(RESEARCH ARTICLE)

Rubella-specific IgM antibodies in non-pregnant women in Rivers State, Nigeria

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Abstract

Rubella can cause arthritis in some women's fingers, wrists, and knees, especially if the infection is complicated. Scarcity of information about the disease in Nigeria, and rubella vaccination is not widely available. This study aimed to look for rubella virus IgM antibodies in non-pregnant women in Rivers State.

Method: Ninety-two (92) consenting non-pregnant women attending Rivers State University Teaching Hospital, Rivers State, were randomly assessed for the study. The sera were analyzed for detectable anti-rubella IgM antibodies following the manufacturer's description using ELISA kits.

Results: Of the 92 samples evaluated for rubella Immunoglobulin M antibody, 14 (15.2%) were positive, and 78 (84.8%) were negative. None of the socio-demographic factors had significant relation with Rubella anti-IgM seroprevalence (p<0.05).

Conclusion: The substantial frequency of IgM antibodies demonstrated the existence of the virus and the possibility of new infections of Rubella in non-pregnant women. To determine the predominance of the rubella infection and subsequently design control tactics against it, a surveillance strategy and education of women regarding the implications of the existence of IgM antibodies would be helpful.

Keywords: Rubella; IgM antibodies; Non-pregnant women; Nigeria

1   Introduction

The rubella virus is the culprit behind rubella, an acute, infectious viral infection that causes a distinctive red rash. German measles and three-day measles are other names for it. Infection with the rubella virus is a significant public health danger, particularly in low- and middle-income countries where the rubella vaccine is not widely used [1]. Most susceptible children and young adults who contract this illness experience minimal to no symptoms [2]. However, if a mother has an infection while pregnant, it can seriously harm the unborn child.

Like measles, rubella spreads through airborne droplets from infected individuals coughing or sneezing, and 20–50% of cases have no rash or are subclinical [3]. Seasonal outbreaks of Rubella occur approximately every 5 to 9 years [2]. The incubation time for Rubella is typically 14 days, but it can be anywhere from 12 and 23 days. Before the rash manifests, there is a brief prodromal phase (1–5 days) in adolescents and adults. The rash appears initially on the face and neck and then spreads to the trunk and extremities. It lasts for about three days. The rash is occasionally itchy and significantly paler than the measles rash.

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Because there are numerous other reasons for a rash that resembles rubella infection, the clinical diagnosis of Rubella is unreliable. Additionally, since up to 50% of rubella infections are asymptomatic, many cases go undetected, or index cases might be overlooked [4]. Identifying the target population for rubella vaccination, ensuring that susceptible individuals within the target groups are vaccinated quickly and keeping Rubella and CRS surveillance are some tactics for controlling the rubella outbreak [5].

[6] IgM antibody is one of the particular antibodies linked to the Rubella virus. It rises and peaks 7–10 days after infection, then declines after several weeks because it is the first antibody to manifest when one is sick [7]. Because of this, the presence of IgM antibodies always suggests a primary and recent rubella infection [8].

Since there are so few reports of Rubella in the nation, its prevalence and effects are mainly unknown. In order to determine the prevalence of IgM-specific antibodies in non-pregnant women in Rivers State, Nigeria.

2 Methodology

2.1 Study Design

At the Rivers State University Teaching Hospital (RSUTH) in Port Harcourt, Nigeria, a cross-sectional study was conducted on non-pregnant women. Before collecting samples, a structured questionnaire was randomly given to willing non-pregnant women to gather information on socio-demographic characteristics. The Rivers State Health Research Ethics Committee granted its ethical approval.

2.2 Subjects, Samples Collection and Processing

After receiving their informed written agreement, 92 non-pregnant women who were antenatal clinic patients at RSUTH, Port Harcourt, Nigeria, were randomly chosen and recruited for this research between June and September 2021. By venipuncture, three millilitres (3ml) of blood were drawn from each of the ladies. After allowing the blood to coagulate, it was centrifuged for five minutes at 3000 rpm. Before analysis, the sera were properly aspirated into simple vials and kept at -20oC.[9].

2.3 Analysis of Blood Samples

The Microbiology Department at the University of Port Harcourt in Choba, Rivers State, performed the laboratory analysis. Using an ELISA kit made by Italian company DIA.PRO Diagnostic Bioprobes Srl at Via G. Carducci no. 27, 20099 Sesto San Giovanni (Milano), the samples was examined for IgM antibodies to the rubella virus. The automated washer was used to wash the microplates five times (Biotek ELx 50, USA). A spectrophotometric plate reader (Biotek ELx808i, USA) was used to measure the coloured reaction result at an absorbance of 450–630 nm. The manufacturer's instructions were followed for every stage of the ELISA assays. After the equipment had been standardized following the manufacturer's instructions, 10 IU/ml concentration was utilized to identify the negative and positive samples. Samples were deemed non-reactive for anti-Rubella Virus IgG antibodies if their concentration was less than 10 WHO IU/ml (Dia Pro. Diagnostic BioprobesSrl). Samples were deemed to contain anti-Rubella Virus IgG antibodies if their concentration was more than or equal to 10 WHO IU/ml [8].

2.4 Data Analysis

Data obtained was evaluated using the statistical package for social sciences version 21 was used to evaluate the information gathered from the lab testing and questionnaires. To ascertain the relationship between the existence of the viral antibodies and other parameters, Pearson chi-square was calculated at a 95% confidence range, and a p-value of 0.05 was deemed significant [10, 7].

3 Results

Rubella-specific IgM antibody occurred in 15.2% (14/92) of the non-pregnant women tested. Eighty-five per cent (78/92) of the women were seronegative for Rubella IgM antibody (Fig 1).
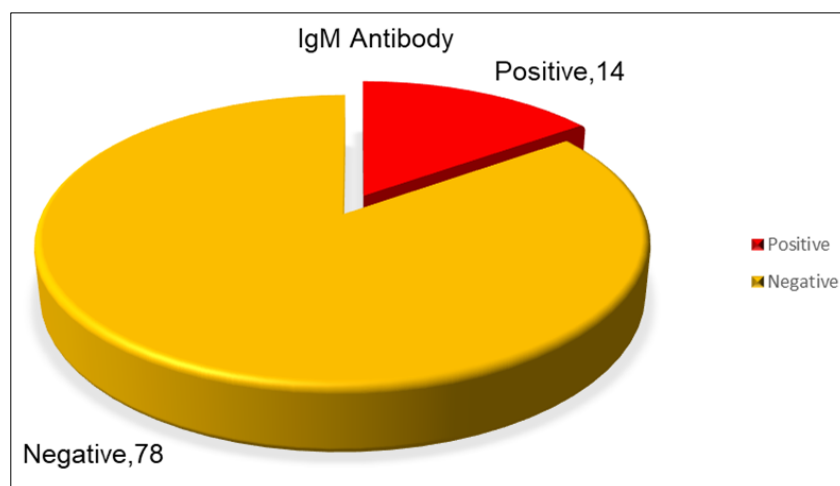
Figure 1 Rubella IgM seropositivity and seronegativity among non-pregnant women in Rivers State

The age of the non-pregnant women ranged from 18 to 47 years (Table 1), with a mean age of 29.7 years. The age-groups 20-29 years had the highest seroprevalence rate of 17.2%, while 30-39years had the lowest seropositivity rate of 12.9%. However, no statistically significant variation between age groups concerning prevalence rates (P = 0.948).

Table 1 Age Distribution of Anti-Rubella Virus IgM Seropositivity among Non-pregnant Women

Age	No. Analyzed	No. Positive (%)	P-value
10 – 19	5	1 (20.0)	
20 – 29	35	6 (17.2)	0.948
30 – 39	39	5 (12.9)	
≥40	13	2 (15.4)	
Total	92	14 (15.3)	

The predominance of Rubella IgM antibodies concerning the education level of the non-pregnant women is presented in Table 2. The highest prevalence rate occurred in 19.1% of the non-pregnant women with a tertiary level of education, and the lowest prevalence rate of 5.3% in those with primary education. There was no difference between the seropositivity rates concerning education (P = 0.303).

Table 2 Anti-Rubella virus IgM Seropositivity across Education Level of Non-pregnant Women

Education level	No. Analyzed n (%)	No. Positive n (%)	P value
Primary	19 (20.7)	1 (5.3)	
Secondary	10 (10.9)	1 (10)	0.303
Tertiary	63 (68.5)	12 (19.1)	
Total	92 (100.0)	14 (15.3)	

In considering their occupation, the non-pregnant women who were artisans had a higher seropositivity rate of 25%, followed by students (20%) and civil servants (16.7%). There was no significant change between the seropositivity rates concerning occupation (P = 0.597). None of the homemakers tested positive for rubella-specific IgM antibodies.

Table 3 Distribution of Anti-Rubella Specific IgM seropositivity across occupation of Non-pregnant women

Occupation	Total No. Analyzed (%)	No. Positive (%)	P-value
Civil servant	42	7 (16.7)	
Student	25	5 (20)	0.597
Housewife	7	0 (0)	
Trader	14	1 (7.2)	
Artisan	4	1 (25)	
Total	92	14 (15.3)	

4 Discussion

Because the rubella infection can manifest as a severe, moderate, or silent sickness, outbreaks may occur without warning or be incorrectly diagnosed [11]. Even when it is linked to the risk of Congenital Rubella Syndrome, studies on the epidemiology of the illness in Nigeria are scarce despite the importance of Rubella for public health in Africa [12]. Only the proportion of non-pregnant women with acute Rubella infections was examined for Rubella IgM antibodies.

The findings of this study showed that non-pregnant women in Rivers State, Nigeria, had a Rubella IgM seroprevalence rate of 15.2%. This result was more significant than the prevalence rates reported by [13] and [14] in Iraq (3.6%) and Iran (5.5%). The prevalence rate in Iraq was 21.3 per cent in the other report. However, the current research results were lower [15]. No prevalence rate was provided for the study conducted in Turkey [6]. Only 3.9% of healthy pregnant women in Middle belt Nigeria tested positive for IgM [16].

These variations in rubella-specific IgM positivity may be related to the varying sample sizes for the various studies, the high proportion of IgM false-positive results, minor variations in assay techniques, and the timing of blood sample collection [17, 18]. The significant false-positive rate when testing for Rubella virus IgM may be attributed to cross-reactivity with autoimmune illnesses and other viral infections such as measles, CMV, herpes simplex, varicella-zoster, and influenza viruses [19]. As samples taken too early during primary infection may not contain detectable levels of IgM, a negative IgM test does not necessarily rule out a primary infection with the Rubella virus.

Regarding the socio-demographic details of the non-pregnant women in this investigation, no statistically significant difference in Rubella IgM positive was detected. With the increasing age of the women, the prevalence according to age group exhibited a decline. Age groups did not significantly differ, proving that Rubella affects people of all ages.

In terms of educational attainment, this study discovered that non-pregnant women with tertiary education had the most excellent anti-rubella IgM levels. This outcome is not surprising considering that women with tertiary education are more likely to contract the virus from various places and lifestyle choices because they are often more mobile [20].

Women who worked as artisans had the highest anti-rubella IgM reactive rates, which may be related to their propensity for factors that facilitate the transmission of rubella virus infection [21]. Furthermore, no statistically significant difference (P=0.597) occurred in the study between the predominance of Rubella IgM in the non-pregnant women and their work.

5 Conclusion

Since a sizable fraction of the non-pregnant women had acute infections with the rubella virus during data collection, anti-rubella IgM was significant in this study. This indicates viral activity that could threaten these women and result in complications from Rubella in the State. The findings of this research work highlight the necessity for routine screening of non-pregnant women and education to lower morbidity and mortality caused by the rubella virus.

Compliance with ethical standards

Disclosure of conflict of interest

Authors have declared that no competing interests exist.

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