

## Seroprevalence of anti-rubella IgM antibody among pregnant and childbearing women in Diyala province

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### ABSTRACT

**Background and Objective:** Rubella infections acquired postnatally are usually mild, but maternal infection during pregnancy is associated with considerable risk of intrauterine fetal infection with multi-system damage. Detection of anti-rubella IgM specific antibodies among pregnant and childbearing women in Baquba city and to explore the effects of certain demographic factors.

**Methods:** The present study was conducted in Baquba-Diyala province during the period from April/2007 to September/2008. Ninety pregnant women were chosen from those attending the primary health care centers in Baquba. They include 30(33.3%) pregnant women who had previous abortions with a mean age  $27.2 \pm 5.3$  years, and 60(66.7%) pregnant women without previous abortion with mean age  $23.7 \pm 5.1$  years. Additionally, 94 non-pregnant childbearing women were enrolled as a control group. Of those, 37(39.4%) had previous abortions with mean age  $33.5 \pm 7.8$  years, and 57 (60.6%) without abortion, the mean age was  $30.7 \pm 7.8$  years. Certain demographic factors were collected by personal interview. Anti-rubella IgM specific antibody was detected by enzyme-linked immunosorbant assay (ELISA). Data were statistically analyzed using SPSS computer assisted processing. P value of  $< 0.05$  was considered significant.

**Results:** The results revealed that 3(5%) of pregnant women without previous abortion and 8(26.7%) of pregnant women who had previous abortions were seropositive for anti-rubella IgM antibody. The difference between the two groups was statistically significant ( $p= 0.003$ ). Whereas, the IgM seropositivity was insignificantly higher in childbearing women without previous abortion compared to childbearing women who had previous abortions (24.6% vs 16.2%), ( $p=0.33$ ). Furthermore, the IgM seropositivity among childbearing women without previous abortion was significantly higher compared to pregnant women without previous abortion (24.6% vs 5%), ( $p=0.003$ ). The presence of life births, time of gestation, and the levels of education significantly affect the seropositivity rate of IgM.

**Conclusions:** Prenatal screening for anti-rubella IgM antibody is an important tool to identify active infection and to provide obstetric management to avoid the risk of congenital rubella syndrome.

**Key words:** Rubella, Congenital rubella syndrome, childbearing women.

### INTRODUCTION:

Rubella infections acquired postnatally are usually mild or even asymptomatic. The major public health concern posed by rubella is its teratogenicity with maternal infection early in pregnancy leading to congenital rubella syndrome (CRS) in

infants<sup>1</sup>. Maternal infection during the first 8 week of gestation result in nearly all fetuses becoming infected and upto 100% of them develops congenital defects<sup>2</sup>. As with primary rubella infection, the gestational age at the time of reinfection influences the chance of fetal abnormalities<sup>[3]</sup>. Studies on prenatal screening for IgM

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specific have yielded variable rates of infection ranging from 0% to 14.8%<sup>4-12</sup>. Nevertheless, the rate of IgM among pregnant women with previous abortions or bad obstetric history was reported to be higher<sup>15,61</sup>. Among childbearing women, the rate of anti-rubella IgM was reported to be ranged between 0%-3.2%<sup>13,14</sup>. Zheng *et al.* (2002)<sup>15</sup> in China, reported 7.4% positivity rate of anti-rubella IgM among pregnant women, and the virus RNA was detected in the placental and dead aborted fetal tissues of 3 women by polymerase chain reaction. In Iraq, the rate of anti-rubella IgM among pregnant women in the first trimester of gestation was 2.8%<sup>16</sup>. In another study, the rate of IgM among pregnant women in the first and second trimester of gestation was 2%<sup>17</sup>. However, among non-immunized women, the rate of IgM was reported to be 15%<sup>18</sup>.

#### MATERIALS AND METHODS:

The present study was conducted in Baquba-Diyala province during the period from April/2007 to September/2008. Ninety pregnant women were chosen from those attending the primary health care centers in Baquba. They include 30(33.3%) pregnant women with previous abortions with a mean age  $27.2 \pm 5.3$  years, and 60(66.7%) pregnant women without previous abortion with mean age  $23.7 \pm 5.1$  years. Additionally, 94 non-pregnant childbearing women were enrolled as a control group. Of those, 37(39.4%) had previous abortions with mean age  $33.5 \pm 7.8$  years, and 57 (60.6%) without previous abortion, the mean age  $30.7 \pm 7.8$  years. Certain demographic factors including age, residence, number of life births, time of abortion, and educational levels, were collected by personal interview. The immunization status of participants was ignored because there is no confidential records in health care settings, and on the other hand we can not relay completely on participant's claim. Anti-rubella IgM specific antibody was detected by enzyme-linked immunosorbant assay (Biokit,

to computerized data base and processed using SPSS version 13 computer assisted program. P value < 0.05 was considered significant.

#### RESULTS:

The results revealed that the anti-rubella IgM seropositivity rate among pregnant women with previous abortions and those without abortion was (26.7% and 5%) respectively. The difference between the two groups was statistically significant (P Chi-square = 0.003). In childbearing women with previous abortion and without abortion, the positivity rate was 16.2% and 24.6% respectively. The difference between the two groups was statistically insignificant (P Chi-square = 0.33). A comparison of anti-rubella IgM between pregnant and childbearing women without previous abortion yield a statistically significant difference (P Chi-square = 0.003). Whereas, difference between pregnant and childbearing women with previous abortions was statistically insignificant (P Chi-square=0.30),(Table 1).

**Table1:** Anti-rubella IgM seropositivity rate among study groups.

Study groups	No. tested	Anti-rubella IgM		95% CI*
		positive	%	
Pregnant with previous abortion	30	8	26.7	(10.9-42.5)
Pregnant without abortion	60	3	5	(0-105)
Non-pregnant with previous abortions	37	6	16.2	(4.3-28.1)
Non-pregnant without abortion	57	14	24.6	(13.3-35.8)

• CI: confidence interval

The anti-rubella IgM seropositivity rate was found to be significantly higher in women with previous life births compared to those without life birth (20.7 % and 9.5%) respectively (P Ch-square < 0.05), (Table2).

**Table 2:** Anti-rubella IgM seropositivity by presence of life births.

Variables	No. tested	Anti-rubella IgM	
		No.	%
Women with previous life births	121	25	20.7
Women without life birth	63	6	9.5

**P Chi-square < 0.05 [S]**

Although the anti-rubella IgM seropositivity rate among women with two dead births was higher than those with none or single dead birth; however, the difference was statistically insignificant (P=0.30), (Table 3).

**Table 3:** Anti-rubella IgM seropositivity by

Variables	No. tested	Anti-rubella IgM	
		No.	%
Women with no dead birth	163	25	15.3
Women with single dead births	18	5	27.8
Women with two dead births	3	1	33.3

number of dead births.

**P Chi-Square =0.30[NS]**

According to the history of previous abortion, the result showed that women with 3 or more previous abortions had higher anti-rubella IgM seropositivity rate,

significance (P= 0.27), (Table 4).

**Table 4:** Effect of previous abortion on anti-rubella IgM seropositivity.

Number of previous abortion	No. tested	Anti-rubella IgM	
		No.	%
None	117	17	14.5
Single	40	8	20
Two	16	2	12.5
Three and more	11	4	36.4

**P= 0.27 [NS]**

The results also showed that the anti-rubella IgM seropositivity rate was significantly higher among women in the first trimester of gestation compared to those in the second and third trimester of gestation (P < 0.05), (Table 5).

**Table 5:** Anti-rubella IgM seropositivity by the time of gestation.

Variables	No. tested	Anti-rubella IgM	
		No.	%
Pregnant women in 1 <sup>st</sup> . trimester	9	2	22.2
Pregnant women in 2 <sup>nd</sup> . trimester	60	7	11.7
Pregnant women in 3 <sup>rd</sup> . trimester	21	2	9.5

Regarding the effect of educational levels of participants on the anti-rubella IgM, although the highest seropositivity rate was recorded among illiterated women; however, this result was failed to reach the statistical significance (p= 0.09), (Table 6).

**Table 6:** Effect of educational levels on anti-rubella IgM seropositivity.

Educational levels	No. tested	Anti-rubella IgM		95% CI
		No.	%	
illiterate	34	10	29.4	(10.9-36.7)
Primary school	80	15	18.7	(8-22)
Secondary school	53	5	9.4	(0-24.7)
High education	17	1	5.8	(0-13.2)

The results also revealed that urban women had insignificantly higher rate of anti-rubella IgM seropositivity compared to rural women ( $P=0.79$ ), (Table 7).

**Table 7:** Effect of residence on anti-rubella IgM seropositivity.

Residence	No. tested	Anti-rubella IgM		95% CI
		No.	%	
Urban	139	24	17.3	(8.7-19.1)
Rural	45	7	15.5	(3.8-12.2)

**P= 0.79 [NS]**

Table (8) showed that women in the age group 20-29 years had significantly higher anti-rubella IgM seropositivity rate compared to other age groups ( $p=0.011$ ).

**Table 8:** The distribution of antirubella IgM according to age groups.

Age groups (ys)	No. tested	Anti-rubella IgM		95% CI
		No.	%	
< 20	48	1	2.1	(0-5)
20-29	77	19	24.7	(11.8-72.8)
30-39	43	9	20.9	(6.9- 27.1)
40 +	16	2	12.5	(0-23.1)

**DISCUSSION:**

The utmost important result obtained in the present study is the high seropositivity rate of anti-rubella IgM whether among pregnant or non-pregnant childbearing women (12.2% and 21.3%) respectively. These results are higher than the results reported by other local studies<sup>16-18</sup>, or in the neighboring or elsewhere countries<sup>4-12</sup>. Even if we considered the probable factors that may contribute to these high seropositivity rates, such as, the sample size and the sensitivity and specificity of the laboratory procedure employed, it still that the present results clearly pointed to the magnitude of rubella infection in Baquba community. Of note, rubella is just one of the infections beside toxoplasmosis, cytomegalovirus, *Chlamydia trachomatis*, and herpes simplex-2 (TORCH) that poses real risk for pregnant women in any given community<sup>4,6,7,13</sup>. Therefore, if the net effect of all these infections are considered collectively in a community like that of Baquba, so one can realize how the big problem is. It is worth to mention that with the exception of the present study on rubella, there are no reliable studies on other TORCH infections in Baquba. Therefore, a comprehensive study on seroprevalence of TORCH infections among general population as well as pregnant women is recommended. The most important factor that contributes to the high prevalence of rubella infection may be the route of transmission by respiratory droplets that is most prevalent during childhood<sup>19</sup>. It has been documented that in household setting, the existence of infected children even if they were asymptomatic may transmit the virus to non-immune individuals<sup>16</sup>. Logically, the first candidate to catch infection are mothers, and this undoubtedly explain the significantly higher rate of anti-rubella IgM among women with previous life births compared to those with no life birth (20.7% and 9.5%) respectively. However, the present results are higher

among pregnant women in the first trimester of gestation is another fascinating result obtained in the present study and even higher than the results reported by previous workers<sup>11,16,18</sup>. It has been reported that maternal infection during the first 8 weeks of gestation leads to intrauterine infection of fetuses and upto 100% of them develop congenital defects<sup>20,21</sup>. Of note, subclinical rubella reinfection during pregnancy in previously vaccinated women with the transmission of the virus to the fetus was documented<sup>22</sup>. Therefore, detection of anti-rubella IgM in early pregnancy is recommended to identify active disease and to provide obstetric management to avoid the risk of congenital transmission of infection. Regarding the educational levels, the current study found that the highest rate of anti-rubella IgM was among illiterate women. This result is not unusual, since illiterate women had little or no health education about the rubella virus, its transmission, and the means of protection. Although it is insignificant, the slightly higher seropositivity rate of infection among urban women compared to those reside in rural areas may be related to the lifestyle and the immune status of urban women. Since humans are the only known reservoir for rubella virus, maintenance of rubella requires continuous access to susceptible population<sup>2</sup>. Before the implementation of rubella vaccine, infection was most common in the 5-9 years old group, with the advent of childhood vaccination there was a shift in disease incidence to young adults<sup>23</sup>. This may be the reasonable explanation of the significant increase in rubella IgM among women with 20-29 years old. This study concluded that prenatal screening for anti-rubella IgM antibody is an important tool to identify active infection and to provide obstetric management to avoid the risk of congenital rubella syndrome.

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