Seroprevalence of measles and rubella virus antibodies in the population of the Community of Madrid, 2008—2009

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Summary   The seroprevalence (SP) of measles and rubella virus antibodies is presented by age groups obtained in the IV Serosurvey of the Region of Madrid (2008—2009). The target population is composed of residents with ages ranging between 2 and 60 years in the Region of Madrid. A two-stage cluster sample is used. The SP of measles virus antibodies is 97.8% (CI 95%: 97.3—98.2). The highest SP is observed in the 2—5 year and 41—60 year age groups. The point estimate does not reach 95% in the 16—20 and 21—30 year age groups. The SP of rubella virus antibodies is 97.2% (CI 95%: 96.5—97.7). The SP is over 95% in all of the age groups. In immigrant women between the ages of 16 and 49, the SP is 95.9% (CI 95%: 93.7—97.4). The identification of groups susceptible to the measles virus in young adults could lead to outbreaks as a result of importing the virus. The circulation of the rubella virus is possible among immigrant women aged between 16 and 49 years, which could lead to the appearance of SRC cases. Epidemiological surveillance will allow the impact on the measles and rubella elimination plan to be determined in the future.

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Introduction

Measles is the most contagious disease with the highest mortality in the world among other vaccine-preventable diseases [1]. Rubella can cause severe harm to a fetus when the virus infects a susceptible pregnant woman [2]. Both diseases meet the requirements for the elimination of a disease [3].

The WHO Region Committee for Europe has committed to eliminate measles and rubella and to prevent congenital rubella syndrome (CRS) by the year 2015 [4]. To meet this target, a high vaccination coverage (95% or more) needs to be reached and maintained with two vaccine doses for measles and at least one vaccine dose for rubella. Likewise, surveillance systems that allow for the detection, investigation and monitoring of all disease cases must be available [4,5]. The Community of Madrid (CM) has had high vaccination coverage for the MMR vaccine since 1984—1985. Measles has been an urgently notifiable disease since the start of the Measles Elimination Plan in the CM in 2001 [6] and rubella has been an urgently notifiable disease since 2012.

Serosurveillance surveys allow for the protection level of the population against these diseases to be evaluated and for any susceptible population groups to be detected that could require specific prevention measures. Four serosurveys have been carried out in the CM; all of them used similar methodologies [7—9]. In this study, the serosurveillance (SP) of measles and rubella virus antibodies is presented by age groups obtained in the IV Serosurvey (2008—2009), and the SP of measles is compared with the serosurveillance that was obtained in the previous survey. The possible association with socio-demographic factors is investigated.

Methods

This study is a transversal observational study. The target population is composed of residents with ages ranging between 2 and 60 years in the CM. A two-stage cluster sample is used, with stratification of the first stage units. The sample framework is shaped by the public health centers belonging to the Madrid Health Service, and the population attending the health service is distributed in basic health areas. The stratification was carried out according to the socio-economic condition and percentage of the immigrant population. The primary healthcare centers were selected in proportion to the size of each stratum. In the second stage, the patients who attended the primary health care centers between January and June 2008 and from October to December 2009 were selected until each sample sub-group size was reached. Each individual had a serum sample taken for analysis, and socio-demographic data were collected along with the immunization status through a questionnaire. Informed consent was obtained from all participants. The variables analyzed were: age, sex, place of origin, educational level, social class and documented vaccine status. The classification of social class proposed by the Sociedad Española de Epidemiología [10] (Spanish Epidemiology Society) was adopted. The serological samples were analyzed at the Regional Public Health Laboratory of the CM. The detection of specific IgG antibodies was carried out using indirect ELISA (Enzygnost® Anti-Measles-Virus/IgG y Enzygnost® Anti-Rubella-Virus/IgG; Siemens Healthcare Diagnostics; GmbH Marburg Germany) and using the Behring ELISA Processor III system. Both quantitative and qualitative IgG results were obtained in accordance with the manufacturer's recommendations.

The representativeness of the sample was evaluated by comparing the distribution of the education level and social class in the Census of Population and Housing (2001) [11] and with the population covered by the surveillance system of risk factors for non-transmittable diseases of the CM (SIVFRENT-A) [12]. The data were weighted by age group, sex and proportion of immigrant population.

The cut-off point from which a sample was considered to be seropositive was 150 mUI/ml for measles and 4 UI/ml for rubella. The possible association with socio-demographic factors was analyzed using logistical regression, including the age group variable and variables with $p < 0.10$ in the bivariate analysis. The prevalence ratio (PR) was used to compare the data obtained in the current survey with that from the previous serosurvey (1999—2000). The geometric mean (GM) of the antibody concentration was estimated by the age group and vaccine status. The seronegative subjects were assigned half of the cut-off point used (75 mUI/ml for measles and 2 UI/ml for rubella) as the GM in an arbitrary manner. The GM comparison was carried out using Student's t-test after logarithmic transformation. The analysis was performed using the STATA 11.0 program. The estimates are presented with a confidence interval (CI) of 95%. The study was approved by a clinical research ethical committee.

Results

Four-thousand three-hundred eighty subjects participated, with a total response rate of 77.0% and a