Rubella Antibodies in Normal Pregnant Women at Srinagarind Hospital, Khon Kaen, Thailand

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Background: *Rubella infection in pregnant women, especially in the first trimester, can result in serious neonatal morbidity and mortality. To stem a series of rubella outbreaks in Thailand (in 1967, 1974 and 1978), the Ministry of Public Health launched the National Expanded Program on Immunization (EPI) in 1986. The Mump-Measles and Rubella (MMR) vaccine was given to all graduated primary school girls.*
Objective: *To determine the immune status to rubella in healthy pregnant women visiting the Antenatal Care Clinic (ANC) at Srinagarind University Hospital.*
Design: *Descriptive study.*
Setting: *Antenatal Care Clinic at Srinagarind Hospital.*
Material and Method: *Between January15 and May17, 2004, 150 normal pregnant women (between 15 and 40 years of age) were included. After a complete history was taken and a physical examination performed, informed consent was signed; serum was collected for testing for rubella antibodies at the same time as routine prenatal check up in normal pregnant women including CBC, red blood cell indices, Rh blood group, VDRL, HBs Ag, and AntiHIV. The ELISA technique was used to detect maternal rubella IgG antibodies.*
Outcome measure: *Rubella IgG antibody level.*
Results: *Three-quarters (112/150) of the pregnant women had immunity to rubella, 7% (11 cases) were indeterminate and 18% (27 cases) had no immunity.*
Conclusion: *The cost of screening for rubella IgG antibodies was 150 baht using the HAI technique and 350 baht/case using the ELISA technique. The latter is more available but twice as expensive, so repeating rubella immunization for all high school females would be more cost effective and provide more certain protection.*

Keywords: *Rubella IgG antibody, Rubella titer, Rubella vaccine, ELISA*

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Rubella is a well-known viral disease which typically manifests as a self-limited benign disease characterized by erythematous maculopapular rash, low grade fever, suboccipital lymphadenopathy and mild respiratory symptoms[1]. Infection in any pregnant woman can cause miscarriage, stillbirth, or multiple congenital rubella syndrome (CRS) characterized by cataract, patent ductus arteriosus, septal defects, pulmonary artery stenosis, sensorineural deafness, meningoencephalitis, IUGR, chronic diffuse interstitial pneumonitis and osseous changes. The major concern of this disease is that it can cause a serious, often fatal, CRS in newborns, especially when infection occurs during the first trimester[1].

Rubella outbreaks occurred in Thailand in 1967, 1974 and 1979[2-7], are increasing the incidence of congenital rubella syndrome. Because rubella is preventable, the Ministry of Public Health introduced rubella vaccine in an Expanded Program of the Immunization (EPI) program[2,4,5] for all graduated primary school girls (Grade 6, between 11 and 14 years of age) in 1986.

In 1989, Werawatakul et al[9] screened for rubella antibodies among normal pregnant women and during the postpartum period. They found that only 43% of pregnant women had any immunity to rubella.

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The immune status was quite low, even though it was only three years after the immunization campaign.

Currently, the Thai Medical Council[11] has recommended, "rubella vaccine should be given to parturients with no immunity before discharging them from hospital, even though the injection may produce the virus in the breast milk, because the effect will not harm the nursing infant". Due to financial constraints and limited laboratory facilities in rural areas, not all Thailand's hospitals follow this guideline including Srinagarind University Hospital.

In 1991, Tatsanavivat et al[10] studied the cost and benefit of rubella vaccination for medical personnel at Srinagarind University Hospital and showed that although the incidence of rubella immune status among medical personnel was 67%, repeated active immunization without prior screening for antibody was cheaper.

The purpose of the present study was to determine the rubella immune status among normal pregnant women attending the ANC Clinic at Srinagarind University Hospital, in order to assess the need for routine rubella antibody screening among postpartum mothers and whether vaccination prior to discharge would be appropriate.

Material and Method

Between January 15 and May 17, 2004, 150 normal pregnant women (between 15 and 40 years of age) were included in the present study. After written, informed consent was received, the pregnant women were asked to complete a questionnaire about the history of recent contact with rubella, signs and symptoms of rubella infection and vaccination history. After completing the history taking and a physical examination, serum was collected and tested for the presence of rubella antibodies at the same time as the routine prenatal check up in normal pregnant women including CBC, red blood cell indices, Rh blood group, screening for syphilis, hepatitis B and HIV.

Excluded were women with a history of recent illness with rash, contact with persons with rubella, those with signs and symptoms of severe or life-threatening disease.

A ~3 mL sample of venous blood was taken for rubella antibody testing by the ELISA technique with one technician at Srinagarind University Hospital - reported in IU/mL. The sensitivity and specificity of the conventional Haemagglutinin inhibition test (HAI) and the ELISA method for detecting the presence of rubella antibodies were 98 percent (95%CI = 96.9-99.2) and 99 percent (95%CI = 96.7-100), respectively[12].

According to the ELISA technique, based upon calibration with WHO's Second International Standard Preparation, the levels of rubella IgG titers are:

- < 10 IU/mL = an absence of immunity to rubella;
- ≥ 10 and < 15 IU/mL = indeterminate immunity; and,
- ≥ 15 IU/mL = the presence of antibodies indicating recent infection (correlated with history and clinicals), past infection, or post-vaccination.

The data was classified into three groups: immune, non-immune and indeterminate immunity to rubella: and compared according to age, gravid, parity, occupation, income, education, domicile and history of previous vaccination.

Results

The baseline characteristics of the 150 pregnant women enrolled in the present study are presented in Table 1. Three-quarters (112/150) had an immunity to rubella, 7% (11/150) had indeterminate immunity, and 18% (27/150) had none (Fig. 1). The concentration of rubella IgG antibodies in most of the women was < 50 IU/mL (Fig. 2); the highest level was 231.8 IU/mL, detected in a woman with a confirmed history of vaccination.

Nearly 60% (88/150) reported they had not received a rubella vaccine in the past, although most (73%; 64/88) had immunity to rubella (Table 2).

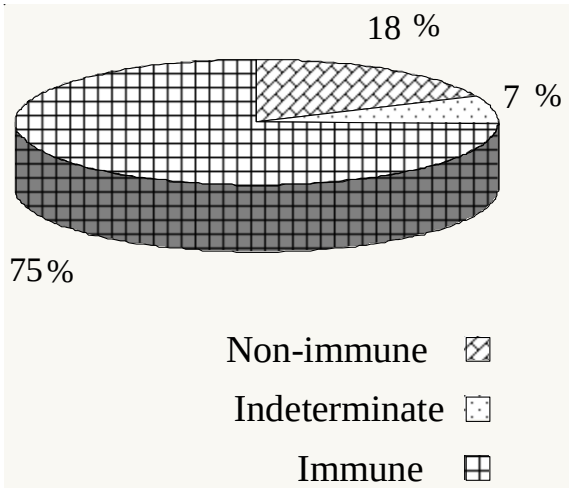

Fig. 1 Rubella immune status at Srinagarind Hospital: between January 15 and May17, 2004

Table 1. Baseline characteristic of pregnant women

Characteristics	Rubella immune status							
	Non-immune		Indeterminate		Immune		Total	
	No	%	No	%	No	%	No	%
Age (years)								
- 15-19	4	33.33	0	0.00	8	66.67	12	8.00
- 20-24	1	2.70	3	8.11	33	89.19	37	24.67
- 25-29	7	14.00	5	10.00	38	76.00	50	33.33
- 30-34	12	31.58	2	5.26	24	63.16	38	25.33
- 35-40	3	23.08	1	7.69	9	69.23	13	8.67
Gravida								
- 1	11	15.49	7	9.86	53	74.65	71	47.33
- 2	10	17.86	2	3.57	44	78.57	56	37.33
- 3	3	21.43	2	14.28	9	64.29	14	9.33
- 4	2	28.57	0	0.00	5	7.14	7	4.67
- 5	0	0.00	0	0.00	1	100.00	1	0.67
- 6	1	100.00	0	0.00	0	0.00	1	0.67
Parity								
- 0	15	18.99	8	10.12	56	70.89	79	52.67
- 1	7	12.50	3	5.36	46	82.14	56	37.33
- 2	5	33.33	0	0.00	10	66.67	15	10.00
Education								
- Primary	11	36.67	1	3.33	18	60.00	30	20.00
- Secondary	6	20.69	1	3.45	22	75.86	29	19.33
- High school	2	7.14	2	7.14	24	85.71	28	18.67
- Vocational	4	14.29	2	7.14	22	78.57	28	18.67
- Bachelor's degree	4	12.12	5	15.15	24	72.73	33	22.00
- Master's degree	0	0.00	0	0.00	2	100.00	2	1.33
Income (baht/month)								
- < 1 000	3	27.27	0	0.00	8	72.73	11	7.33
- 1 000-5 000	11	18.96	4	6.90	43	74.14	58	38.67
- 5 001-10 000	6	10.17	6	10.17	47	79.66	59	39.33
- 10 001-20 000	6	30.00	1	5.00	13	65.00	20	13.33
- 20 001-50 000	1	50.00	0	0.00	1	50.00	2	1.33
Dolicile								
- Khon Kaen	11	11.46	8	8.33	77	80.21	96	64.00
- Other	11	20.37	4	7.41	39	72.22	54	36.00
Occupation								
- Employee	6	11.11	4	7.41	44	81.48	54	36.00
- Housewife	15	33.33	4	8.89	26	57.78	45	30.00
- Farmer	3	27.27	0	0.00	8	72.73	11	13.33
- Government service	2	10.53	0	0.00	17	89.47	19	12.67
- Merchant	1	5.00	2	10.00	17	85.00	20	0.67
- State enterprise	0	0.00	1	100.00	0	0.00	1	0.67
- Total	27	18.00	11	7.33	112	74.67	150	100.00

Table 2. The history of previous rubella vaccination

Characteristics	Rubella immune status							
	Non-immune		Indeterminate		Immune		Total	
	No	%	No	%	No	%	No	%
Previous vaccination								
- Yes	3	17.65	3	17.65	11	64.70	17	11.33
- No	18	20.45	6	6.82	64	72.73	88	58.67
- Uncertain	6	13.33	2	4.45	37	82.22	45	30.00
- Total	27	18.00	11	7.33	112	74.67	150	100.00

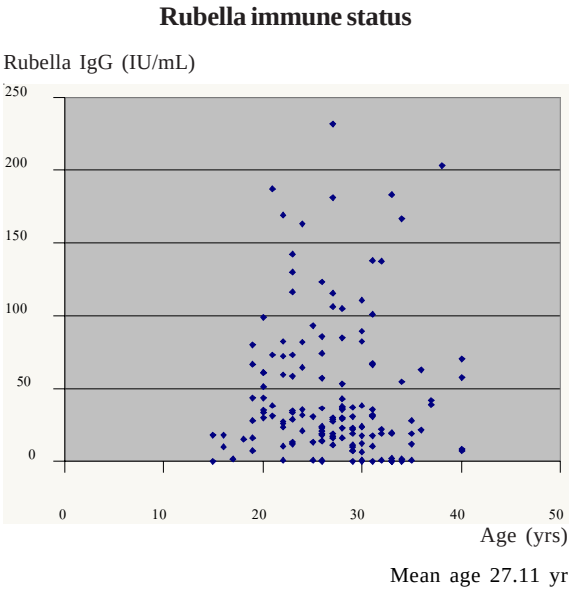

Fig. 2 Distribution of rubella IgG level in pregnant women at Srinagarind Hospital

Discussion

Three-quarters (112/150) of the normal pregnant women attending the Srinagarind University Hospital Antenatal Care Clinic had an adequate immunity to rubella. By comparison, Werawatakul et al[9] (1989) found the prevalence of immunity to rubella among pregnant women increased from 43 to 75 percent, perhaps the result of the then recent EPI campaign to vaccinate all graduated primary school girls. The present study was conducted 18 years after the MMR vaccine campaign, when all of the vaccinated girls had entered their reproductive age.

Once a woman is infected with rubella or receives the vaccine, rubella antibodies are produced conveying life-long immunity. According to the EPI program, every pregnant woman should already have an immunity to rubella before she gets pregnant, but, in fact, one-quarter of them had no immunity. Possibly they were missed by the vaccination campaign.

The data also show that trying to recall a history of receiving the vaccine is unreliable data as most of the women who had an immunity to rubella could not remember whether or not they were vaccinated. The authors therefore checked public health records and found the subjects in question had indeed been vaccinated during the campaign.

According to the Thai Medical Council, screening for rubella titer in all parturients is impracticable and costly. MMR at Srinagarind University Hospital costs 165 baht/dose, while the cost of rubella IgG antibody screening is 350 baht/case and the cost of rubella IgM antibody is 450 baht/case. Repeating rubella vaccinations does not harm non-pregnant women or persons already having an immunity; therefore, routine rubella vaccination in non-pregnant women without screening would be more beneficial and cost effective than screening for rubella antibodies.

Conclusion

The authors recommend that repeating vaccination in all high school female students would increase the immunity to rubella and reduce the incidence of congenital rubella syndrome. This would be a better approach than prescribing the vaccine to parturients, which might already be too late for their newborn.

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ภาวะภูมิคุ้มกันต่อโรคหัดเยอรมันในสตรีปกติที่มาฝากครรภ์ ณ รพ. ศรีนครินทร์ ม.ขอนแก่น

สันทัด บุญเรือง, ประนอม บุพศิริ

โรคหัดเยอรมัน เป็นโรคติดต่อทางระบบทางเดินหายใจ ซึ่งโดยทั่วไปอาการมักไม่รุนแรง แต่ถ้ามีการติดเชื้อโรคนี้ในสตรีตั้งครรภ์โดยเฉพาะช่วง 3 เดือนแรกของการตั้งครรภ์จะมีโอกาสทำให้เกิดความพิการในระบบต่าง ๆ แก่ทารกได้ หลังการระบาดของโรคหัดเยอรมันในประเทศไทยในปี พ.ศ. 2527 จึงได้มีโครงการรณรงค์ให้ฉีดวัคซีนป้องกันโรคหัดเยอรมันแก่เด็กนักเรียนหญิงชั้นประถมศึกษาปีที่ 6 ทั่วประเทศไทย ในโครงการสร้างภูมิคุ้มกันโรค (Expanded Program on Immunization; EPI) เมื่อปี พ.ศ. 2529 ทั้งนี้เพื่อป้องกันการเกิดเด็กพิการแต่กำเนิด อย่างไรก็ตาม โครงการนี้ก็ยังไม่ครอบคลุมแก่ทุกคน จึงยังมีการระบาดของโรคนี้เป็นบางครั้ง ดังนั้นในปัจจุบันแพทยสภาจึงกำหนดให้มีการฉีดวัคซีนป้องกันโรคหัดเยอรมันแก่สตรีหลังคลอดทุกคนที่ไม่มีภูมิคุ้มกัน

การศึกษานี้มีวัตถุประสงค์เพื่อศึกษาหาความชุกของภาวะภูมิคุ้มกันต่อโรคหัดเยอรมัน ในสตรีทั่วไปที่มาฝากครรภ์ ณ รพ. ศรีนครินทร์ โดยได้ทำการศึกษาในสตรีทั้งหมด 150 คน ตั้งแต่วันที่ 15 มกราคม พ.ศ. 2547 ถึงวันที่ 17 พฤษภาคม พ.ศ. 2547 โดยได้ส่งเลือดตรวจเพื่อดูภาวะภูมิคุ้มกันต่อโรคหัดเยอรมันด้วยวิธี ELISA ซึ่งผลการศึกษาพบว่า 75% (112 คน) มีภูมิคุ้มกันต่อโรคหัดเยอรมัน 18% (27คน) ไม่มีภูมิคุ้มกันต่อโรคหัดเยอรมัน และ 7% (11คน) เป็นกลุ่มที่ไม่สามารถบอกได้ว่า มีภูมิคุ้มกันต่อโรคหัดเยอรมัน นอกจากนี้ผลการศึกษายังพบว่าประวัติการได้รับวัคซีนต่อโรคหัดเยอรมันในอดีต ไม่สามารถบอกได้ว่าจะมีภูมิคุ้มกันต่อโรคหัดเยอรมันหรือไม่

จากผลการศึกษานี้ จึงสรุปว่า น่าจะมีการรณรงค์ให้มีการฉีดวัคซีนป้องโรคหัดเยอรมันอีกครั้งแก่สตรีทั่วไป ซึ่งอาจเป็นนักเรียนระดับมัธยมศึกษาตอนปลาย โดยไม่ต้องสนใจมีประวัติการได้รับวัคซีนต่อโรคหัดเยอรมันมาก่อนหรือไม่ ทั้งนี้เพราะการฉีดวัคซีนป้องโรคหัดเยอรมัน (165บาท/ราย) มีความคุ้มทุนกว่าการตรวจคัดกรองภาวะภูมิคุ้มกันต่อโรคหัดเยอรมัน (350บาท/ราย) ก่อน แล้วจึงฉีดวัคซีนป้องโรคหัดเยอรมันแก่สตรีหลังคลอดที่ไม่มีภูมิคุ้มกัน