risk factors for HCV in the Chaldean/Arab American community and the serious consequences of HCV, we attempted to estimate the prevalence of anti-HCV among the Arab/Chaldean American population residing in southeast Michigan (SE MI).

METHODS

A retrospective review of data collected from an Arab/Chaldean American population in SE MI during an HCV public awareness and education program was conducted by the Arab American and Chaldean Council (ACC), a non-profit organization, between 2005 and 2007. Chaldeans are Catholic Christians of Assyrian/Aramaic

Table 1. Demographic characteristics of participants and estimated prevalence of anti-HCV

Variable	Characteristics	n	Estimated Prevalence of Anti-HCV
All participants		484	5.4
Sex	Male	244	4.9
	Female	240	5.8
Ethnicity	Arab American	434	5.8
	Chaldean American	50	1.0
Age group	<40 years of age	168	4.2
	40-59 years of age	266	6.0
	60+ years of age	50	6.0
Education	≤ 12 y	306	5.9
	> 12 y	168	4.8
Occupation	Unemployed	263	5.7
	Employed	221	5.0
Health insurance	Medical insurance	243	3.7
	Uninsured	235	7.2
Years in US	<7 years	192	7.3
	≥7 years	265	4.5
Annual income	< 15K	148	6.1
	> 15K	293	4.8

There were no significant differences between the subgroup variables and those who were anti-HCV positive or negative.

descent. All the Chaldeans included in the study were originally from Iraq.

The HCV public awareness and educational program was announced in the local newspapers, on radio and television stations, at community events, and in places of worship in the community. In addition, flyers were distributed to local community markets. Study participants either contacted the ACC public health division staff, or volunteered during an outreach effort by the ACC staff. Participants were given an information sheet, filled out a questionnaire, and signed a consent form, which were all available in Arabic and English. They then underwent testing for anti-HCV using the "Home Access Hepatitis C Test," which is FDA-approved. The test has a > 99% accuracy rate, compared to a blood sample drawn by medical professional and tested using current test methods. Participant received \$10 gift certificate for their participation.

Inclusion criteria for this retrospective study were: of Arab/Chaldean descent, born in an Arab country, and

test either positive or negative for anti-HCV. Three subjects with an "indeterminate result" were retested. One retested positive and the other 2 negative. This study was approved by the Human Investigation Committee at Wayne State University.

RESULTS

A total of 492 participants, from 16 different zip code areas, were tested for anti-HCV. Eight participants who were born in the United States were excluded from further analysis. Of 484 participants, 26 patients (5.4%) tested positive for anti-HCV, with at least one participant from each zip code area except for one. Demographic characteristics of the 484 participants and estimated prevalence rates of anti-HCV among different demographic variables are shown in Table 1. Among the 26 participants who tested positive for anti-HCV, the majority were female (54%), between 40-59 years of age (60%), married (88%), had a high school education or

Table 2. Estimated prevalence of anti-HCV according to country of origin

Country of Origin	n	Anti-HCV Positive, n (%)
Eritrea	2	1 (50%)
Jordan	11	2 (18.2%)
Tunisia	6	1 (16.7%)
Egypt	121	12 (10%)
Yemen	90	6 (6.7%)
Lebanon	99	3 (3%)
Iraq	136	1 (.7%)
Syria	4	0 (0%)
Other	15	0 (0%)

less (68%), unemployed at the time of the study (56%), and had no health insurance (65%). Of these 26 participants, 39% had a household income <\$15,000 and 4% were retired.

The majority of participants positive for anti-HCV were Arab (96%) with only one Chaldean. Of the positive participants, the majority ($n=12$, 46%) were from Egypt, as expected. Six (23%) were from Yemen. Our sample size is too small to extrapolate overall prevalence among different Arab ethnic communities; the estimated prevalence of anti-HCV according to country of origin is shown in Table 2.

Estimated prevalence of anti-HCV among participants with risk factors for HCV is shown in Table 3, with the highest estimated prevalence among those with a history of hepatitis. Of the 10 risk factors for anti-HCV examined, six were statistically significant according to a chi square test. (Table 3).

In regard to risk factors among participants who tested positive for anti-HCV, 6.4% had history of intravenous drug injection, 3.8% admitted to risky sexual behavior, 54% had shared personal hygiene products, 24% had received a blood transfusion, 13% have received an injection by a non-sterile needle, and 14% have had some form of surgical operation. Of the 6 participants with a history of blood transfusion, 4 had the transfusion prior to 1992; the remaining 2 had a transfusion in 2004 and 2006. Six participants (24%)

Table 3. Estimated prevalence of anti-HCV among participants with certain risk factors

Risk Factors	Participants with Risk Factor (n)	Estimated Prevalence of Anti-HCV (%)	P
Blood transfusion	41	14.6	.02
Hepatitis	23	30.4	.001
Jaundice	19	21.1	.01
Intravenous drug injection	267	6.7	n.s
Treatment by non-sterile injections	22	13.6	n.s
Pricked by a needle or shared needles	331	4.2	.04
Tattoos or body piercing	110	10	.02
Have shared personal hygiene products	303	4.3	n.s
Surgical operation	33	9.1	n.s.
Risky sexual behavior	1	100	.05

recalled having hepatitis, and 3 participants were previously told they had hepatitis C. Four participants recalled having jaundice. Using binary logistic regression analysis, history of hepatitis, blood transfusion, and tattoo or body piercing were predictors of positive anti-HCV (Table 4).

DISCUSSION

To our knowledge, this is the first study to examine the estimated prevalence of anti-HCV among the Arab and Chaldean Americans in the United States. We found an estimated anti-HCV prevalence of 5.4% among this community in SE MI. While this rate is more than triple the national average, it must be cautioned that this is an exploratory and preliminary finding at best.

The 2000 U.S. Census reported 1,189,731 Americans who list Arab as one of their top two ancestries.⁸ This number is now likely higher since the overall growth of the United States and

the fact that many may not list their ancestry for several reason. It is estimated that there are 3 to 5 million Arab Americans residing in the United States today.⁹⁻¹¹ With an estimated prevalence of 5.4%, we project an estimated 162,000 to 270,000 Arab Americans who are anti-HCV positive. With the estimated persons positive for anti-HCV being 4,060,000,¹ up to 6% or more may be in this relatively small population of Arab Americans who have not been studied.

Today, Arab Americans, like many minority groups, are geographically concentrated. Over two thirds live in 10 states; one third in California, New York, and Michigan,^{9,10} and about 94% live in metropolitan areas.¹¹ Ten US cities, but primarily Detroit, New York and Los Angeles, are considered home for 36% Arab Americans.¹⁰ An estimated 350,000 Arab and Chaldean Americans live in SE MI, the largest community outside of the Middle East.¹⁰

Prevalence of hepatitis C in Arab countries varies and is reported to be 14.7% in Egypt.⁴ During 2006-2007, the National Blood Transfusion Center in Baghdad, Iraq reported the hepatitis C was found among .3% of its donors¹² and 7.1% of its hemodialysis patients.¹³ In Tunisia, the prevalence is reported to be between .4%-7%.^{14,15} In Yemen, the prevalence of anti-HCV is 1.7% among healthy volunteers.¹⁶ In Jordan, the prevalence of HCV among the general population varies from .65% to 6.25% depending on the sub-population studied.¹⁷ In Lebanon, anti-HCV rates were reported to be .6% among blood donors,¹⁸ and, in Syria, the anti-HCV rates among blood donors was reported to be .95%.¹⁹

Strengths and Limitations of the Study

To our knowledge, this is the first study to examine the estimated prevalence of anti-HCV and risk factors in the Arab/Chaldean American community. Limitations include small sample size, possible selection bias since participants volunteered to be tested, and all participants were from only one geographic location (SE MI).

CONCLUSION

Minorities in general have less access to health care and well-regarded research suggests that 83,000 deaths each year in the United States are attributable to racial and ethnic health disparities.⁷ In addition, in such minority communities,

We found an estimated anti-HCV prevalence of 5.4% among this community in southeast Michigan.

Table 4. Predictors of positive anti-HCV among participants studied in Southeast MI

Risk Factor	P	OR	95% CI
Hepatitis	.004	19.0	2.58-139.93
Blood transfusion	.038	4.7	1.09-20.56
Tattoo and/or body piercing	.047	4.2	1.02-17.13
Jaundice	.314	.304	0.03-3.069
Pricked by a needle or shared needles	.201	2.335	.673-8.56
Risky sexual behaviors	.999	.000	.000

Adjusted for age, sex, marital status, education, ethnicity, occupation, annual income, and health insurance. Binary logistic regression analysis used.

diseases such as HCV and others, that maybe sexually transmitted, bear a stigma. Thus, patients may be less likely to seek a diagnosis or treatment. In some cases, primary care physicians may be less likely to test for HCV in these individuals because they may think cultural norms would suggest a lower prevalence of this disease. Further studies are needed to better address these communities' needs and increase awareness about HCV in this community.

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REFERENCES

1. Armstrong GL, Wasley A, Simard EP, McQuillan GM, Kuhnert WL, Alter MJ. The prevalence of hepatitis C virus infection in the United States, 1999 through 2002. *Ann Intern Med.* 2006;144(10):705-714.
2. Ly KN, Xing J, Kleven RM, Jiles RB, Ward JW, Hohnberg SD. The increasing burden of mortality from viral hepatitis in the United States between 1999 and 2007. *Ann Intern Med.* 2012;156(4):271-278.
3. World Health Organization Hepatitis C: global prevalence (update). *Weekly Epidemiological Record.* 1999;425-427.
4. El-Zanaty FaW. *Egypt Demographic and Health Survey 2008.* Cairo, Egypt: Ministry of Health, El-Zanaty and Associates and Macro International. 2009.
5. Frank C, Mollamed MK, Strickland GT, et al. The role of parenteral antischistosomal therapy in the spread of hepatitis C virus in Egypt. *Lancet.* 2000;355(9207):887-891.
6. el-Sadawy M, Ragab H, el-Toukhy H, et al. Hepatitis C virus infection at Sharkia Governorate, Egypt: seroprevalence and associated risk factors. *J Egypt Soc Parasitol.* 2004;34 (1 Suppl):367-384.
7. Graham G. *Ensuring that Health Care Reform Will Meet the Health Care Needs of Minority Communities and Eliminate Health Disparities. A Statement of Principles and Recommendations.* Washington, DC: U.S. Department of Health and Human Services Advisory Committee on Minority Health (ACMH). 2009. minorityhealth.hhs.gov/Assets/pdf/Checked/1/ACMH_HealthCareAccessReport.pdf. Accessed Oct. 4, 2012.
8. *We the People of Arab Ancestry in the United States.* Census 2000 Special Reports U.S. Department of Commerce: Economics and Statistics Administration, U.S. Census Bureau 2005. <http://www.census.gov/prod/2005pubs/censr-21.pdf>. Accessed Oct. 4, 2012.
9. Ehrlich HJ. *Factsheet 5: Arab Americans.* prejudiceminstitute.org/Factsheets5-ArabAmericans.html. Accessed Jan 9, 2011.
10. El-Badry S. *Arab American Demographics.* allied-media.com/Arab-American/Arab%20american%20Demographics.html. Accessed Jan 9, 2011.
11. *Arab American Institute: Demographics.* Arab American Institute Demographics aaiusa.org/pages/demographics Accessed Aug 13, 2011.
12. Ataallah TM, Hanan KA, Maysoun KS, Sadoon AA. Prevalence of hepatitis B and C among blood donors attending the National Blood Transfusion Center in Baghdad, Iraq from 2006-2009. *Saudi Med J.* 2011;32(10): 1046-1050.
13. Khatatib OS. Prevalence and risk factors for hepatitis C virus infection in hemodialysis patients in an Iraqi renal transplant center. *Saudi J Kidney Dis Transpl.* 2008;19(1): 110-115.
14. Triki H, Ben Salah A, Arrouji A, et al. Seroepidemiology of hepatitis B, C and delta viruses in Tunisia. *Trans R Soc Trop Med Hyg.* 1997;91(1):11-14.
15. Gorgi Y, Yalaoui S, Ben Nejma HI, et al. Detection of hepatitis C virus in the general population of Tunisia. *Bull Soc Pathol Exot.* 1998;91(2):177.
16. Bajubair MA, Elrub AA, Bather G. Hepatic viral infections in Yemen between 2000-2005. *Saudi Med J.* 2008;29(6):871-874.
17. Quadan A. Prevalence of anti hepatitis C virus among the hospital populations in Jordan. *New Microbiol.* 2002;25(3):269-273.
18. Irani-Hakime N, Tamim H, Samaha H, Alnawi WY. Prevalence of antibodies against hepatitis C virus among blood donors in Lebanon, 1997-2000. *Clin Lab Haematol.* 2001;23(5):317-23.
19. Othman BM, Monem FS. Prevalence of hepatitis C virus antibodies among intravenous drug abusers and prostitutes in Damascus, Syria. *Saudi Med J.* 2002;23(4):393-395.

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