Rubella Immune State of A Sample of Pregnant Women at Al-Falluja City-Anbar Province

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ABSTRACT:

BACKGROUND:

Rubella infection of a pregnant woman may end with serious adverse outcome depending on gestational age at time of infection. Congenital rubella infection may cause various disabilities in addition to increased risk of many diseases in future life. Vaccination in childhood is an effective method of prevention of this disease.

OBJECTIVE:

To assess susceptibility of a sample of pregnant women in Falluja city to rubella infection.

SUBJECTS AND METHODS:

From May to August 2017, 95 pregnant women attending private clinic in Falluja city were included in cross sectional study to assess rubella IgM and IgG antibodies using ELISA kits and ELFA technique respectively.

RESULTS:

None of the pregnant women found to have IgM antibodies. Rubella IgG serum level varies from 0-400 IU/ml. Of 97 pregnant women included in this study, 23 (24.2%) were non-immune to rubella having IgG level less than 10 IU/ml. There was no significant association between age, parity or history of previous abortion with IgG level.

CONCLUSION:

Congenital rubella infection is a probable hidden health problem. Routine screening of pregnant women and vaccination of susceptible women after delivery should be applied in all health care institutions.

KEY WORDS: rubella, pregnant women, IgG, IgM.

INTRODUCTION:

Rubella virus is the causative organism of a disease previously called German measles. It often cause mild sickness in children giving them lifelong immunity[1] but the major concern a of bout rubella is when affecting pregnant women causing fetal infection and infants may present with congenital rubella syndrome with multiple congenital abnormalities including heart defects, deafness and eye defects[2]. Congenital rubella may also cause neurological defects like psychomotor, mental and speech delay[3]and it was found it is associated with development of schizophrenia in adulthood[4].Also there is 200 times higher incidence of autism in children with congenital rubella syndrome[5].Congenital rubella infection increase the incidence of both type 1 and type 2 diabetes and rubella virus has been isolated from the pancreas of infants at autopsy[6].

Maternal infection is frequently subclinical or causes signs and symptoms that are shared by many other infections like parvovirus B19 infection[3]. The risk of fetal infection due to maternal rubella is related to the gestational age of pregnancy in which the risk is high in early pregnancy reaching 81% if maternal rubella occurs in the first 12 weeks of pregnancy and decreases to 25% at the end of the second trimester and the risk increase again to 100% if maternal infection happens in the last month of pregnancy [7].

For prevention of this disabling congenital infection, a live attenuated virus vaccine was introduced. Two different vaccination programs were used. First one is to vaccinate all infants.

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Second program involves vaccination of adolescent girls. Both programs had partial success and many countries adapted a combined infant and adolescent girls immunization program[8].Rubella vaccine is given in combination with measles and mumps vaccines (MMR vaccine) and many developed countries have achieved their goal of elimination of this disease namely northern Europe and united state[2].In spite of vaccination program implementation, rubella outbreaks still occurring like outbreaks in Japan for the period from 2012 to 2013 [9] ,in Romania from 2011 to 2012 [10]and in Egypt from 2005-2007[11]. So, rubella still an important cause of congenital abnormalities with 100000 cases of congenital rubella syndrome worldwide every year[12].

In Iraq ,MMR vaccination is part of vaccination program .However, Iraq in general and Fallujah city specifically have witnessed long periods of instability and people were displaced many times making total coverage of the population with the vaccine practically impossible.

AIM OF THE STUDY:

To assess the rubella immune status in a sample of pregnant woman at Al-Falluja city_Anbar province.

Subjects and Methods:

After ethical approval by ethical approval committee/University of Anbar(Ref: 17/2017), a cross sectional study was conducted at Al-Falluja city for a period of 4 months extended from May through August 2017 in which blood samples were taken randomly from 100 pregnant women at their first trimester attending private clinic. 3 ml of blood was aspirated from each woman .The blood samples were centrifuged and the obtained sera were stored at -20C^0. Serum could not be obtained from 5 samples due to technical problem. After thawing, 95 serum samples were screened for IgM antibodies to rubella using ELISA (Enzyme Linked Immunosorbant Assay) kit and quantitative assay for IgG antibodies to rubella using the ELFA technique (Enzyme Linked Fluorescent Assay).

Interpretation of the IgG & IgM Testing:

Few days after infection or vaccination, IgM antibodies can be detected and continue as seropositive up to 8 weeks after natural infection and 6 months after vaccination. So, in adult, IgM seropositive result indicates acute rubella infection [13].

IgG antibodies can be detected 2-3 weeks after infection or vaccination and persist giving lifelong immunity[13].A serum IgG level of less than 10 IU/ml consider as non-immune person while a level 10IU/ml and more is protective against rubella infection[14]. The IgG antibodies indicate vaccination or previous infection but the exact time of infection is unknown[3].

Accordingly, the following possibilities may be found:

1- IgM seropositive with IgG level less than 10 IU/ml : It indicates acute infection in the last 2-4 weeks.
2- IgM seronegative with IgG less than 10 IU/ml :It indicates no previous exposure to the virus and the pregnant woman is susceptible to have this infection .
3- IgM seronegative with IgG more than 10IU/ml: It indicates immunity to rubella.

RESULTS:

The study included 95 pregnant women their age ranges from (19- 40) years.As shown in table (1), 32 of the included women were primigravidas (they have no previous pregnancy) and 63 were multigravidas (they have one or more previous pregnancies). 15 women have a history of previous abortion and 3 women have children with congenital abnormalities.

Table 1: The demographic and obstetric history distribution of pregnant women.

Women age	No (%)
19---29 years	63 (66.3%)
30---40 years	32 (33.7%)
Mean±SD (Range)	25.1±4.6 (19-40)
Women parity	
Primigravida	32 (33.7%)
Multigravida	63 (66.3%)
History of abortion (miscarriage)	
Yes	15 (15.8%)
No	80 (84.2%)
History of congenital abnormalities	
Yes	3 (3.2%)
No	92 (96.8%)
IgG level (IU/ml)	
<10	23 (24.2%)
=>10	72 (75.8%)
Mean±SD (Range)	73.6±81.1 (0-400)

In the present study, all the studied group were IgM seronegative, which mean that no case of acute infection had been detected. Regarding IgG antibodies, 23 women had a serum level less than 10 IU/ml as shown in table (1).

Quantitative assay of IgG showed wide variability ranging from zero to more than 400 IU/ml. Fifty-two out of 72 immune pregnant women (72.2 %) have rubella IgG level more than 50 IU/ml as shown in figure (1).

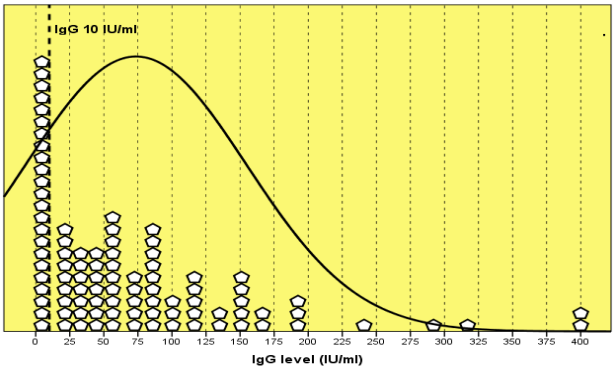

Figure 1: The distribution of Rubella IgG (IU/ml) in pregnant women.

The current study found no significant association between IgG level and age of the studied group as shown in table (2).

Table 2: The distribution of study group according to age and IgG level

	Women age (years)			P value
	19---29	30---40	Total	
IgG level (IU/ml) <10	16(25.4%)	7(21.9%)	23 (24.2%)	0.705(NS)
=>10	47 (74.6%)	25(78.1%)	72 (75.8%)	
IgG level (=>10)(IU/ml)				
10---49 IU/ml	16(34.0%)	7 (28.0%)	23 (31.9%)	0.564(NS)
50---99 IU/ml	18(38.3%)	8 (32.0%)	26 (36.1%)	
=>100 IU/ml	13(27.7%)	10(40.0%)	23 (31.9%)	
Pearson Chi-square test used at 0.05 level NS = non-significant				

This study found no significant association between immunity to rubella infection and age of the studied group or with parity. Also there was no significant association between rubella immune state and history of previous abortion as shown in table(3).

Table 3: The distribution of IgG level according to age, parity, history of abortion.

		IgG <10 IU/ml (non-immune)	IgG =>10 IU/ml (immune)	P value
Age (years)	19---29	16(25.4%)	47 (74.6%)	0.705(NS)
30---40		7(21.9%)	25(78.1%)	
Parity	Primigravida	7 (5.8%)	25 (94.2%)	0.705(NS)
	Multigravida	16 (25.4%)	47 (74.6%)	
Previous abortion	Yes	6 (40.0%)	9 (60.0%)	0.120(NS)
No		17 (21.3%)	63 (78.7%)	
Pearson Chi-square test used at 0.05 level NS = non-significant				

Three women in this study have children with different congenital abnormalities as shown in table (4).

Table 4: The distribution of IgG level according to history of congenital abnormalities.

History of cong. abnormalities	No	Case presentation
Yes	3 (3.2%)	Case 1: Age 30 years, IgG level 119 IU/ml, Type of abnormality is congenital heart disease Case 2: Age 29 years, IgG level 81 IU/ml, Type of abnormality is microphthalmia and deafness. Case 3: Age 36 years, IgG level 16 IU/ml, Type of abnormality is autism.
No	95 (96.8%)	

DISCUSSION:

In many countries, screening for rubella antibodies is done as part of routine investigations at the first antenatal visit to identify non-immune pregnant women and offer them vaccination post-delivery as the vaccine is a live attenuated virus which is contraindicated during pregnancy [3]. In Iraq, surveillance for rubella antibodies in not part of routine investigation of pregnant women at health care system nor a common practice in the private sector of it.

Falluja city has a high incidence of congenital abnormalities reaching 8.4% in comparison with Saudi Arabia where in incidence is 3% [15].Although depleted uranium and other elements contamination has been studied as a possible cause but none of these infants were investigated for possibility of congenital infection [16].

In this study, 24% of the pregnant women were susceptible to rubella and this is much higher than what is found in Babylon province in which 10.7%

of pregnant women were susceptible to rubella[17].Also this susceptibility is higher than those found in neighboring countries in which in a study conducted in Istanbul showed that all pregnant women were immune [18]and in a study conducted in Saudi Arabia, 8.4% of the pregnant women were susceptible to rubella[19].For comparison, in London, less than 2% of women borne in UK were susceptible to rubella[20].

In agreement with the study that has been carried out in Babylon province [17], this study showed that there is no significant association between age, parity and previous history of abortion and rubella immunity. This contradicts with the study conducted in Saudi Arabia which showed that rubella immunity significantly decreases with increasing age and the author's explanation that these antibodies resulted from vaccination given many years ago will be lost with time. This indifference in relation to age in our study reflects variable mode of gaining immunity that is by natural infection rather than by vaccination and lacking of medical records in this unstable city make identification of vaccinated women impossible.

Regarding quantitative assessment of IgG level, the current study showed that immune women have IgG level range between 0-400 Iu/ml while the study done in Istanbul [18] showed IgG level ranging between 24-143 IU/ml.This very high IgG level detected in our study in some of the cases may be explained by recent immunity due to natural infection.

In this study,it was found that 72.2% of immune women have IgG level more than 50 IU/ml so nearly one third of immune women have low protective level of IgG with possible risk of re-infection in the future while the study done in Istanbul showed that 91% of immune women have IgG level more than 50 IU/ml [18] .

CONCLUSION:

Congenital rubella infection is an under-recognized health problem. Teenage girls should be vaccinated to protect them in the future when they become pregnant.Until then, routine testing of pregnant women for rubella antibodies should be encouraged with offering of vaccination post-delivery for non-immune women.Newbornes with congenital abnormalities should be tested for rubella as possible cause.

Recommendation

Wider study is needed for women in reproductive age attending primary health care center for any reason.

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