Journal of Medical Virology 87:1697–1701 (2015)

Prevalence of Hepatitis C Antibodies in the Population Aged 16–80 Years in the Community of Madrid 2008–2009

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Together with AIDS, the burden of hepatitis C virus (HCV) in Spain heads the list of communicable diseases in terms of impact on public health. The aim of this study was to estimate the prevalence of HCV antibodies in the Community of Madrid, assess changes in recent years and analyse associated risk factors. Descriptive cross-sectional study of a target population consisting of Community of Madrid residents aged 16–80 years old. Two-stage cluster sampling was performed, with stratification by socioeconomic status and percentage immigrant population. The sampling frame consisted of public blood extraction centers attached to the Madrid Health Service. Seroprevalence of HCV antibodies, prevalence ratios by age groups in comparison with 1999 survey data and prevalence association with risk factors were assessed using a logistic regression model. Prevalence of HCV antibodies for the age group 16–80 years was 1.8% (95% CI: 1.3–2.5). The age group with the highest prevalence was 41–60 years. In comparison with the 1999 survey, prevalence fell for the age groups 21–30 and 31–40 years and increased for the age group 41–60. Statistically significant associations were found for age, education, history of hepatitis C and consultation regarding liver problems. Seroprevalence of HCV antibodies in the Community of Madrid is similar to that shown in other regions of Spain. It is increasing in older age groups as the population at risk ages. Incidence of hepatitis C may be decreasing considering the decrease in the seroprevalence in the population younger than 40 related to the previous serosurvey. ***J. Med. Virol. 87:1697–1701, 2015***. © 2015 Wiley Periodicals, Inc.

KEY WORDS: Hepatitis C; Seroprevalence; Epidemiology; Serosurvey

INTRODUCTION

The hepatitis C virus (HCV) is mainly transmitted through parenteral or percutaneous exposure to infected blood. The main risk factors, therefore, are blood transfusions from untested donors, injection drug use, therapeutic injections and other healthcare procedures and the use of contaminated sharp objects. The distribution of these risk factors varies between countries. In developed countries, risk has decreased in line with the elimination of transfusion-transmitted hepatitis and the reduction in injection drug use. In Spain, the most frequent risk factor for patients diagnosed with acute HCV infection is currently reported to be hospital treatment, which would point to healthcare-associated HCV infection. Apparent sexual transmission of HCV has recently been reported among HIV-infected men who have sex with men in multiple European cities and New York City. Common practices associated with these clusters of infection include serosorting, group sex, and the use of cocaine and other nonintravenous drugs during sex.

The burden of HCV in Spain in terms of long-term morbidity and mortality is such that, together with AIDS, it heads the list of communicable diseases. Spanish HCV antibody prevalence, based on surveys performed in the 1990s, ranges between 1% and 2.6%.

In the Community of Madrid, serosurveillance periodical surveys are conducted under the auspices

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Accepted 23 March 2015

DOI 10.1002/jmv.24219
Published online 18 May 2015 in Wiley Online Library (wileyonlinelibrary.com).

of the epidemiological surveillance network, following the same methodology.

The aim of this study was to estimate the prevalence of HCV antibodies in the Community of Madrid, assess changes in recent years and analyse associated risk factors.

METHODS

Cross-sectional observational study of a target population consisting of residents aged 16–80 years in the Community of Madrid. Two-stage cluster sampling was performed, with stratification of the first-stage elements. The sampling frame consisted of public blood extraction centers attached to the Madrid Health Service, whose target population includes individual or grouped basic health areas. Stratification was by socioeconomic status and percentage of immigrant population. Extraction centers in each stratum were selected in proportion to size. Patients who attended extraction centers between January and June 2008 (first phase) and between October and December 2009 (second phase) were selected. In order to complete the sample quota it was sometimes necessary to recruit patients via the medical card register. Excluded were patients with any disease or condition that could interfere with their immune response.

Eligible individuals were those having blood tests requested by their family doctor at public primary care blood extraction centers. People waiting to have samples of their blood taken were invited to participate in the survey by interviewers, and were requested to answer a face-to-face interview. They were informed that some of the blood drawn for other purposes would be tested for antibodies against infectious diseases in vaccination schedules, and would be anonymously tested for other infections of public health relevance.

Data were collected in the form of the following variables: age, sex, country of origin, education, hepatitis history, socioeconomic status, cohabitation in the last 5 years with a person with hepatitis, and exposure to bloodborne transmission risk (via blood transfusions, haemophilia, dialysis, acupuncture or a previous diagnostic or therapeutic invasive procedure). Socioeconomic status was assigned according to occupation using the Spanish Society of Epidemiology classification, for categories ranging between I (unskilled workers) and V (liberal professionals).

Serum samples were tested for the presence of specific immunoglobulin G (IgG) antibodies to HCV by the regional public health laboratory of the Community of Madrid.

Third-generation ELISA (ORTHO® HCV 3.0 ELISA test system with enhanced SAVe; Raritan, New Jersey), which uses a combination of recombinant virus antigens (c22-3, c200, and NS5), was used to identify the antibodies. All tests were performed following the manufacturer's recommendations. Samples that initially tested positive were tested a second time to confirm the result.

The response rate and the most frequent reasons for non-response were described. Sample representativeness was evaluated by comparing the distribution for education and socioeconomic status with those in the Population and Housing Census for 2001 (10) and the Risk Factor Surveillance System for Non-communicable Diseases (SIVFRENT-A) for 2010 (11).

Seroprevalence was calculated according to sociodemographic characteristics. Differences between age groups have been estimated by means of prevalence ratios, using the age group 21–30 years as a reference. Results were compared with those obtained in the 1999 survey for the age groups 21–60 years (the groups analyzed in both surveys). Possible risk factors associated with the seroprevalence of HCV antibodies were analysed using multiple logistic regression, with risks adjusted in a model that included variables that showed a value of $p<=0.10$ in the bivariate analysis. Age, education and socioeconomic status were coded as ordinal variables (five categories for age and four categories each for education and socioeconomic status). Sex and country of origin were treated as dichotomous variables. The odds ratios (OR) was obtained for each of the factors adjusted for the other variables.

Taking into account the type of sampling, all estimates were made for 95% confidence intervals and were corrected for the design effect. Analyses were performed using the statistical program STATA 11.0. The study was approved by an ethical committee of clinical research.

RESULTS

The final sample consisted of 3,598 individuals, 48 of whom were found to be positive for antibodies to HCV. Prevalence of HCV antibodies for the age group 16–80 years was 1.8% (95% CI: 1.3–2.5). A value of $p > 0.10$ was found in relation to country of origin, socioeconomic status, or cohabitation with a person with hepatitis.

Almost half of those positive (45.8%) had been exposed to bloodborne transmission risk, having either received a transfusion (27.0%) or undergone a diagnostic or therapeutic invasive procedure (6.2%), or having got a tattoo or a piercing (16,6%).

Prevalence in the age group 16–20 years was 0%. The age group with the highest prevalence was 41–60 years. In comparison with the 1999 survey, prevalence fell for the age groups 16–20, 21–30 and 31–40 years and increased for the age group 41–60 years (Fig. 1 and Table I), although the differences were not statistically significant.

The multivariate analysis included age group, sex, bloodborne transmission, reason for consultation, education, and history of hepatitis C. Statistically significant associations were maintained for age group, education, history of hepatitis C and

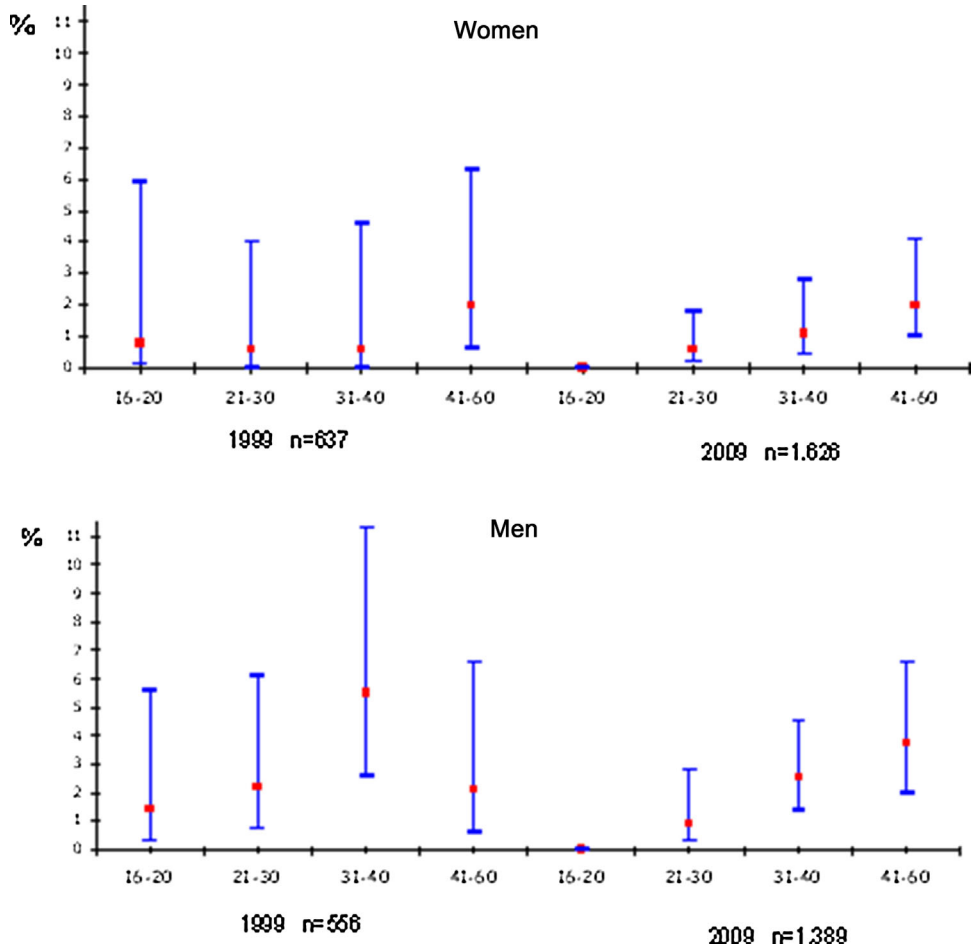

Fig. 1. Seroprevalence of hepatitis C virus antibodies by age and sex. Community of Madrid 1999 and 2008–2009.

consultation regarding liver problems (Table II). 64.4% of seropositive subjects declared no history of hepatitis C.

The response rate was 69%. Reasons for non-response were lack of interest (57%), lack of time (21%), fear of extraction (11%), amount of blood (7%) and a sensation of weakness (4%). No significant differences were detected in distributions regarding education and socioeconomic status in relation to either the Population and Housing Census or SIVFRENT-A.

DISCUSSION

Prevalence of HCV antibodies in the population aged 16–80 years in the Community of Madrid is

TABLE I. Seroprevalence of Hepatitis C Virus Antibodies. Comparison by Age Groups and With the 1999 Survey. Community of Madrid 2008–2009

	2008–2009 survey Each age group compared to the age group 21–30 years			1999 and 2008–2009 surveys Each age group for the 2008–2009 survey compared to the same age group for the 1999 survey		
Age (years)	Prevalence ratio	95% CI		Prevalence ratio 2009/1999	95% CI	—
21–30	1			0.57	0.16	2.01
31–40	0.43	0.16	1.12	0.57	0.25	1.33
41–60	3.92	1.59	9.67	1.42	0.58	3.47
61–80	1.86	0.65	5.34	—	—	—

The age group 16–20 years, with prevalence of 0% in the 2008–2009 survey, is excluded.

TABLE II. Seroprevalence of Hepatitis C Virus Antibodies and Adjusted Odds Ratio (OR) for the Variables of Interest. Community of Madrid 2008–2009

	n	%	95% CI		OR	95% CI	
Age (years)							
16–20	719	0.0	–	–	–	–	–
21–30	815	0.7	0.3	1.6	1.00	–	–
31–40	754	1.8	1.1	3.0	3.16	1.01	9.90
41–60	727	2.8	1.8	4.4	2.87	0.77	10.60
61–80	583	1.4	0.7	2.8	1.37	0.32	5.91
Sex							
Female	1924	1.2	0.8	2.0	1.00		
Male	1674	2.3	1.5	3.6	2.09	0.90	4.86
Education							
None-Primary	556	2.4	1.3	4.4	1.00		
Lower secondary	1174	2.4	1.4	4.2	0.60	0.26	1.42
Upper secondary	1005	1.0	0.5	2.6	0.26	0.09	0.76
University	817	1.5	0.8	2.7	0.14	0.04	0.45
History of hepatitis C							
No	3279	1.1	0.7	1.8	1.00		
Yes	26	64.3	44.9	79.9	202.03	68.04	599.88
Reason for consultation							
Others	3474	1.5	1.1	2.2	1.00		
Liver problems	100	10.3	4.7	21.1	4.39	1.29	14.92
Total	3598	1.8	1.3	2.5			

located at an intermediate level and is similar to population-level estimates for other parts of Spain. Prevalence rates in African and Asian countries are as high as 15–20%, with significant variations between countries and even between regions. The lowest rates are reported for the UK and the Nordic countries (0.01–0.1%); somewhat higher rates (around 2%) are reported for the USA, Japan, and southern European countries.

Regarding the overall trend in the Community of Madrid, and considering the results of the 1999 survey, no significant changes were detected over the decade in question, with estimated prevalence of 2% in 1999 and 1.8% in 2008–-2009 for the age ranges common to both surveys, that is, the population aged 16–60 years (8).

Seroprevalence varied with age. Compared to the previous survey, prevalence decreased for the age groups between 16–40 years and increased for the age group 41–60 years, although these differences were not statistically significant. Incidence of hepatitis C may be decreasing considering the decrease in the seroprevalence in the population younger than 40. The increase in older age groups is possibly due to the influence of injection drug users, as this cohort was aged 20–30 years at the height of injection drug use in Spain. Thus, this increase may be reflecting that the population at risk ages. Most heroin users nowadays do not inject heroin, although there is still a small subgroup that continues to inject despite the risks.

We found, in addition to age, education, history of hepatitis C and consultation regarding liver problems to be associated with seroprevalence of HCV antibodies. A low level of education is associated with a higher seroprevalence, as it has been described in other studies. Furthermore, a high percentage of seropositive subjects declared no history of hepatitis C, suggesting that the infection is underdiagnosed. Almost half of positive subjects had been exposed to bloodborne transmission risk. Testing for HCV antibodies has been available since 1989, and the screening of blood donations has been mandatory in Spain since October 1990. Transfusion-transmitted HCV infection is now considered to have been eradicated in Spain. However, the bloodborne transmission risk, as analysed in our survey, may refer to events before that date, or even in other countries (although no differences were found according to country of origin). As commented earlier, diagnostic or therapeutic invasive procedures represent a current challenge regarding control over HCV transmission in Spain. Suitable preventive measures include continuing education of healthcare professionals and the enforcement of other precautionary measures.

Limitations of this study include those related to the questionnaire used, as no data were collected on injection drug use or sexual behaviour. Moreover, the risks associated with healthcare practices were self-reported. No causal relationships could be established, given the descriptive and cross-sectional

nature of the study. Furthermore, it is not possible to diferentiate recent infection from chronic or past infection. The sampling frame is limited to population attending a public healthcare center. Besides, more than 30% of the target population did not agree to participate. Although this could introduce a selection bias, no significant differences were detected in distributions regarding education and socioeconomic status in relation to either the Population and Housing Census or SIVFRENT-A.

Epidemiological surveillance of HCV infection requires different approaches to be combined. Fundamental are regular serological surveys of representative samples of the population. Methods to diagnose acute cases would ensure more effective surveillance by collecting data on indicators of recent transmission.

In conclusion, seroprevalence of HCV antibodies in the Community of Madrid is similar to that shown in other regions of Spain. It is increasing in older age groups as the population at risk ages. Incidence of hepatitis C may be decreasing considering the decrease in the seroprevalence in the population younger than 40 related to the previous serosurvey.

ACKNOWLEDGMENTS

The authors acknowledge the field works of the healthcare professionals of the Madrid Health Service who carried out the blood extraction and conservation of samples. The authors also greatly appreciate the disposition of residents in Madrid who voluntarily donated a serum sample for the study and answered the questionaire.

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