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SEROPREVALENCE OF RUBELLA IGM ANTIBODIES AMONG PREGNANT WOMEN ATTENDING ANTE-NATAL CLINICS IN KADUNA METROPOLIS, KADUNA STATE, NIGERIA

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ABSTRACT

Rubella is an infection caused by the rubella virus; it can cause severe harm to the unborn child. The virus is transmitted through respiratory droplet or trans-placental infection of the fetus during pregnancy. Therefore, this study was aimed to determine the seroprevalence of IgM to rubella virus among pregnant women attending ante-natal clinics in Kaduna Metropolis, using a qualitative rubella IgM ELISA kit (Genesis Diagnotics Ltd, Cambridgeshire UK). Of the 400 pregnant women screened for IgM to rubella virus, 265 were seropositive giving seroprevalence of 66.3%. Seroprevalence of 55.9%, 81.9% and 60.9% were obtained among pregnant women attending Yusuf Dantsoho Memorial Hospital, Barau Dikko Specialist Hospital and Gwamna Awan General Hospital respectively, with high statistical significance ($P<0.05$). The seroprevalence of 72.8% and 33.3% were obtained among pregnant women in the age group of 26-30years and 41-45years respectively. In relation to trimester, seroprevalence of 70.0%, 64.2% and 70.0% were obtained among pregnant women in their first, second and third trimester respectively. This shows that rubella virus is endemic among pregnant women; therefore, there is need for rubella vaccination to reduce the burden of the disease.

KEYWORDS: Rubella Virus, Seroprevalence, Pregnant Women and IgM ELISA-Kit.

INTRODUCTION

Rubella is an infection caused by a single-stranded, enveloped RNA virus of the genus *Rubivirus*, belonging to the family *Togaviridae*. It is transmitted through respiratory droplet

or trans-placental infection of foetus during pregnancy.[1] The infection is generally mild in children and young adults with symptoms which include low-grade fever, malaise, lymphadenopathy, upper respiratory symptoms and maculopapular rash. Infected adult women develop athralgia and arthritis.[2] The public health concern on rubella is on its teratogenic effect in women, particularly when they become infected during the first eight weeks of pregnancy, she has a 90% chance of transmitting the virus on to her fetus. This can cause miscarriage, stillbirth or severe birth defects known as Congenital Rubella Syndrome (CRS).[3] Hearing impairment, eye and heart defects as well as other lifelong disabilities are associated with CRS surviving children, many of which require costly therapy, surgeries and other expensive care.[4] CRS is rare in developed countries as a result of proper and adequate vaccination programs. However, in many developing countries CRS is a major cause of developmental anomalies with roughly 100,000 cases estimated to occur every year worldwide. This makes rubella a leading cause of preventable congenital defects.[5]

No routine screening is carried out in Nigerian hospitals and despite the availability of rubella vaccines, no vaccines against this virus has been introduced in the country. This poses high health risks for the fetus and hence increases morbidity and mortality as a result of the infection. Therefore, the aim of this study was to determine the seroprevalence of IgM to rubella virus among pregnant women attending ante-natal clinics in Kaduna Metropolis.

MATERIALS AND METHODS

Ethical Approval: Ethical approval to undertake the study was obtained from the ethical committee of the State Ministry of Health.

Study Population

The study was carried out on pregnant women between the aged 15 and 45years attending Yusuf Dantsoho, Barau Dikko and Gwamna Awan ante-natal clinics in Kaduna Metropolis.

Questionnaire Administration

Structured questionnaires were administered to consenting pregnant women to obtain information on the age, trimester and educational background prior to sample collection.

Sample Collections: Three milliliters (3ml) of whole blood were collected through vein puncture and transfer into sterile plain bottles and the blood was allowed to clot. The blood was then centrifuged at 1500 rpm for 5 minutes to obtain the serum. The sera was carefully

aspirated with a sterile pipette tips into a labeled plain container and stored at -20^{0}C until tested.

Detection of IgM Antibody to Rubella Virus

The samples were analyzed for rubella IgM antibody using a qualitative rubella IgM ELISA kits (Genesis Diagnotics Ltd, Cambridgeshire UK). Samples with absorbance values ≥ absorbance of the standard are considered positive while absorbance < absorbance of the standard are considered negative. The obsorbance was read at 450nm base on the manufacturer's instructional manual.

Statistical analysis

The data obtained from questionnaires and laboratory analysis was analyzed using Statistical Package for Social Sciences version 16. Pearson Chi-square was calculated at 95% confidence interval and p-value < 0.05 was considered significant to determine the association between the presence of the antibodies to the virus and other parameters such age and trimester of pregnancy.

RESULTS

Out of the 400 pregnant women screened for IgM to rubella virus, 265 were seropositive giving seroprevalence of 66.3%. Seroprevalence of 55.9%, 81.9% and 60.9% were obtained among pregnant women attending Yusuf Dantsoho Memorial Hospital, Barau Dikko Specialist Hospital and Gwamna Awan General Hospital respectively. The difference between the three hospital was statistically significant (p=0.0001). The pregnant women were within the age group of 15-45years. The seroprevalence of 72.8% and 33.3% were obtained among pregnant women in the age group of 26-30years and 41-45years respectively. In relation to trimester, seroprevalence of 70.0%, 64.2% and 70.0% were obtained among pregnant women in their first, second and third trimester respectively.

Table 1: Seroprevalence of Rubella IgM Antibodies among Pregnant Women Attending Ante-natal Clinics in Kaduna Metropolis, Nigeria.

Hospital	No. screened	No. Positive (%)
Yusuf Dantsoho Memorial Hospital	134	75 (55.9)
Barau Dikko Specialist Hospital	133	109 (81.9)
Gwamna Awan General Hospital	133	81 (60.9)
Total	400	265 (66.3)

χ^2 = 22.705, df = 2, p = 0.0001.

Table 2: Age-related Seroprevalence of Rubella IgM Antibody among Pregnant Women Attending Ante-natal Clinics in Kaduna metropolis, Nigeria.

Age group	No. Screened	No. Positive (%)
15-20	84	54 (64.3)
21-25	136	99 (72.8)
26-30	105	66 (62.9)
31-35	51	32 (62.7)
36-40	21	13 (61.9)
41-45	3	1 (33.3)
Total	400	265 (66.3)

$\chi^2 = 5.202$, df = 6, p = 0.392.

Table 3: Gestational Age-related Seroprevalence of Rubella IgM Antibodies among Pregnant Women Attending Ante-natal Clinics in Kaduna Metropolis, Nigeria.

Trimester	No. screened	No. Positive (%)
First	20	14 (70.0)
Second	260	167 (64.2)
Third	120	84 (70.0)
	400	265 (66.3)

$\chi^2 = 1.355$, df = 2, p = 0.508.

DISCUSSION

The seroprevalence of immunoglobulin (IgM) antibody to rubella virus was 66.3% among pregnant women attending some selected ante-natal clinics in Kaduna metropolis. The 66.3% seroprevalence of IgM antibody obtained are higher than 38.8 % by Olajide *et al.*[6] in Zaria and 6.8 % obtained by Ogbonnaya *et al.*[7] The attributable factor to the high prevalence of rubella virus infection may be the route of transmission, which is mainly through respiratory droplet, infected children, even if they were asymptomatic may transmit the virus to non-immune individuals. There were significant association between the study sites and viral seroprevalence. This study was carried out in the three major ante-natal clinics located in the densely populated areas of Kaduna metropolis. It may be reasonable to assume that there may be a sustained viral circulation during sampling period for this high seroprevalence to be obtained in this study. Also, humans are the only known reservoir for rubella virus, hence it continuously access to susceptible population.[8]

The seroprevalence of IgM was highest in the age group 21-25 years and lower in the age group between 41 to 45 years-old. This finding agrees with the report of Ogbonnaya *et al.*[7] where the older age group had a lower prevalence of IgM antibody than the younger age group. Viral-specific IgM can be detected can be detected 10 days post infection and peaks at

4 weeks post infection. This may persist for 12 to 14 weeks after acute infection but rapidly diminishes in concentration until the antibody is no longer detectable.[9]

In this present study seroprevalence rate of 70.0% and 64.2% was obtained among pregnant women who were in first and second trimester and these women have a higher risk of transmitting the virus to their foetus causing congenital rubella and its complications. The risk of the foetus developing CRS is 40 to 60% if infection occurs during first two months of pregnancy, 35 to 40% if it occurs in the third month of pregnancy, and 10% if it occurs in the fourth month of pregnancy.[10]

CONCLUSION

This study shows high seroprevalence of rubella virus infection among pregnant women attending ante-natal clinics in kaduna metropolis. Therefore, there is a need for rubella vaccination to reduce the burden of the disease.

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