Full Length Research Paper

Seroprevalence of Rubella virus among pregnant Sudanese women with history of abortion

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Mainly, rubella infections during pregnancy are considered as serious infections worldwide. Since Rubella virus not only infects susceptible women early in pregnancy, they can also be transmitted to the fetus, and might induce birth defects. Accordingly, accurate as well as meticulous diagnosis of rubella infection is crucial during pregnancy. A descriptive, retrospective cross sectional hospital based study was conducted during the period from January 2012 till January 2013; in this context, 107 pregnant women attending Khartoum teaching hospital were enrolled. Needless to mention, the entire participants have history of abortion. Moreover, demographic together with clinical data were retrieved from the patient medical file. Enzyme-linked immunosorbent assay (ELISA) was used for detecting Rubella (IgG and IgM) antibodies using commercial diagnostic kits (DRG Instruments GmbH. Germany). Quantitative analyses for Rubella (IgG and IgM) antibodies were performed; furthermore, the assay result was interpreted as IU/mL. The obtained data were statistically analyzed using Statistical Packages for Social Sciences (SSPS) version 17. Out of a total of 107 participants, 93 were examined for the presence of Rubella IgG and IgM antibodies. Mean age was calculated as 30.3 with standard deviation (SD) ±6.2. Interestingly, rubella IgM was found reactive in 5 participants (5.4%), in contrast, 48 participants (51.6%) were found reactive to Rubella IgG antibodies. The present study found that the age groups of 20-29, and 30-39 have a significant correlation with antibody sero-positive. However, since this study was cross sectional, it is difficult to state whether the occurrence of high antibody titre preceded or followed the abortions. Rubella vaccine and routine screening for rubella should be introduced for pregnant women in this setting. Further research in this area is highly recommended.

Key words: Rubella virus, history of abortion, IgM and IgG antibodies.

INTRODUCTION

Rubella also called German measles or three-day measles is a disease that is caused by the virus known as Rubella. Clinically, the disease is presented as mild self-limited infection during childhood (MMWR, 2001). Surprisingly,
unlike symptoms during childhood, the onsets of the virus during pregnancy are more serious, and the virus potentially has devastating effects on the developing fetus. It has been entailed for tremendous wastage as well as severe congenital malformations (MMWR, 2001). Basically, rubella virus is the sole member of the genus, of Rubivirus in Togaviridae family. Moreover, it is a positive strand RNA virus with a non-segmented genome. Serologically, the virus is diverse from other members of the Togaviridae, moreover, unlike most other Togaviruses, is equivocal to be spread by an arthropod (Megyeri et al., 1999). Not surprising, humans are the only known reservoir of Rubella virus, with postnatal person-to-person transmission occurring through direct or droplet contact with the respiratory secretions of infected persons, additionally, congenital to growing fetus via placenta (MMWR, 2010). Importantly, fetal damage happens through destruction of cells as much as mitotic arrest (MMWR, 2013). Intriguingly, maternal infection for the duration of the first trimester is much often associated with stillbirth, spontaneous abortion, or adverse neonatal outcome including heart problems, cataract and deafness which is known as congenital Rubella syndrome, which has a major neonatal morbidity along with problem to families. The defects are frequently transpired alone or in concomitant with others, and may be temporary or permanent. The Rubella-associated congenital defects posed greatest risk during the first trimester of pregnancy. Furthermore, some defects have been stated later following maternal infections in the second trimester (Ojala et al., 1973). Incidence of Rubella infection is becoming low globally, nevertheless, some African countries such as Mozambique estimated high incidence (95.3%) (Barreto et al., 2006).

Moreover, growing body of study conducted in Sudan in 2011 reported that, the prevalence of Rubella was 65.3%, accordingly, 34.7% of the pregnant women are at risk of Rubella infection besides their unborn babies which are vulnerable to congenital Rubella syndrome (Hamdan et al., 2011). Despite this fact, this prevalence is in accordance with those reported from Nigeria (68.5 and 76 %) (Bamgboye et al., 2004; Onyenekwe et al., 2000). This value is less than the prevalence reported in Burkina Faso, Tanzania and Nigeria (95.0, 92.6 and 93.1%, respectively) (Okikiola et al., 2015). Significantly, evolving body of study conducted in Iran (2011); stated that Rubella virus had been corroborated as an etiologic factor for spontaneous abortion, accordingly, routine screening programme of Rubella for women during pregnancy had been strongly recommended (Jahromi et al., 2011). Conclusive evidence had demonstrated that, during the maternal viraemic phase, the Rubella virus enters the fetus through the placenta (Robertson et al., 1997). Interestingly, damaging of fetus looks likes involving of all germ layers and subsequently lead to swift death of some cells along with viral infection in others cells persistent (Onyenekwe et al., 2000; Stegmann and Carey, 2002).

The information regarding Rubella infections during pregnancy has been considered as significant as well as important for health organizers and care providers. Importantly, if Rubella virus infects susceptible women during pregnancy, it could be passed over to the fetus and resulting in birth defects. And so, accurate diagnosis is instrumental during pregnancy. This current study aims at investigating seroprevalence of Rubella infections among pregnant women with history of abortion.

METHODOLOGY

A descriptive, retrospective cross sectional hospital based study was conducted in the period between January 2012 and January 2013. In this context, a total of 107 pregnant women attending Khartoum teaching hospital in Sudan were enrolled. History of abortion is the main inclusion selection criteria for entire participant. Information was retrieved from the patient medical record. Five millilitres of venous blood were collected in plain tubes, allowed to clot, and then centrifuged at room temperature. Then, sera were capped and stored at -20°C. An ELISA technique was employed for detecting Rubella antibodies including IgG and IgM by commercial diagnostic kits (DRG Instruments GmbH. Germany). Quantitative analysis for Rubella antibodies was performed; the result was interpreted as IU/mL. The manufacturer’s instructions were followed for the cut-off points, <10 IU/mL was considered negative for Rubella IgG antibodies and <68 IU/ml was considered negative for Rubella IgM antibodies. The hospital ethical committee was informed for the purpose of the study; moreover, the necessary ethical guidelines were strictly followed. Permission to carry out the study was taken from the Scientific Research Committee, University of Khartoum. The obtained data were analyzed using Statistical Packages for Social Sciences (SSPS), accordingly with cross tabulation for descriptive and analytical statistics were done using Chi-square test.

RESULTS

Out of a total of 107 participants, only 93 samples were tested for Rubella antibodies owing to unsatisfactory blood samples. Mean age + standard deviation (SD) was estimated as 30.3 + 6.2. Rubella IgM was found reactive among 5 participants (5.4%), whereas 48 participants (51.6%) were found reactive for Rubella IgG. The age of participants ranged from 17 to 42 years. The age of the participants was divided into four groups as shown in Table 1. Statistically, significant correlation was found among the age group of 20 to 29 and 30 to 39 and antibody sero-positive; p value 0.02 (Figure 1).

DISCUSSION

Maternal infections particularly during the first trimester are adversely associated with stillbirth, spontaneous abortion, or antagonistic neonatal outcome, that encompasses heart disease, cataract and deafness
Table 1. Distribution of the participants by age groups.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Age</th>
<th>Frequency</th>
<th>%</th>
<th>Rubella IgG Sero-positive</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt; 20</td>
<td>5</td>
<td>5.4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>20-29</td>
<td>37</td>
<td>39.8</td>
<td>23</td>
<td>47.9</td>
</tr>
<tr>
<td>3</td>
<td>30-39</td>
<td>42</td>
<td>45.2</td>
<td>20</td>
<td>41.7</td>
</tr>
<tr>
<td>4</td>
<td>&gt;39</td>
<td>9</td>
<td>9.7</td>
<td>5</td>
<td>10.4</td>
</tr>
</tbody>
</table>

Figure 1. Classification of Rubella IgG sero-positivity with respect to age groups.

known as congenital Rubella syndrome. The rubella virus plays a significant role in the occurrence of abortion (Cutts et al., 1997; Desinor et al., 2004; Palihawadana et al., 2003). The data presented in this study has found that, the seroprevalance of Rubella virus was in agreement with those reported in other African countries in pregnant women. In Nigeria, it is found that 68.5% of pregnant women had Rubella infections (Bamgboye et al., 2004), whereas in incidence was reported in Mozambique, which was estimated as 95.3%. (Barreto et al., 2006). In mounting body of study conducted among Sudanese women, Rubella virus was detected in 65.3% (Hamdan et al., 2011) and 95.1% (Adam et al., 2013). In growing number of studies conducted in Turkey, rubella seropositivity among pregnant women was reported to be between 93.8 and 100% (Aksakal et al., 2007; Pehlivan et al., 2007; Seker et al., 2004). It was found that the age group of 20 to 29 and 30 to 39 had a significant correlation with antibody sero-positive. This confirms the correlation between the age and Rubella seroprevalence, which has been reported by others in Cameroon (Fokunang et al., 2010).

CONCLUSION AND RECOMMENDATION

Since this study is cross sectional, it is difficult to say whether the occurrence of high antibody titre preceded or followed the past abortions in women enrolled in this study. Generally, the rubella virus plays a significant role in the occurrence of abortion. It is recommended that routine screening of rubella is needed for pregnant women in Sudan to reduce the abortions that may be due to rubella virus.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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REFERENCES


