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A SEROLOGICAL STUDY OF RUBELLA INFECTION IN PREGNANT WOMEN LIVING IN WU-HAN AREA

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To understand the infection rate of maternal rubella (German measles) among pregnant women living in the Wu-Han area of the Hu-Bei Province, a large-scaled survey was conducted by using the enzyme-linked immunosorbant assay (ELISA). A group of 617 normal, healthy women in the first three to six months of thier pregnancy were screened. Our results indicated that 73.1% (451 in 617) of the tested subjects were IgG positive. While only 2.76% (17 in 617) were IgM positive. When compared the percentage of the IgG-negative obtaining in this study to those of similar surveys conducted in other large cities. We found that IgG-negative rate in pregnant women in the Wu-Han area are much higher than other areas, suggesting that more pregnant women are lack of the immunity to rubella infection in Wu-Han area.

Rubella infection, especially occurred in the early pregnancy, it is belived to associate with spontaneous abortion, premature birth and still birth as congenital anomalies. Therefore, it is considerably important to evaluate the immunity status of pregnant women to prevent the abnormal birth.

Since rubella viral infection usually elicits a life-time immunity, therefore, previous infection or acquired immunity via vaccine immunization before pregnancy could effectively prevent to deliver babies with congenital anomalis. Based on our findings, We highly recommend the vaccination against measles , mumps, and rubella (The MMR vaccine) should be provided to children of both sexes older than 15 months, students in primary school and those of ninth graders in order to prevent the occurance of congenitally abnormal babies later in their pregnancies.

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Introduction

In recent years, congenital anomalies have been one of the greatest concerns of the society. Although genetic factors play some roles in causing congenital diseases, it has become increasingly clear that. environmental factors are of equal at least no less importance as genetic factors. Among many sophisticated environmental factors, maternal viral infection is one of the major cause of congenital anomalies. Under the current population policy of "one baby per family" in China, to give birth of a healthy baby is highly wanted. Therefore, We were prompted to conduct this study to improve the successful rate for giving birth of a healthy baby. Previous studies[1-4] have clearly shown that the effects of rubella infection during early pregnancy in causing congenital anomalies. Researches done in developed countries like Japan and the United States have demonstrated that the causal relationship between rubella infection during early pregnancy and spontaneous abortion, premature birth and still birth as well as congenital anomalies,[5,6] e.g. congenital cardiac anomalies, [7] congenital cataract[3] and others. In this study, blood samples from pregnant women with pregnancy registration cards living in the Wu-Han area were examined and the presence of rubella antibody in their sera were investigated.

We hope our study would be not only of scientific importance, but also be informative to those decision-makers to establish a vaccination policy in order to eliminate the congenital anomalies resulted by maternal rubella infections.

Research subjects and methodology

From October 1989 to June 1990, a total of 617 three-to six-month pregnant women at their twenties and early thirties, who came to the pregnancy clinic centers for routine checkups were randomly selected as the study subjects, Standard procedures for serum preparation were used in this study. The collected serum samples were stored at -70°C until use. The presences of rubella antibodies, both IgG and IgM, were determined by using the standard enzyme-linked immunabsorbant assay (ELISA) as described previously.[8,9]

Results

As shown in Table 1, we found that among the 617 pregnant women tested, 451 were IgG positive (73.1%), 166 were IgG negative (26.9%), and 17 were IgM positive (2.76%) (Table 1). The frequencies of both positive and negative ELISA reactions were calculated in percentages as indicated in the same table (Table 1).

Discussion

In 1941, Norman Gregg, an Australian ophthalmologist first reported the causal rela-

Table 1. The percentage and headcounts of IgG (+), IgG (-), and IgM (+) in all the pregenant women checked in Wu-Han area.

Area checked	Total women checked	No. of IgG (+)	% of IgG (+)	No. of IgG (-)	% of IgG (-)	No. of IgM (+)	% of IgM (+)
Wu-Han area	617	451	73.1%	166	26.9%	17	2.76%

tionship between maternal rubella infection and congenital anomalies. Later, it was clear that these congenital anomalies were resulted from the infection of rubella virus of pregnant women during their early pregnancy. These anomalies were recognized as the congenital rubella syndrome and were subdivided into two different types: one is with multiple clinical symptoms, and another displays only subclinical features.[10,11]

In maternal rubella infection, rubella virus infects the fetus through the placenta during the early pregnancy. Since the first three months of pregnancy are critical for the development of most fetal organ systems, the chronic and lasting infection of rubella could significantly affect the development of eyes, heart, ears, and result in many other congenital anomalies.[12-17] As the fetus grows toward full term, the continuous infection causes more acute symptoms including congenital hepatitis, purpura, osteoporosis and adverse effects to the uterus.[18-20] Chen et al (1983) described that the timing of maternal rubella infection during pregnancy dictates the types of congenital anomalies induced.[21] According to the report, the incidence rate for giving birth of babies with congenital anomalies may be as high as 40% of infected pregnant women if the infection occurs during the first month of their pregnancy. The incidence rate drops to 25% and 10% when the maternal infections are in the second and the third month of pregnancy.[21] Therefore it will be considerably important to prevent the eventual birth of congenital anomalies during the early pregnancy.

Compared the occurance of the IgG-negative shown in this study (Table 1) to those of similar surveys conducted in other large cities, 24.2% (87/360) in Kaohsiung[1] and 4.5% (47/1040) in Taipei,[22] the IgG-negative pregnant women found in the Wu-Han area are higher than these areas. That is, more in number of pregnant women are lack of the immunity to rubella infection. Moreover, these pregnant women are very young at their twenties and early thirties. It has been reported that the younger the pregnant women are, the higher the IgG-negative rate is.[4] It is, therefore, indicating that there are relatively high number of pregnancy-ready women in Wu-Han area has never been exposed to or infected by rubella. Thus, These women are very vulnerable to rubella infection during their pregnancy. Even worse, 2.76% of these pregnant women are in the active infectious states. as shown in Table 1. The fetus in their uterus might be infected by rubella virus and consequently many congenital anomalies are manifested. Therefore, it would be significantly important to avoid the spontaneous infection of rubella virus in pregnant women, especially during their first three months of pregnancy.

The infection of rubella usually induces a life-long immunity and the chance to be infected the second time is less than 5%.[21] To effectively prevent pregnant women from infection of rubella, a thorough vaccination policy should be implemented. Based on our results, we highly recommend that vaccination against measles, mumps, and rubella (MMR) should be given free of charge to children of both sexes, older than 15 months, students in primary schools and students of ninth graders. More importantly, the vaccination policy should cover areas not only restricted to Wu-Han, but also to the entire mainland China. In this way, both the immunity to the virus could be established as well as the source of the virus might be cut off. The chance for a pregnant woman infected by the virus would be limitted. Since the possibility of infection of rubella via vaccination can not be ruled out, pregnant women or women planning to get pregnant within three months should avoid

MMR vaccination.

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