

Seroprevalence of Rubella IgG Antibodies in Women of Child Bearing Age Attending University Teaching Hospital, Ado-Ekiti Nigeria

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Abstract

Original Research Article

Rubella is a disease caused by rubella virus. It causes a significant human public health problem in developing countries, Nigeria inclusive. Efforts were made in this study to determine its seroprevalence in women of child bearing age attending University Teaching Hospital, Ado-Ekiti, and Ekiti State in Nigeria. Out of a total of 151 samples tested using IgG sandwich ELISA based kits, 132 (87.4%) were positive while 19 (12.6%) were negative. The women within the age range 21-25 years had the highest prevalence of 23.8% while the least was in the age range 41-60 (4.6%). Among different occupations, civil servants and traders had the highest prevalence of 27.8% each while the least was observed among housewives (26%). Results from educational status showed that women that had tertiary education had the highest prevalence (43.7%) while women that had no formal education had the least prevalence (1.3%) this study strongly indicates that rubella virus infections are present and active in Ekiti State. It is therefore recommended that adequate vaccine coverage given to women that may not have been exposed to the virus to avoid problems associated with congenital rubella syndrome.

Keywords: Seroprevalence, Rubella virus, Antibody, public health, antibody, women.

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INTRODUCTION

Rubella also known as cruanan measles is a common acute febrile (bearing) illness characterized by rash and lymphadenopathy that affects children and young adults [1]. It is the mildest of common viral exanthemas. However, infection during early pregnancy may result in serious abnormalities of the fetus including congenital malformations and mental retardation most especially if the infection occurs within the first trimester of pregnancy. It can lead to spontaneous abortion, still birth and the child may be born with congenital rubella syndrome (CRS) which is a range of serious incurable illnesses [2]. Rubella is caused by the rubella virus, a single stranded, positive sense RNA virus. It belongs to the genus rubi-virus in the family Togaviridae. It has an envelope with glycoprotein spikes.

Rubella is worldwide in distribution. Its seroprevalence has been recorded in Russia, Western Europe, Netherland, Asia and Africa including Nigeria [3]. This study was design to determine the prevalence

of rubella IgG antibodies in women of child bearing age attending University Teaching Hospital in Ado-Ekiti, Ekiti State of Southwestern Nigeria using the IgG sandwich ELISA based kits.

MATERIALS AND METHOD

Samples

Blood serum samples were collected from women of child bearing age attending University Teaching Hospital, Ado-Ekiti, Ekiti State located in Southwestern part of Nigeria. A total of 151 samples were collected from women with no previous history of vaccination.

Sample assay

ELISA kits prepared and manufactured by Diagnostic Automation, Inc, 23961 craftsman road, suite D/E/E, Calabasas were used to assay the samples. It is a solid phase Enzyme Immune Assay (EIA). The contents of the kits and the test samples were brought to room temperature over a period of time before use. Washing buffer was prepared by adding distilled water

to 10x wash concentrate provided to a final volume of 1 litre. The water strips were placed into the holder. The test samples and kits were gently mixed. A 1:40 dilutions were prepared by adding 5µl of the test samples, negative controls and calibrators to 200µl of sample diluents and were mixed well. 100µl of diluted sera, calibrators and controls were dispensed into the appropriate wells. For the reagent blank, 100µl sample diluent was dispensed into 1A well position. The holder was tapped to remove air bubbles from the liquid and was mixed well. The microwell plates were incubated at 30 minutes at room temperature. Liquids were removed from cell wells and washing was repeated for three times with washing buffer. 100µl of enzyme conjugate was dispensed to each well and incubated for 30 minutes at room temperature, enzyme conjugate was removed from wells and washing was repeated three times with washing buffer. 100µl of 1MB chromogenic substrate was dispensed to each well and incubated for 30 minutes at room temperature. 100µl of 2N HCl was added to stop the reaction. Air bubbles were expelled from the wells before reading. The plates were read at 450nm and 630nm blanking the instrument on 14 well.

A standard curve was elaborated by plotting optimal density of cut off and positive calibrators on Y-axis against their corresponding anti-rubella IgG concentration of 0, 15, 30 and 100µg/ml on X-axis. The estimates of levels in patient serum are read off the graph using their individual OD. values.

RESULTS AND DISCUSSION

Infection with rubella virus is one of the major public medical health problem especially in susceptible women of child bearing age and has the tendency to cause major complications including spontaneous abortion, stillbirth and many more in fetus and neonates if a susceptible women is exposed to it especially in early gestational weeks [4-6].

This is called Congenital Rubella Syndrome (CRS) and has a very high estimated lifetimes cost for both parent and government.

The results from this study showed that 132 (87.4%) out of 151 sera from women of child bearing age were positive for rubella antibody in Ekiti State (Table 1). This is higher than 73.5%, 79.3%, 68.5% and 54.1% prevalence obtained from Nigerian cities of Adamawa, Kaduna, Ibadan and Maiduguri respectively [4, 7]. However, higher prevalence has been reported in this continent in the past. Antenatal rubella survey in Maputo Mozambique detected antibody in 95.3% of subjects and 97.6% in Mozambican refugees living in South Africa and a 96% prevalence in Jos, Nigeria [8, 9]; Weather different between the cited locations, this study area could be responsible for the disparity in the prevalence distributions. Another reason may be that people in these areas were exposed to rubella vaccination.

Table 1: Sample Distribution IgG status

	No of samples	Positive (%)	Negative (%)
Serum sample count	151	132	19
Total count (%)	100	87.4	12.6

The age distribution revealed that the samples from age group 21-25 years had the highest prevalence (23.8%) and a decline in prevalence as age progresses (table 2) this is similar to what has been reported from a study carried out in Adamawa and Yola (Chukwuedo *et al.*, 2010) [4] and agreed with the claim by some

authors that females in the tropics contact rubella virus infection before attaining child bearing age (Banatrala and Best, 1990)¹⁰ and may be of the fact that antibody level wares with age. However, in some rare cases seropositive women may become infected during re-infection (Best, 1991) [11].

Table 2: Age Distribution of rubella IgG Antibodies

	No of samples	Positive(%)	Negative(%)
15-20	10	9(6.0)	1(0.7)
21-25	43	36(23.8)	7(4.6)
26-30	37	32(21.2)	5(3.3)
31-35	25	22(14.6)	3(2.0)
36-40	10	10(6.6)	0(0.0)
41-60	7	7(4.6)	0(0.0)
Unspecified	19	16(10.6)	3(2.0)
	151	132(87.4)	19(12.4)

Many countries in the developing world have reported relatively low rubella susceptibility rates compared to those for industrialized countries in their pre-vaccination periods. Peru found marked difference in estimates of rubella infection in urban and rural areas

¹² However, this study showed that the rate of susceptibility among rural dwellers (6.6%) is slightly higher than urban dwellers (6.0%) but this may be due to the less numbers of urban dwellers enrolled in this study (Table 3).

Table 3: Urban and Rural Distribution

Residence	No of samples	No Positive (%)	No Negative (%)
Urban	39	30(19.9)	9(6.0)
Rural	112	102(67.5)	10(6.6)
	151	132(87.4)	19(12.5)

Had reported the highest incidence in housewives in a study carried out in Adamawa and Kaduna. In this experiment, both civil servants and traders had the highest prevalence of 27.8% (Table 4). This may be due to the small numbers of housewives

that were screened in this study. Data from their education background showed that women that have tertiary education had the highest prevalence (Table 5). This may be due to their level of exposure and interactions with others [13].

Table 4: Occupational distribution

Occupation	No of samples	No Positive (%)	No Negative (%)
Housewife	4	4(2.6)	0(0.0)
Civil servant	47	42(27.8)	5(3.3)
Trade	52	42(27.8)	10(6.6)
Student	232	21(13.9)	1(0.7)
Unemployed	11	8(5.3)	3(2.0)
Others	15	15(9.9)	0(0.0)
	151	132(87.4)	19(12.6)

Significant differences were observed between the place of residence and the religious groups. Although, sero-negativity rate of 12.6% was observed in this study area, congenital Rubella syndrome could still occur, such that happened in a region of Oman, where only 4% of the women were susceptible [12]. More so a single case of rubella infection is considered a potential outbreak in United State [14]. Pregnancy is a contraindication to rubella vaccine, it is important to note that pregnant and pregnancy should be avoided for at least one month after receiving rubella vaccine [13].

CONCLUSION

This study has revealed that 87% of the study population are protected against rubella infection while 13% are not protected and are therefore at risk and need to be vaccinated. Elaborate control measures should therefore be put in place in the state and control be put in place in the state and country at large. The strategies for rubella outbreak control include targeting susceptible population for rubella vaccination ensuring that susceptible persons within the target population are vaccinated rapidly and maintaining free rubella and congenital rubella environment. It is advocated that more work should be carried out in neighboring states to ensure that Nigeria child does not suffer from preventable viral infections.

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