Serodynamic and Clinical Significance of Anti-Rubella Antibodies in Young Female Domiciled in Benin City and its Environs

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Abstract

Rubella is a disease of childhood and individual infected by this organism experience mild prodromal symptoms. The prevention of congenital rubella syndrome is the ultimate goal of any nation through wide vaccination programs for these young females. In this present study blood samples were collected for serum extraction from 199 test subjects with age range from 5-29 years. The collected sera were screened for rubella antibodies (IgG) using the Enzyme linked Immuno Sorbent Assay techniques (ELIZA). This study detected (80.4%) sero evidence rate for the rubella IgG antibodies with the ELIZA method. Also detected and observed was the high sero evidence rate of young females from the urban areas with (82.5%) who were found to be more prevalent than other young females from the rural areas with (17.5%). The study also detected high susceptibility of rubella infection among young females in the age group 20-24 with (7.75%). The objective was to assess the level of immunity of young females in an attempt to evaluate the need of mass immunization. We recommended vaccination of young females of reproductive age and also carryout immunization on the seronegative young female that are also susceptible.

Keywords: Anti rubella antibodies, Clinical significance, Young females

Introduction

Rubella also known as German measles or three-day measles [1], is an infection caused by the Rubella virus [2]. This disease is often mild with half of people not realizing that they are sick [3]. A rash may start around two weeks after exposure and last for three days.

It usually starts on the face and spreads to the rest of the body. The rash is not as bright as that of measles and is sometimes itchy. Swollen lymph nodes are common and may last a few weeks [3]. A fever, sore throat, and fatigue may also occur. In adults joint pain is common. Complications may include bleeding problems, testicular swelling, and inflammation of nerves [3]. Infection during early pregnancy may result in a child born with congenital Rubella syndrome (CRS) or miscarriage. Symptoms of CRS include problems with the eyes such as cataracts, ears such as deafness, heart, and brain. Problems are rare after the 20th week of pregnancy [2].

Rubella is usually spread through the air via coughs of people who are infected [2]. People are infectious during the week before and after the appearance of the rash. Babies with CRS may spread the virus for more than a year. Only humans are infected. Insects do not spread the disease. Once recovered, people are immune to future infections.

Rubella is preventable with the Rubella vaccine with a single dose being more than 95% effective [2]. Often it is given in combination with the measles Vaccine and mumps vaccine, known as the MMR vaccine. With a population vaccination rate of less than 80%, however, more women might make it to childbearing age without developing immunity and issues could increase. Once infected there is no specific treatment [4].

In absence of pregnancy, it is usually clinically manifested as a mild self-limited disease associated with a characteristic rash. Although rubella is asymptomatic in 25% to 50% of case, some individual may experience mild prodromal symptoms such as low-grade fever, conjunctivitis, sore throat coryza headaches or malaise and tender lymphadnopathy. These prodromal symptoms will usually last one to few days before the onset of the scarlet in form rash, which may be mildly pruritic. The rash characteristically begins on the face and spreads to the trunk and extremities. It will be usually resolved within three days [5].
Serological test as ELISA is an important tool to measure rubella specific IgG and IgM. It is considered as a convenient sensitive and accurate method of diagnosis [6]. Serologic studies are best performed within 7 to 10 days after the onset of the rash and should be repeated two to three weeks later. Viral cultures drawn from nasal blood throat, urine, or cerebrospinal fluid may be positive from the week before to two weeks after the onset of the rash [7]. Since the isolation of rubella virus in 1962, rubella testing has developed continuously, with the hem agglutination inhibition (HAI) assay often being considered the reference method [8]. There are small series reporting the usefulness of rubella specific PCR on CRS for the prenatal diagnosis of intrauterine rubella infection [9].

Prevention of congenital rubella is the ultimate goal of any nation by wide rubella immunization program, to reach this goal two immunization strategies have been applied in various countries. They are direct protection through vaccination of adolescent girls and adult woman [10]. The first live attenuated rubella of this vaccine was introduced in 1969. A single dose of this vaccine will result in measurable antibody in almost 95% of susceptible persons. Antibody levels persist for at least 18 years in more than 90% of the vaccine recipients. Primary failure of the rubella vaccine occurs in less than 5% of immunization [11].

The aim of this study is to determine the sero evidence of anti-rubella antibodies and its clinical significance in this population of young females and the percentage of seronegativity of the young females will also be detected to know the range of susceptibility and the need for vaccination.

Population and Method

The total number of 199 female subjects from the city and its rural areas were enrolled in the study.

This study was carried out in Benin City and its environs among young female patients who attended the University of Benin Teaching Hospital, from March, 2014 to February 2015. These investigated subjects, were young females with age range from 5-27 years who attended the general practice clinic of the hospital for different complaints. The subjects were from the city and its surrounding rural areas. 4mls of Venous Blood was collected each from the subject and seroanalysis for the detection of IgG was carried out using ELISA method. The detection of IgG antibodies against rubella in the serum sample were incubated together with rubella antigen fixed in the wells of the microplates. 0.15 ml of the buffer was pipetted into each well. This was followed by 0.5ml of the patient serum pre-diluted 1:40 added into the first well of each dilutions series. 0.05ml of patient serum was transferred from one well to the next and 0.05ml from the last well was discarded. The wells were incubated for 1hr in moist chamber at 37°C. 0.2ml of washing solution was added follow by 0.5 ml of IgG conjugate solution. The wells were incubated for 1hour followed by the addition of 100 ml of substrate to each well and for 45 minutes at 20-25°C. 0.05ml of 2N NaOH was added to each well and result were read photometrically at 405 nm wavelength.

Statistical Analysis

Chi-squared test of significance was used as appropriate.

Results

Table 1 shows clinical data of young females serologically screened in relation to their age group with a total of 138 (69.3%) seropositive while 61 (30.6%) were seronegative (p>0.5). The highest seropositive/susceptible group was detected among young females in the age group of 20-24 years.

The seropositivity among young females in urban area was 82.5% as against 17.5% of those from rural area (p>0.5) (Table2).

Discussion

Congenital rubella syndrome is more frequently seen in developing countries where vaccination against rubella is not common practice. The world health organization reported an incidence of rubella antibodies in 80% - 88% of personal aged 17 - 22 years in most areas of the world. Thus 12 - 20% of these populations are still susceptible to infection with rubella virus.

In this research work, a total of 69.3% sero prevalence of antibodies to rubella was recorded among the subjects under investigation while 30.6% were seronegative. In this present study, we detected 80.4% seropositive young females in urban area (Benin) out of the 199 examined for rubella antibody using ELISA technique. Our report was in agreement with other results obtained in previous studies where they reported seropositivity to rubella infection in Turkey as 95.5% of child bearing age. On the other hand, the seronegativity was about 30.6%.

Our results were higher than those reported by others. Ang, et al. found a considerable proportion (15.8%) of women from 18 - 44 years remained susceptible to rubella infection [12]. They concluded that rubella prevention and control has been successfully implemented. However the relatively susceptible to rubella among women in reproductive age group continues to be of concern.

Barah and his coworkers in Syria examined the current seroepidemiology of rubella IgG among Syrian women of child bearing age that missed the rubella vaccination, they found that the
seropositivity for rubella was 85.6% and leaving a relatively high proportion of susceptibility of 14.4% among tested group [13].

This study found that the seropositivity of young female against rubella were nearly in accordance with others. Yacin and his co-workers selected two primary and two high schools of low to medium socioeconomic status, rubella seroprevalence was 92.5% [14].

Also, Oner and his group estimated the rubella seroprevalences in unvaccinated Turkish adolescent girls in urban and rural areas of Edirne, to create preventsivities for congenital rubella syndrome (CRS). After analysis of samples, seropositivity prevalence, equivocal and seronegative samples of adolescent girls in Edirne were determined as 93.1%. Data from their present study indicated that 6.9% of adolescent girls have considerable susceptibility to rubella infection.

Our result was not in agreement with others who carried out a study in Bangladesh to determine the seroprevalence of IgG antibodies against measles, rubella and mumps in children. They found that the children between 5 - 15 years old of age became protected by antibody against rubella (63-85%) although; majority of children between 5 months and 5 years have to have no protective antibody against rubella. Non-significant differences were observed in antibody prevalence ranging socioeconomic classes, nutritional status and parental education.

Our reports were confirmed with others from Delhi, they reported that the national institute of communicable disease (NICD) evaluated the information made available on rubella in the last 15 years. They found, approximately 10 to 15% of women reached childbearing age without developing immunity against rubella virus and were at high risk of contacting infection during pregnancy. The increase in immunity status during the period in this study may be due to subclinical or clinical exposure to rubella virus as there is no policy for immunization against rubella virus and were at high risk of contacting infection during pregnancy. The increase in immunity status during the period in this study may be due to subclinical or clinical exposure to rubella virus as there is no policy for immunization against rubella virus infection.

The prevalence of seronegativity in rural areas was confirmed by others. Nur, et al. determined the rubella seroprevalence among women in the reproductive group in rural district in Ankara to provide data for rubella susceptibility for policymakers. The seropositivity of this rural group of women was found to be high; this indicated the need for a rubella vaccination program, for women of child-bearing age [15].

Miller, et al. attributed the prevalence of immunity in the urban areas by high level of socioeconomic standard as well as high educated level, also strict vaccination programs always performed in urban areas more than rural areas [16].

Johnson, et al. reported that rubella seropositivity was about 67% among 11-13 years old compared to 90% among 4-6 years old. They attributed these results to the obligatory vaccination programs in children and rubella vaccine at school and recommended bolstering to decrease susceptibility at a time of reproductive age [17].

In spite of high prevalence of rubella specific antibodies in adult female population, protection against rubella through natural infection appears inadequate. Therefore, it is recommended that nationwide vaccination program can be instituted for adolescent adult females who are not pregnant and will not get pregnant within 3 months of vaccination, and who show no history of rubella vaccination or clinically diagnosed disease. In conclusion, rubella vaccination should be recommended in developing countries, because of the high seropositivity in our region we don't recommend rubella vaccination in early childhood; yet this is a preliminary study and further studies with a larger population size are needed to determine the national immunization policy for rubella.

References