



## Seroprevalence Survey of Rubella IgG Antibodies among Pregnant Women Attending Antenatal Clinics in Abakaliki, Ebonyi State, Nigeria

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### Abstract

Rubella is a mild, contagious viral infection that is endemic worldwide and poses a serious threat to infants and pregnant women. It causes a spectrum of severe birth defects like congenital rubella syndrome, abortions and still birth if the infection occurs within the first trimester of pregnancy. The Seroprevalence of rubella IgG antibodies was investigated among 187 pregnant women attending Mile Four Hospital (MFH) Abakaliki, Ebonyi State. Blood specimens were collected from the subjects and sera extracted. The sera were screened for rubella virus immunoglobulin G antibody (IgG) using ELISA test Kit (Micro Immune limited, UK). The results obtained were subjected to SPSS system and Chi square test for significant difference at 95% confidence interval. Of the 187 pregnant women tested, 174(93.05 %) were positive for the rubella virus IgG. This study revealed that all the subjects who were 41 years and above tested positive 5(100.00%), whereas those who were 15 years and below 2 subjects had the prevalence rate of 50.00%. Pregnant women in their third, first and second trimesters had prevalence rates of 95.75%, (95.35%) and 86.95% accordingly. Samples tested shows that unmarried women were more infected with anti- rubella IgG of 94.44% recorded, then followed by married women with 93.79% and divorcee had 90.91%. However, widows had the least prevalence rate of 84.62%. Occupationally, women civil servants had prevalence rate of 97.56%. Educationally, pregnant women with tertiary education were more infected, rubella virus amounting to 96.61%. More infection was found among women living in rural areas with 93.59% rate, than their urban counterparts who had 92.66%. Furthermore, primigravida women were more infected (95.16%). The Sero-prevalence of rubella in this study was high and it calls for general surveillance and mass immunization of children and females of child bearing age.

**Keywords:** ELISA, Immunnoglobulin G, Pregnant Women, Rubella, Seroprevalence.

### INTRODUCTION

Rubella also known as German measles is a mild illness caused by a non- arthropod-borne member of the togaviridae family and is the only member of the genus rubivirus (Abernathy *et al.*, 2013). Rubella virus is a positive sense single stranded RNA virus and affects all ages and sex (Hobman and Chantler, 2007). It is an acute viral communicable disease of children, young adults, women of child bearing age and pregnant women (CDC, 2001). Rubella exhibits an acute febrile illness characterized by discrete macular rash, enlargement of the cervical lymph node and lymphadenopathy that affects children and young adults (Jewetz *et al.*, 2007). In most cases the disease is self-limiting and rarely causes complications. Nevertheless, it causes cognitial rubella syndrome (CRS) or foetal death when the infection occurs during the first trimester of

gestation (Agbede *et al.*, 2011). Complications of CRS may include miscarriage and severe abnormalities of foetus, such as cataracts, retinopathy, heart defects, neurological deficits and deafness (Junaid *et al.*, 2011).

Rubella is transmitted by respiratory route and confers high degree of immunity after exposure (Davidson, 2011). The virus may also be present in the urine, feces and on the skin (Eleazu *et al.*, 2012). There is no carrier state and the reservoir exists entirely in active human cases (Richardson *et al.*, 2001). In the absence of pregnancy rubella is usually clinically manifested as a mild self-limiting infection (CDC, 2001). During pregnancy, however, the virus can have potentially devastating effects on the developing fetus and has been directly responsible for inestimable wastage and severe malformations (Dontigny *et al.*, 2008).

The incubation period of rubella virus is 2 - 3 weeks before onset of symptoms. The infants surviving the CRS are significant sources of infections to other infants and most importantly to pregnant female contacts (CDC, 2004). The primary symptoms of rubella virus infection is the appearance of rashes (exanthema) on the face which spreads to the trunk and limbs, and usually fades after three days, hence the name 3 days measles (Eleazu *et al.*, 2012). Other symptoms include low fever, swollen glands (post cervical lymphadenopathy), joint pains, headache, arthritis, swelling of the brain, and conjunctivitis (Edlich *et al.*, 2005). The CRS follows intrauterine infection by rubella virus and comprises of cardiac, cerebral, ophthalmic and auditory defects (Atreya *et al.*, 2004). It may also cause prematurity, low birth weight, neonatal thrombocytopenia, anemia and hepatitis (Eleazu *et al.*, 2012).

Rubella disease is worldwide in distribution but primarily found in the developing countries of Asia, Africa and South America. Rubella has a varying incidence of outbreaks and the virus tends to peak during the spring in countries with temperate climates (Eleazu *et al.*, 2012).

Rubella invokes a serological response that is detectable at the onset of its characteristic rash and continues to evolve over the next few weeks (Hobman and Chantler), 2007). Viral specific immunoglobulin M (IgM) antibodies are first detected 10 days post infection and peaks at about 4 weeks post infection. This may persist for over 7 months after an acute infection and by three weeks post infection, anti-rubella virus antibodies are present in all immunoglobulin classes, including IgG, IgA and IgE (Hobman and Chantler, 2007). The infectious period of rubella virus is from 7 days before to 5 - 7 days after onset of rash.

No antiviral drug is available for treating rubella or preventing transmission to the fetus (Junaid *et al.*, 2011, Dontigny *et al.*, 2008). Supportive care may be provided, including efforts to lower fever. Vaccination programs are regarded as an effective tool to eliminate rubella and congenital rubella (Chiang *et al.*, 2010, Best, 2007 and Kanbur *et al.*, 2003). Since the introduction of vaccines, occurrences have become rare in those countries with high prevalent rates. Outbreaks however, still arise usually in developing countries where the vaccine is not accessible (Reff, 2006). There is dearth of information on the prevalence of rubella among pregnant women in the study area. As thus, this study has been targeted at detecting the presence of rubella in pregnant women attending antenatal clinics in Abakaliki, Ebonyi state.

## MATERIALS AND METHODS

The study was carried out at Mile Four Hospital Abakaliki, Ebonyi State over a period of six months between October, 2014 and April 2015. The study population included all the pregnant women attending antenatal care clinics of the Hospital. Exactly 5 mls of blood sample was collected aseptically by venepuncture from each consenting pregnant woman. The ethical approval for the study was obtained from the Ethical Board of Mile Four Hospital Abakaliki. Written Informed consent form was also administered to the subjects. The samples were processed by centrifuging at 3000rpm for 5 minutes and sera stored at -20°C until ready for use. The rubella IgG antibody was detected in the sera of these pregnant women using the quantitative rubella IgG specific enzyme linked immunosorbent Assay (ELISA) test kits (Micro immune, UK). The samples were analyzed according to the manufacturer's instructions. The mean value of the rubella IgG was calculated by dividing the mean absorbance value by the cut-off calibrator mean value. Samples with index values greater than 0.90 were considered positive while those with index values below or equal to 0.90 were considered negative. The data obtained was analyzed using SPSS Version 20.0 software and Pearson Chi Squares were calculated at a 95% confidence interval to test the statistical significant between groups. A value of  $P < 0.05$  was considered significant.

## RESULTS

A total of one hundred and eighty seven (187) pregnant women were enrolled in the study. The overall prevalence of 93.05% was recorded. Pregnant women within the age of  $\geq 40$  years recorded the highest prevalence 100.00% while those  $\leq 15$  years had the least prevalence 50.00% (table 1).

The highest prevalence of 94.44% was obtained from single mothers, 93.79% among married women, 90.91% among divorcees and 84.62% among widows (table 2).

Also, pregnant women in their third trimester recorded the highest prevalence of 95.35% while those in their first and second trimester recorded prevalence of 93.75% and 86.95% respectively.

Furthermore, higher prevalence was recorded among primigravidae 95.16% than multigravidae 93.20%, and grandmultigravidae 86.36% (table 2).

The highest prevalence of 96.61% was recorded among pregnant women with tertiary education while those with no formal education had the least prevalence 77.78% (table 3).

Occupationally, pregnant women who are civil servants recorded the highest prevalence of 97.56% while farmers had the least prevalence 83.33% (table 3).

Finally, pregnant women from rural areas recorded higher prevalence of 93.59% than their urban counterpart 92.66% (table 3).

**Table 1: Seroprevalence of Rubella IgG According to Age**

Age (Years)	No Screened	No Positive (%)
≤15	2(1.09)	1(50.00)
16 - 20	17(9.10)	16(94.12)
21 -25	43(22.99)	40(93.02)
26 - 30	65(34.76)	60(92.31)
31 - 35	36(19.25)	34(94.44)
36 - 40	19(10.67)	18(94.74)
≥41	5(2.67)	5(100.00)
<b>Total</b>	<b>187(100.00)</b>	<b>174(93.05)</b>

**P = 0.99**

**Table 2: Seroprevalence of Rubella IgG in Relation to Marital status, Stages of pregnancy and Parity.**

Marital Status	No Screened	No Positive (%)	
Married	145(97.54)	130(93.79)	
Single	18(9.63)	17(94.44)	
Divorced	11(5.88)	10(90.91)	
Widow	13(6.95)	11(84.62)	
<b>Total</b>	<b>187(100.00)</b>	<b>174(93.05)</b>	<b>P=0.99</b>
<b>Stages of Pregnancy</b>			
1 <sup>st</sup> Trimester	32(17.11)	30(93.75)	
2 <sup>nd</sup> Trimester	69(36.90)	60(86.95)	
3 <sup>rd</sup> Trimester	86(45.90)	82(95.35)	
<b>Total</b>	<b>187(100.00)</b>	<b>174(93.05)</b>	<b>P=0.001</b>
<b>Parity</b>			
Primigravida	62(33.16)	59(95.16)	
Multigravida	103(5.08)	96(93.20)	
GrandMultigravida	32(11.76)	18(86.36)	
<b>Total</b>	<b>187(100.00)</b>	<b>174(93.05)</b>	<b>P=0.001</b>

**Table 3: Seroprevalence of Rubella IgG in relation to Educational level, Occupation and Place of Residence.**

Educational Level	No Screened	No Positive (%)	
None	69(4.81)	7(77.78)	
Primary	37(19.79)	33(89.19)	
Secondary	82(43.85)	77(93.90)	
Tertiary	59(31.53)	57(96.61)	P=0.99
<b>Total</b>	<b>187(100.00)</b>	<b>174(93.05)</b>	
<b>Occupation</b>			
Housewife	78(41.71)	74(94.87)	
Trading	38(20.32)	35(92.11)	
Civil Servant	41(21.93)	40(97.56)	
Farming	30(10.04)	25(83.33)	
<b>Total</b>	<b>187(100.00)</b>	<b>174(93.05)</b>	<b>P=0.99</b>
<b>Place of Residence</b>			
No Screened	No Screened	No Positive (%)	
Rural	78(41.71)	73(93.59)	
Urban	109(58.29)	101(92.66)	
<b>Total</b>	<b>187(100.00)</b>	<b>174(93.05)</b>	<b>0.98</b>

## DISCUSSION

Results obtained from this study indicated that 174(93.05%) out of 187 pregnant women screened were positive for rubella specific IgG. This is in agreement with the works of Okolo *et al.*; 2013 at Vom, Nigeria, Isa *et al.*, 2013 in Plateau State, Nigeria, Fadwaa *et al.*; 2010 in Jeddah, Saudi Arabia, Olajide *et al.*, 2015 in Zaria, Nigeria, Gadallah *et al.*, 2014 in Egypt, Obijimi *et al.*, 2013 in Southwestern Nigeria, Jubaida *et al.*, 2011 in Dhaka, Oyinloye *et al.*, 2014 in Maiduguri, Nigeria and Adesina *et al.*, 2008 in Ibadan, Nigeria with the prevalence of 93.50 %, 92.51 %, 94.1 %, 93.10%, 88.2%, 96.6%, 83.3% and 94.2% respectively. However, it is higher than the prevalence of 15.22 %, 66.30% and 68.5 % in Ilorin and Ibadan among pregnant women reported by Agbede *et al.* (2013), Chukwuedo *et al.* (2011) and Bamgboye *et al.* (2004). Our study recorded the highest prevalence among pregnant women aged  $\geq$  41 years (100.0%) and least among those aged  $\leq$  15 years (50.0%). This is contrary to the finding of Okolo *et al.*, 2013 and Isa *et al.*, 2013. Single mothers recorded higher prevalence (94.44%) while the widows recorded the least prevalence (84.62%). This is in agreement with the report of Bamgboye *et al.*, 2004 but contradicted the previous studies of Eleazu *et al.*, (2012) and Gadallah *et al.*, (2014) who recorded higher prevalence among married women. Also, pregnant women at their 3<sup>rd</sup> trimester had highest prevalence (95.35%) while those in their second trimester recorded the least prevalence (86.95%). Primigravida had highest prevalence (95.16%) while grandmultigravida recorded the

least prevalence (86.36%). This study further recorded higher prevalence among women with tertiary education (96.6%) while those without formal education had the least prevalence (77.78%). This is in agreement with the study of Okolo *et al.*, 2013 in Vom, Nigeria and Gadallah *et al.*, (2014) in Egypt. The results of this study revealed that occupation and educational level were insignificant risk factor, a finding consistent with the results of other studies by Dayan *et al.*, 2005 and Langiano *et al.*, 2009. This is in contrast with the finding of Bamgboye *et al.*, 2004. Civil servants were more infected (97.56%) while farmers had the least infection (83.33%). This is in accordance with the work of Isa *et al.*, 2013. Our findings revealed more infection among rural dwellers (93.59%) than their urban counterpart (92.66%) ( $P > 0.05$ ). This contrasts the findings of Bamgboye *et al.*, 2004.

## CONCLUSION

Our findings in this study show that there is the existence of rubella virus infection in the study area. As such there is need for more serological survey on rubella in the study area and other parts of the country. Also, there is need to encourage the use of rubella vaccines among women of childbearing age to reduce the incidence of congenital rubella syndrome in developing countries.

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