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in Diyala province**

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**Abstract**

Rubella is the mildest of common viral exanthems. However, infection during early pregnancy may result in serious abnormalities of the fetus including congenital malformation and mental retardation. The objectives of the present study are to determine the seropositivity rate of anti-rubella IgG and IgM antibodies among premarriage girls in Diyala province.

A total of 358 subjects were included in the present study. The study was extended from 7/April/2007 to 30/September/2008. 186 (51.9%) were females with mean age  $16.7 \pm 2.1$  years, and 172(48.1%) were males with mean age  $24.5 \pm 5.5$  years. Those subjects were randomly selected from those attending the Public Health Laboratory in Baquba for premarriage investigations. Further information regarding age, residence, educational levels was taken by personal interview. Detection of anti-rubella antibodies was done by enzyme-linked immunosorbant assays (ELISA) using (Biokit, Spain). Data were statistically analyzed using SPSS version 13 computer assisted processing. P value  $<0.05$  was considered significant. The results showed that all males and females were negative for anti-rubella IgM antibody. However, 168 (97.7%) of males and 170(91.4%) of females were positive for anti-rubella IgG antibody. Therefore, the rate of non-immune females was higher than that of males (8.6% vs 2.3%). In conclusion premarital screening for anti-rubella IgG and vaccination of non-immune girls could minimize the risk of rubella infection during pregnancy and child-bearing period.

**Key words:** Rubella, Congenital rubella syndrome, premarriage girls

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## **Introduction**

Rubella is a mild viral infection of childhood caused by non-arthropod-borne member of the family *togaviridae*. At least half of all primary rubella infections are subclinical [1]. However, if it is acquired during pregnancy it may cause abortion, stillbirth, premature delivery, low birth weight, and a number of congenital anomalies [2]. Since the introduction of rubella vaccination in 1969, the rate of rubella infection and congenital rubella syndrome (CRS) has markedly decreased in certain developed countries, but the global picture is different, with only 28% of developing countries have routine vaccination against rubella [3]. In 1996, the World Health Organization encourages all countries to consider universal rubella vaccination of children and ensure immunity in women of childbearing age [4]. Therefore, Strengthening of rubella and CRS surveillance programs in parallel with pre-marriage counseling has been recommended for young females [5].

Several studies conducted to ascertain the seroprevalence of rubella infection in young females have yielded variable results. In Saudi Arabia, the anti-rubella positivity rate among MMR(measles, mumps and rubella) vaccinated children at 13 years old was 100% [6]. In Jordan, the seroprevalence among young female (15-19) years was 83% that is significantly lower than that of childbearing women [5].

The overall rubella seroprevalence of unvaccinated adolescents in Ankara (Turkey) was 92.6% [7]. In another study, the anti-rubella antibody seroprevalence among unvaccinated 12-17 years old Turkish girls was 93.1% , indicating that 6.9% had considerable risk for rubella infection during pregnancy [8]. Among Yemeni schoolgirls aged 11-21 years old, the positivity rate of anti-rubella IgG was 91.6% [9]. In Greece, the susceptibility rate for rubella infection among girls 11-15 and 16-20 years old were 22.9% and 8.7% respectively [10]. In Iraq, the seroprevalence among teenage girls in Baghdad was 95.4% [11].

Although studies on the seroprevalence of rubella infection in men is scarce, however, it was found to be ranges from 87.9% in Spain through 93.0% in Mexico to 100% in Iraq [11-13].

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### Materials and methods

The present study was conducted in Baquba city- the center of Diyala province, for the period from 7/ April/2007 to 30/ September/2008. A total of 358 subjects were included. 186 (51.9%) were females with mean age  $16.7 \pm 2.1$  years, and 172(48.1%) were males with mean age  $24.5 \pm 5.5$  years. Those subjects were randomly selected from those attending the Public Health Laboratory in Baquba for premarriage laboratory investigations (including screening for HIV 1 & 2, syphilis and blood group & Rh). Further information regarding age, residence, educational levels was taken by personal interview. Detection of anti-rubella IgG antibody was done by enzyme-linked immunosorbant assays (ELISA) using (Biokit, Spain). Data were converted to computerized data base. Statistically analyses were sought using SPSS version 13 computer assisted processing. P vale was considered significant when it is  $< 0.05$ .

### Results

The results showed that all males and females were negative for anti-rubella IgM antibody. However, 168 (97.7%) of males and 170(91.4%) of females were positive for anti-rubella IgG antibody, table (1).

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

Sex	No. tested	Anti-rubella IgG		95% CI
		Positive	%	
Female	186	170	91.4	(82.1-100)
Male	172	168	97.7	(93.3-100)

Table (2) and (3) revealed that there was insignificant effect of age, residence, and levels of education on the anti-rubella IgG seropositivity rate in males and female.

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Abdul-Razak SH. Hasan , Abbas A. Al-Duliami , Adnan A. Neima , Asmaa H. Al-Jurani

Table (2): Effect of age, residence, and educational levels on anti-rubella IgG seropositivity in men.

Variables	No. tested	Anti-rubella IgG positive		95% CI
		No.	%	
Age (Ys)				
< 20	32	32	100	**
20-29	105	105	100	**
30-39	35	31	88.6	(88.4-100)
<b>P=0.14 [NS]</b>				
Residence				
Urban	90	86	95.5	(87.4-100)
Rural	82	82	100	**
<b>P=0.89 [NS]</b>				
Education				
Illiterate	12	12	100	**
Primary	82	78	95.1	(86.1-100)
Secondary	31	31	100	**
High	47	47	100	**
<b>P=1 [NS]</b>				

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**Table (3): Effect of age, residence, and educational levels on anti-rubella IgG in females.**

Variables	No. tested	Anti-rubella IgG positive		95% CI
		No.	%	
Age (Ys)				
< 20	83	73	87.9	(77.8-97.8)
20-29	103	94	91.2	(83.8-98.6)
<b>P=0.65[NS]</b>				
Residence				
Urban	147	136	92.5	(85.7-96.3)
Rural	39	34	87.2	(73.6-98.8)
<b>P=0.48 [NS]</b>				
Education				
Illiterate	41	35	85.4	(71-96.8)
Primary	85	81	95.3	(87.9-99.7)
Secondary	50	43	86	(62.5-97.5)
High	10	10	100	**
<b>P=0.22 [NS]</b>				

The rate of susceptibility (anti-rubella IgG negative) among male and female was 2.3% and 8.6% respectively. Therefore, the rate of non-immune females was higher than that of males, table (4).

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Abdul-Razak SH. Hasan , Abbas A. Al-Duliami , Adnan A. Neima , Asmaa H. Al-Jurani

**Table (4): Susceptibility rate for rubella infection among study groups.**

Study group	No. tested	Anti-rubella IgG		95% CI
		Negative	%	
Male	172	4	2.3	(0-6.7)
Female	186	16	8.6	(0- 17.9)

### Discussion

The aims of the present study are to determine the seropositivity rate of anti-rubella IgG antibody and the rate of susceptibility (non-immune) for rubella infection among females and male couples attending for premarriage investigations.

The seropositivity rate of anti-rubella IgG among our female participants was 91.4%. Although the previous study conducted in Baghdad on teenage females had obtained slightly higher rate 95.4% [11]; However, almost all studies conducted on teenage girls in the neighboring countries and elsewhere had yielded nearly similar results [5-9,14]. The slight variations in the results of the present study and others may be multifactorial, including sample size, sensitivity and specificity of laboratory procedure and most importantly the immunization status of the participants. Of note, the MMR vaccine was scheduled in the Iraqi expanded program of immunization since 1989. Unfortunately, we ignored the immunization status of the participants in this study because there was no confidential family records of immunization, beside that, most of the immunization programs in Iraq were exposed to intermittent retardation due to unsuitable conditions at least for the 15 years ago [15].

Studies regarding the effect of age, residence, educational levels and other demographic factors on the anti-rubella IgG seropositivity rate have yielded controversial results. An increasing anti-rubella IgG by age and number of persons by household was reported by certain studies [5-7,9,16,17]. On the other hand, other studies have documented insignificant effect of residence, occupation, economic status and levels of education on the anti-rubella IgG seropositivity rate [5,14,16].

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According to the world Health Organization (WHO) definition criteria, countries that are at risk for developing CRS are those in which the rate of susceptibility to rubella is 10% among women in the fertile age (WHO,1999). In the present study, 8.6% of females who are about to marry are at risk for infection by rubella virus. The rates of nonimmune teenage girls obtained in previous studies were ranged between 0% to 13% [5-9,11,14,18]. Although the rate of susceptibility among our female participants was below the 10% recommended by the WHO; however, this study suggest that screening test for anti-rubella IgG and vaccination of nonimmune girls should be implemented in parallel with premarriage counseling regarding rubella and CRS for young female.

Regarding males, the present study found that 97.7% were seropositive for anti-rubella IgG antibody and 2.3% were non-immune. Of note, previous studies had obtained a seropositivity rates ranged between 87.9% to 100% [11-13]. In our participants, of course we cannot recognize the source of anti-rubella IgG whether it is from natural infection or as a response to the vaccine. Nevertheless, in both situations the IgG usually persist for life as only one antigenic type of the virus exist [2]. Persistence of protective levels of IgG for the lifetime may be due to continuous stimulation of the host's immune system by repeated subclinical rubella infection.

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## Seropositivity of anti-rubella antibodies among premarriage girls in Diyala province

Abdul-Razak SH. Hasan , Abbas A. Al-Duliami , Adnan A. Neima , Asmaa H. Al-Jurani

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## Seropositivity of anti-rubella antibodies among premarriage girls in Diyala province

Abdul-Razak SH. Hasan , Abbas A. Al-Duliami , Adnan A. Neima , Asmaa H. Al-Jurani

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