Seroprevalence of rubella virus IgG in pregnant women in Harare, Zimbabwe

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Rubella is an infectious disease caused by a virus belonging to the family *Togaviridae*.[1] The virus is mainly transmitted from human to human by direct contact with infected bodily fluids or respiratory droplet secretions from infected people.[1] In pregnant women, primary infection with the virus may cause congenital rubella syndrome (CRS), often accompanied by miscarriage, stillbirth and/or birth defects in infants.[2,3] It is therefore strongly recommended by the World Health Organization that serological surveys on rubella virus infection in women of childbearing age be done.[4]

In Zimbabwe, no studies evaluating the seroprevalence of rubella virus in women of childbearing age have previously been conducted. Furthermore, there is no national public health policy on rubella screening or immunization in Zimbabwe. The objective of this study was to evaluate the seroprevalence of rubella virus IgG antibodies in pregnant women attending antenatal clinics in Harare, Zimbabwe.

The study protocol was reviewed and approved by the Joint Parirenyatwa Hospital and University of Zimbabwe's College of Health Sciences Research Committee (JREC ref: IRB 123). Pregnant women presenting at two antenatal clinics in Harare, Zimbabwe, were included in the study. The study sites were Rutsanana and Rujeko polyclinics that serve high-density areas of the Harare City.

A sample size of 51 women was recruited. After completion of informed consent, the women were interviewed using a questionnaire, and data on their demographic, socio-economic and obstetric variables were captured. Any pregnant woman resident in Harare, with an age between 18 and 50 years who consented to participate was included in the study.

An aliquot of venous blood was collected from each woman on site and transported on ice to the University of Zimbabwe, Department of Medical Microbiology, Laboratory for Immunological Assays. The sera were tested for rubella IgG antibodies using the anti-rubella virus IgG ELISA kit (Siemens, Germany) according to manufacturer's instructions. Results were read using the microwell reader at 450 nm. The kit had positive and negative controls which were run with the samples as part of quality control. Calculations of IgG results were done by software package KC4 and transferred to the Dade Behring Excel package that validated the assay by calculating lower and upper limits for the optometric densities. Data from the study were entered into an Excel spreadsheet and imported to the statistical package (STATA 11.0) for analysis.

Socio-demographic characteristics

Demographic data collected from the study subjects (n=51) showed that 25 (49.02%) women were married, 20 (39.22%) were single mothers, 5 (9.8%) were divorced and 1 (1.96%) was widowed. Of all the women, 10 (19.61%) had reached university or college education, 25 (49.02%) had attained 13 school years ('Advanced' level of education), 14 (27.45%) had

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attained 11 schools years ('O' level of education) and 2 (3.92%) had reached 9 school years (Zimbabwe Junior Certificate Level). On employment status, 15 (30%) of the women were working in the public service, 7 (14%) were self-employed, 2 (4%) were in the private service and 26 (52%) were unemployed. Concerning parity, 6 (11.76%) were nulliparous, 15 (29.41%) had one child, 20 (39.22%) had two children, 7 (13.73%) had three children, 2 (3.92%) had four children and 1 (1.96%) had five children. The mean age of participants was 30.9 years with a standard deviation of 6.8. The age range of the participants was 18-50 years. The mean gestational age at antenatal booking among the women was 15.9 weeks (range 2-36 weeks).

Rubella IgG seroprevalence

The consenting pregnant women who provided blood samples while attending antenatal care clinics presented with or had history of rash, fever, malaise and mild conjunctivitis before or after pregnancy. Out of 51 women studied, 47 (92%) were positive for rubella IgG antibodies and only 4 (8%) were seronegative (Table). There was no association between rubella IgG status and age (p=0.333). All women (100%) in the age-groups 16-20, 31-35 and over 40 years had detectable rubella antibodies (Figure). Women in the 21-25 and 26-30 age groups had detectable rubella antibodies in 90% and 80% of cases, respectively (Figure).

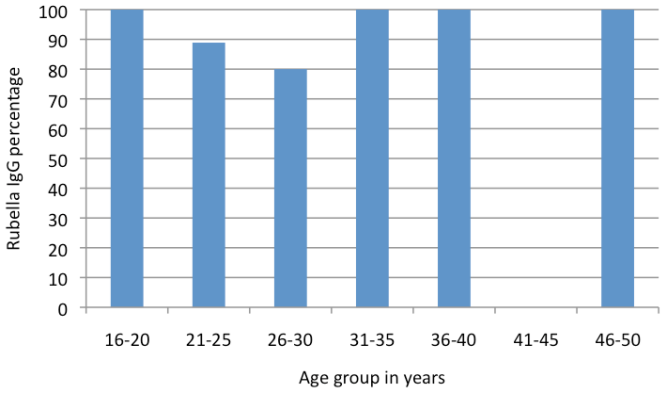


Figure. Seroprevalence of rubella IgG in pregnant women (n=51) according to age group

Table. Seropositivity of rubella IgG and mean age (years) in pregnant women

Rubella IgG status	Frequency	Mean age (standard deviation)	95% confidence interval
Negative	4	27.8 (2.6)	23.6-31.9
Positive	47	31.2 (7.0)	29.2-33.3
Combined	51	30.9 (6.8)	29.0-32.9

Despite a vaccine against rubella virus being available, most African countries do not include it into their national public health immunization programmes. The rubella virus is therefore circulating freely in many African regions. Data on the seroprevalence of the virus in most African populations is also very limited. Although the sample size was small, this was the first study to the best of our knowledge to investigate the seroprevalence of rubella virus-specific IgG in pregnant women in Zimbabwe.

The high prevalence of rubella IgG suggests that the virus is circulating in the Zimbabwean population and most of the women in this study acquired their immunity through natural infection as they were never vaccinated. The high prevalence of rubella IgG in this population is comparable with what has been found in other African countries. Studies of pregnant women showed high prevalence of rubella IgG in Burkina Faso (95.0%), western Sudan (65.3%), Tanzania (92.6%), Mozambique (95.3%), Ibadan (68.5%), and Lagos (76%).[5-10] These few studies demonstrate the high seroprevalence of rubella-specific IgG in Africa.

Rubella virus infection is known to be associated with about 80% risk of congenital abnormalities if it is initially acquired in the first 12 weeks of pregnancy.[11-13] In this study, it was of much concern that there were pregnant women without detectable rubella virus IgG antibodies. Such women could easily acquire rubella virus infection during pregnancy as they are not immune and could pass the virus to their unborn babies. There is a need to evaluate the prevalence of CRS in children in Zimbabwe.

The World Health Organization has recommended rubella vaccination to cater for the seronegative pregnant women and women of

childbearing age that may not be immune to the virus.[4] However, the high prevalence of rubella IgG antibodies found in the majority of women may confer a high rate of immune protection and may also be associated with low levels of child complications. The high rate of IgG rubella seropositivity in some age groups in Africa, however, raises a question related to the value of vaccination based on cost/effectiveness. Most people who are already immune due to natural rubella virus infection would not need vaccination. In most countries, there is therefore need to generate a good and accurate knowledge of the recent epidemiology of rubella epidemics.

Conclusion

The seroprevalence of rubella virus IgG in pregnant women in Zimbabwe was shown to be very high. This was in agreement with what has been found in other African countries where no rubella vaccinations are done. Vaccination is the only way of preventing or reducing the circulation of rubella virus in the Zimbabwean population.

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Authors' contributions statement

TSM and PN designed, supervised and carried out the study. NC and VR drafted the manuscript. All the authors contributed to writing and approving the final manuscript.

Conflicts of interest: All authors – none to declare.

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