Seroprevalence of Anti-Rubella IGg Antibody Among Pregnant And Childbearing Women in Diyala Province-Iraq

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Abstract

Background: In countries where the rate of susceptible women to rubella infection is higher than 10%, preconceptional or prenatal screening is important to reduce the burden of the disease.

Objectives: determination of anti-rubella IgG seropositivity and susceptibility rates among pregnant and childbearing women in Baquba-Diyala province.

Subjects and methods: A total of 184 women were enrolled in the present study which was conducted in Baquba-Diyala province during the period from April/2007 to September/2008. Ninety eight pregnant women were chosen from those attending the primary health care centers in Baquba. They include 46(46.9%) who had previous abortions with a mean age 27.2 ± 5.3 years, and 52(53.1%) without previous abortion with mean age 23.7± 5.1 years. Additionally, 86 non-pregnant childbearing women were enrolled as a control group. Of those, 39(45.3%) had previous abortion with mean age 33.5 ± 7.8 years, and 47 (54.6%) without previous abortion, the mean age 30.7±7.8 years. Certain demographic factors were collected by personal interview. Anti-rubella IgG specific antibody were detected by enzyme-linked immunosorbant assay (ELISA). Data were statistically analyzed using SPSS version 13 computer assisted program. P value of < 0.05 was considered significant.

Results: The results revealed that the IgG seropositivity among pregnant women without previous abortion, and those with previous abortion was 96.1% and 76% respectively, with a statistically significant difference (p=0.04). The seropositivity among non-pregnant women without previous abortion, and those with previous abortion was 85.1% and 100% respectively, with a statistically insignificant difference (p= 0.11). The overall susceptibility rate for rubella infection was 10.7%. There was insignificant effect of age, educational levels, residency, presence of pregnancy, and history of previous abortion on the seropositivity rate of IgG specific anti- rubella antibody.

Conclusion: evaluation of the susceptibility of women in the reproductive age to rubella infection is essential to set a strategy for prevention of congenital rubella syndrome.

Keywords: rubella, congenital rubella syndrome, susceptibility rate.

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Introduction

Rubella is a common childhood rash disease. The most serious consequences of rubella result from infection during the first trimester of gestation including miscarriage, fetal death, and congenital anomalies [1]. Upto 90% of infants born to mothers infected during the first 11 weeks of gestation develop congenital rubella syndrome (CRS) [2,3]. Therefore, it is essential to evaluate the susceptibility of women (anti-rubella IgG seronegative) in the reproductive age in order to set a strategy for prevention of CRS [4,5]. Studies conducted to determine the anti-rubella IgG seropositivity rate among pregnant women have yielded a range of (86.5%-100%)[6-10]. The association of seropositivity rate with age, residency, mother occupation, number of previous gestations, number of household contacts, economic status, and levels of education have yielded controversial results [11-16]. In Iraq, a previous study on pregnant women found that the seroprevalence was 88.2% [17]. On the other hand, the seropositivity rate among childbearing women was reported to be ranged between 90.9% -100% [6,10,16].

The world Health Organization considered a rubella susceptibility rate of more than 10% of all women in a community as a predisposing factor for CRS and a value of more than 20% as very high risk [18]. Therefore, the Advisory Committee on Immunization Practices recommended that women whose rubella vaccination history is unreliable or who lack laboratory evidence of immunity should receive MMR vaccine upon completion or termination of pregnancy [19].

Subjects and methods

A total of 184 women were enrolled in the present study which was conducted in Baquba-Diyala province during the period from April/2007 to September/2008. Ninety eight pregnant women were chosen from those attending the primary health care centers in Baquba. They include 46(46.9%) who had previous history of abortions with a mean age 27.2 ± 5.3 years, and 52(53.1%) without previous abortion with mean age 23.7 ± 5.1 years. Additionally, 86 non-pregnant childbearing women were enrolled as a control group. Of those, 39(45.3%) had previous history of abortion with mean age 33.5 ± 7.8 years, and 47 (54.6%) without previous abortion, the mean age 30.7 ± 7.8 years. Certain demographic factors were collected by personal interview. Anti-rubella IgG specific antibody were detected by enzyme-linked immunosorbant assay (ELISA). Data were translated to computerized data base and processed using SPSS version 13 program. P value of < 0.05 was considered significant.

Results

The Chi-Square analysis for paired comparison revealed that the anti-rubella IgG seropositivity rate was significantly higher in pregnant women without previous abortion compared to pregnant women with previous abortions (96.1% vs 76%) (p=0.04). Likewise, a significantly higher rate was found in childbearing women with previous abortion compared to pregnant women with previous abortion (100% vs 76%), (p= 0.02). Whereas, the seropositivity rate among childbearing women with previous abortions was insignificantly higher than that in childbearing women without abortion (100% vs 85.1) (p= 0.11), table (1).

Table 1: Anti-rubella IgG seropositivity rate among study groups.

Study groups	No. tested	Anti-rubella IgG		95% CI*
		No.	%	
Pregnant without abortion	52	50	96.1	(89.5-100)
Pregnant with abortion	46	35	76	(59.3-92.7)
Non-pregnant without abortion	47	40	85.1	(71.8-98.6)
Non-pregnant with abortion	39	39	100	**
Total	184	164	89.1	

*CI: confidence interval

Regarding the age groups, the results showed that the highest anti-rubella IgG seropositivity rate was among those with 40 years and more, while the lowest rate was among women less than 20 years old. However, there was insignificant difference among the age groups (p=0.65), table (2).

Table 2: Anti-rubella IgG seropositivity rate by age groups.

Age groups (Ys)	No. tested	Anti-rubella IgG positive		95% CI
		No.	%	
>20	54	46	85.2	(77.8-97.8)
20-29	75	69	92.0	(83.8-98.6)
30-39	42	36	85.7	(76-99)
≥ 40	13	13	100	**
Total	184	164	89..1	

P= 0.22[NS]

The distribution of anti-rubella IgG seropositivity rate according to the levels of education revealed that the highest rate was among women with higher education and the lowest rate was among illiterated women. However, the difference was statistically insignificant (p=0.22), table (3).

Table 3: Anti-rubella IgG seropositivity rate by educational levels.

Educational levels	No. tested	Anti-rubella IgG positive		95% CI
		No.	%	
illiterated	42	34	80.9	(71- 96.8)
Primary school	85	79	92.9	(87.9- 99.7)
Intermediate school	26	22	84.6	(62.5-97.5)
Secondary school	24	22	91.6	(82.9-100)
High education	7	7	100	**
Total	184	164	89..1	

P= 0.22[NS]

Although the anti-rubella IgG seropositivity rate was higher in urban women compared to that of rural women (90.4% vs 84.2%0). However, the difference was failed to reach the level of statistical significance (p= 0.48), table (4).

Table 4: Anti-rubella IgG seropositivity rate by residency.

Residence	No. tested	Anti-rubella IgG positive		95% CI
		No.	%	
Urban	146	132	90.4	(85.7-96.3)
Rural	38	32	84.2	(73.6-98.8)
Total	184	164	89..1	

P= 0.48 [NS]

The results also showed that the presence of pregnancy was not a risk factor for a significant increase in the seropositivity rate of anti-rubella IgG among the study groups (p=0.36), table (5).

Table 5: Anti-rubella IgG positivity rate by pregnancy.

Presence of pregnancy	No. tested	Anti-rubella IgG positive		95% CI
		No.	%	
No	98	90	91.8	(85.1-99.5)
Yes	86	74	86.0	(77.7-95.9)
Total	184	164	89..1	

P=0.36[NS]

The history of previous abortion was found to be insignificantly increase the seropositivity rate of anti-rubella IgG(p=0.36), table (6).

Table 6: Anti-rubella IgG seropositivity rate by previous abortion.

Previous abortion	No. tested	Anti-rubella IgG positive		95% CI
		No.	%	
No	99	90	90.9	(83.3-98.5)
Yes	85	74	87.0	(79-97)
Total	184	164	89..1	

P=0.36[NS]

The rate of susceptibility to rubella infection (anti-rubella IgG negative) was 13.2% among pregnant women and 8.1% among childbearing women. The overall susceptibility rate among participant women was 10.7%, table (7).

Table 7: The susceptibility rate among study groups.

Study groups	No. tested	Anti-rubella IgG negative		95% CI
		No.	%	
Pregnant women	98	13	13.3	(4.1-22.3)
Non-pregnant women	86	7	8.1	(0.5-14.9)
Total	184	20	10.7	

Discussion

The overall seroprevalence of anti-rubella IgG among pregnant women obtained in the present study was 86.7%. This result is almost similar to another study conducted in Baghdad [17], but it is higher than those reported by certain studies [11,15], and lower than other studies conducted elsewhere abroad [7-9,12-14,20]. We thought that one of the important reasons behind these variable results is the strength and reliability of the implemented vaccination programs.

Moreover, premarital or prenatal vaccination against rubella has been adopted by certain countries [10, 21]. Of note, in our participants we do not know the source of anti-rubella IgG whether from natural infection or from previous vaccination during the childhood, because in our country, premarital or prenatal vaccination are not routinely done. Furthermore, even the MMR vaccination program during the childhood was frequently interrupted at least through the last 15 years due to sanction and subsequent unsuitable security conditions.

In the present study, the non-pregnant women in the childbearing age had an overall anti-rubella IgG positivity rate 91.8%. This result is within the range obtained by other reports [6,10,16]. The slightly higher positivity rate in non-pregnant compared to pregnant women obtained in the current study (86.7% vs 91.8%) may be due to residual IgG antibody after clinical or subclinical infection by rubella virus during the last pregnancy, since 12.2% of pregnant women enrolled in this study were positive for anti-rubella IgM (previous study)[22].

Most previous studies like the present one agree that the anti-rubella IgG positivity rate was increased by age [6,13,14,16]. Probably the chance of exposure to wild rubella infection is increase as the age progress.

The insignificantly higher anti-rubella IgG positivity rate among urban compared to rural women (90.4% vs 84.2%) is consistent with previous studies [12, 16], but it is inconsistent with other [11]. The higher population density in urban areas and the transmission of rubella virus through the respiratory droplets undoubtedly prone people reside in such areas to higher risk for acquiring rubella infection.

Although it was insignificant, the anti-rubella IgG positivity rate was appeared to be highest among women with higher education. Similar result has been reported by Majliessi

et al. (2008)[13] who found insignificant effect of educational levels on the IgG positivity rate among pregnant women. Motivation of health education regarding the risks of rubella infection seems beneficial for women to minimize the burden of the disease.

The overall rate of susceptible (non-immune) women was 10.7%, with slightly higher in pregnant women compared to non-pregnant women (13.3% vs 8.1%). Previous studies have reported variable rates [8,9,14,16]. Nevertheless, the world Health Organization considered a rubella susceptibility rate of more than 10% of all women in a community as a predisposing factor for CRS and a value of more than 20% as very high risk [18]. Therefore, the present study recommends that all women whose rubella vaccination history is unreliable or who lack laboratory evidence of immunity should receive MMR vaccine upon completion or termination of pregnancy and vaccinated women should be informed to avoid pregnancy for 28 days after vaccination.

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