

Rates of Rubella Immunity Among Immigrant and Non-immigrant Pregnant Women

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Abstract

Objective: Elimination of congenital rubella syndrome depends not only on effective childhood immunization but also on the identification and immunization of susceptible women of childbearing age. Since many countries do not immunize against rubella, it is possible that some immigrant women may not be immune. Moreover, contemporary estimates of rubella immunity among Canadian-born mothers are lacking. Accordingly, we sought to compare the immunity status in pregnancy of a large number of immigrant and Canadian-born women in Toronto.

Methods: We examined data among 5783 consecutive pregnant women who gave birth at an inner city hospital in downtown Toronto between 2002 and 2007. Antenatal maternal rubella immunity status was recorded at the time of delivery, and assessed according to the mother's birthplace. Odds ratios (OR) for rubella immunity were adjusted for maternal age, gravidity and duration of residency in Canada.

Results: Relative to a rate of 93.2% among Canadian-born mothers, the adjusted risk of being rubella immune was lowest among women from Northern Africa and the Middle East (OR 0.54, 95% CI 0.31–0.94) and China and the South Pacific (OR 0.78, 95% CI 0.59–1.03).

Conclusion: Rates of rubella immunity are lower than desired among Canadian-born and, especially, new immigrant pregnant women. Under-immunized populations might be identified at the time of the immigration medical examination, while consideration should be given to screening for rubella immunity among all young Canadian women before puberty.

Résumé

Objectif : L'éradication de l'embryopathie rubéolique dépend non seulement d'une immunisation efficace pendant l'enfance, mais également de l'identification et de l'immunisation des femmes sensibles en âge de procréer. Puisque bon nombre de pays ne procèdent pas à l'immunisation contre la rubéole, il est possible

que certaines immigrantes ne soient pas immunisées. De surcroît, nous ne disposons pas d'estimations contemporaines quant à l'immunité contre la rubéole chez les mères nées au Canada. Par conséquent, nous avons cherché à comparer l'état immunitaire pendant la grossesse d'un grand nombre d'immigrantes et de Canadiennes de naissance à Toronto.

Méthodes : Nous avons examiné les données propres à 5 783 femmes enceintes consécutives ayant accouché au sein d'un hôpital du centre-ville de Toronto entre 2002 et 2007. L'état immunitaire prénatal de la mère quant à la rubéole a été consigné au moment de l'accouchement et évalué en fonction du lieu de naissance de la mère. L'effet de l'âge maternel, de la gravidité et de la durée de résidence au Canada a été neutralisé en ce qui concerne les rapports de cotes (RC) quant à l'immunité contre la rubéole.

Résultats : Par comparaison avec un taux de 93,2 % chez les mères nées au Canada, le risque corrigé d'être immunisée contre la rubéole atteignait son niveau le plus bas chez les femmes d'Afrique du Nord et du Moyen-Orient (RC, 0,54, IC à 95 %, 0,31–0,94), ainsi que chez les femmes de Chine et du Pacifique Sud (RC, 0,78, IC à 95 %, 0,59–1,03).

Conclusion : Les taux d'immunisation contre la rubéole sont plus faibles que ce qui serait souhaitable chez les Canadiennes de naissance et, particulièrement, chez les nouvelles immigrantes enceintes. Les populations sous-immunisées pourraient être identifiées au moment de l'examen médical d'immigration, tandis qu'une attention devrait être portée au dépistage avant la puberté de l'immunisation contre la rubéole chez toutes les jeunes Canadiennes.

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INTRODUCTION

A cute rubella infection manifests as a mild self-limiting condition in children and adults. While up to 50% of cases are asymptomatic, others manifest with fever, scarlatiniform rash, conjunctivitis, coryza, pharyngitis, and polyarthritides.¹ Importantly, maternal rubella infection prior to 16 weeks' gestation may result in the congenital rubella syndrome (CRS), characterized by congenital hearing loss, heart defects, cataracts, glaucoma, chorioretinitis, neuro-

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logic disorders, hepatosplenomegaly, intrauterine growth restriction, thrombocytopenia, and radiolucent bone disease. Affected infants are highly contagious in their first year, as they shed the virus through nasopharyngeal secretions.² Although a measles, mumps, and rubella (MMR) immunization program for all infants was introduced in Canada in April 1983,³ only 25% of the world's nations routinely vaccinate children against rubella.⁴ Prior to routine rubella vaccination among Canadian infants, the incidence rate of rubella infection was 109 per 100 000 persons. After routine vaccination, the rate of infection declined to 4 per 100 000 persons, and the incidence rate of CRS declined to 0.6 per 100 000 live births.⁵

Elimination of the CRS depends not only on effective childhood immunization but also on the identification and immunization of susceptible women of childbearing age.⁵ Despite current antenatal screening recommendations, there are no contemporary Canadian studies of rubella immunity among foreign-born or Canadian-born women living in Canada. Because Toronto has the largest number and greatest diversity of immigrants to Canada,⁶ we sought to compare the rubella immunity status in pregnancy of a large number of immigrant and Canadian-born women in that city.

METHODS

We conducted a retrospective cohort study of all women who delivered at St. Michael's Hospital, an inner city hospital in downtown Toronto, between 2002 and 2007, using the obstetrical database. As described elsewhere,⁷ as a routine part of each woman's care, maternal and obstetrical data are recorded on a standardized form, which is completed by her obstetrician and intrapartum nurse. Rubella immunity status is based on a woman's first trimester screening results, as recorded on her standard antenatal care forms or from the hospital laboratory database when the former is not available. Women who are not immune are vaccinated postpartum, prior to discharge from hospital.

The obstetrical database form also contains information about a woman's country of birth and her duration of residency in Canada. For each woman, her first delivery was considered, and her country of birth was categorized according to global regions defined by the Organisation for Economic Co-operation and Development,⁸ and described in the footnote of Table 1.

The prevalence of rubella immunity was determined for each global region of maternal birth, and the odds of immunity expressed as a crude odds ratio (OR) with 95% confidence intervals (CI), using Canadian-born women as the reference group. Adjusted odds ratios were calculated by logistic regression analysis, with current maternal age

(continuous in years), gravidity (1, 2, 3, etc.), and duration of residency in Canada (0–5 or > 5 years) included in the model, *a priori*. We compared the characteristics of rubella immune and non-immune individuals in a post hoc analysis restricted to Canadian-born women. For the latter, we used a non-paired *t* test for continuous data and a chi-square test for bivariate data.

All *P*-values were two-sided, and significance was set at a value of 0.05. Statistical analyses were performed using SAS Version 9 (SAS Institute Inc., Cary, NC).

Permission to conduct the study was obtained from the St. Michael's Hospital Research Ethics Board, and all patient identifiers were removed from the dataset prior to analysis.

RESULTS

Among 7368 individual patients, information about maternal country of birth and rubella immunity status was available for 5783 women (78%). Over 65% of the study participants were immigrants to Canada, of whom the largest number were born in China and the South Pacific (29%), followed by Latin America and the Caribbean (24%), South Asia (16%), and Sub-Saharan Africa (10%) (Table 1).

Approximately 93% of Canadian-born women were rubella immune. The lowest rates of rubella immunity were among those born in Northern Africa and the Middle East (87.1%) (adjusted OR 0.54; 95% CI 0.31–0.94) as well as China and the South Pacific (91.5%) (adjusted OR 0.78; 95% CI 0.59–1.03) (Table 2). In a post hoc analysis restricted to Canadian-born women, comparing rubella non-immune and immune women, the former tended to be younger (28.5 vs. 31.9 years), and current smokers (8.2% vs. 2.1%) (Table 3).

DISCUSSION

We found that pregnant women originating from Northern Africa and the Middle East, as well as China and the South Pacific, had the lowest rates of rubella immunity. Even among Canadian-born women the rate of immunity was only 93%. This is the first North American study of a diverse sample of women to determine the rate of rubella immunity in pregnancy, especially among immigrant women. While our sample may not be reflective of some birthing centres, the data are likely generalizable to immigrant populations in major cities like our own.⁶ Nonetheless, we did not record the rubella immunization status or country of birth of some participants, since these fields are optional within the obstetrical database. Also, for some regions, the sample comprised fewer than 250 women, which may affect the generalizability and precision of our estimates of rubella immunity.

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