TORCH Agents in Pregnant Saudi Women

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Key Words

Enzyme-linked immunosorbent assay · Immunoglobulin G antibodies · Pregnant women · Makkah, Saudi Arabia · TORCH

Abstract

Objective: To determine the seroprevalence rates of IgG to common TORCH agents in pregnant Saudi women using indirect enzyme-linked immunosorbent assay.

Subjects and Methods: A total of 926 samples of sera were tested for antibodies to TORCH agents known to cause serious congenital infections: *Toxoplasma gondii*, rubella, cytomegalovirus (CMV), herpes simplex viruses (HSV-1 and HSV-2), varicella zoster virus (VZV) and human immunodeficiency virus (HIV-1 and HIV-2). **Results:** Toxoplasma IgG antibodies were detected in 35.6%, CMV total IgG antibodies were found in 92.1%, rubella IgG antibodies in 93.3%, HSV-1 IgG antibodies in 90.9%, HSV-2 IgG in 27.1%, and VZV IgG antibodies in 74.4%. A 0% seroprevalence rate for HIV-1 and -2 was found. **Conclusion:** Pregnant Saudi women commonly have IgG antibodies to rubella, CMV, HSV-1 and -2, VZV, and *T. gondii*. Serological evidence of HIV infection was not observed.

Introduction

The acronym TORCH [toxoplasmosis, 'other', rubella, cytomegalovirus (CMV), and herpes simplex (HSV-1 and HSV-2)] was introduced two decades ago to refer to those pathogens causing infection in utero, presenting with similar clinical features [1]. The 'O' in TORCH (other) includes a list of pathogens that grows longer over time, including not only syphilis and varicella (VZV), but also newer pathogens such as human immunodeficiency virus (HIV) and parvovirus B19.

During pregnancy, those agents which cause clinical diseases in the fetus are sometimes indistinguishable and thus have created an interest in research in intrauterine infections. A highly efficient placental barrier prevents some microbes present in the mother from crossing from maternal into fetal circulation. Nevertheless, some microorganisms are known to cross the placenta with devastating consequences to the fetus [2, 3].

Maternal IgG1, IgG3 and IgG4 cross the placenta to provide the fetus with a spectrum of molecules differing in specificity [4]. The fetus expresses passive immunity to a variety of antigens despite lack of antigenic experience. This transfer of IgG is conferred by the intrinsic structure of Fc rather than the Fab protein of the IgG [1, 4].

This study was performed to determine the seroprevalence rates of IgG antibodies to common TORCH agents

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in pregnant Saudi women. It is the first such investigation to use an enzyme-linked immunosorbent assay (ELISA), known for its rapid, sensitive and reproducible serological techniques [5].

Subjects and Methods

A total of 926 serum samples obtained during the first trimester of pregnancy from Saudi women attending Maternity and Children's Hospital in Makkah, Saudi Arabia were investigated serologically for TORCH agents.

Informed consent for the testing procedure was obtained from all the women prior to inclusion in the study. Maternal and clinical data were recorded during the first antenatal visit. All serum samples were screened using a sandwich ELISA (Wampole Laboratories, New Jersey, USA) for *Toxoplasma gondii*, rubella, CMV, HSV-1, HSV-2 and VZV specific IgG antibodies according to manufacturer's instructions.

Screening for HIV-1 and -2 was carried out using the Bioelisa HIV-1+2 (rec) Biokit (Barcelona, Spain) following manufacturer's instructions. All samples testing positive initially were retested using the same test kit, in accordance with WHO recommendations [6]. If they retested negative, the initial test result was regarded as a false positive. If the repeat test result was still positive, a confirmation test for HIV/AIDS was performed using Western blot. The Western blot kit used was CHRION × RIBA × HIV-1/HIV-2 SIA to detect antibodies to recombinant HIV-1 p24, p31, gp120, gp41 equivalent; recombinant HIV-2 p25, and synthetic HIV-2 envelope peptide.

Results

The results of the serological screening for TORCH agents from the subjects are shown in table 1. Toxoplasma IgG antibodies were detected in 330 (35.6%), CMV total IgG antibodies were found in 853 (92.1%), rubella IgG antibodies in 864 (93.3%), HSV-1 IgG antibodies in 842 (90.9%), HSV-2 IgG in 251 (27.1%), and VZV IgG antibodies in 689 (74.4%). For HIV-2, 2 (0.2%) tested positive initially. On the repeat test, 1 was still positive and the other negative. When the Western blot technique was performed on the 1 remaining positive sample, it was found to be negative.

Discussion

T. gondii is an obligate intracellular protozoan parasite that causes toxoplasmosis. The infection is found worldwide, particularly in warm and moist climates. Inactive toxoplasmosis is of rather high prevalence in the human population in Saudi Arabia [7–9].

Table 1. TORCH agents in 926 pregnant Saudi women

Agents	Positive	
	n	%
<i>T. gondii</i>	330	35.6
HIV-1 and -2	0	0
VZV	689	74.4
Rubella	864	93.3
CMV	853	92.1
HSV-1	842	90.9
HSV-2	251	27.1

T. gondii is one of the few mammalian parasites which crosses the placenta to infect the fetus. When this occurs, a high risk of infection of the fetus exists [10]. *T. gondii* infection prior to pregnancy does not infect the neonate; it is only when primary infection is acquired during pregnancy that the fetus may be at risk of congenital infection [11].

In our study, we found 35.6% of the pregnant Saudi women to exhibit IgG antibodies to *T. gondii*. This fairly high prevalence of antibodies may be attributed to the consumption of undercooked meat as well as to soil contaminated from the feces of domestic and stray cats, consistent with other reports [12, 13]. Primary prevention of toxoplasmosis in the pregnant mother can be achieved through education to practice precautionary measures, which include washing the hands frequently, washing all vegetables and fruits and, most importantly, avoidance of eating raw meat.

HIV, known to be transmitted from mother to infant, is found in the blood of approximately 33% of infected infants within days after birth, suggesting in utero acquisition of the virus [14]. In particular, HIV-1 can be transmitted during the antenatal, peripartum, or postnatal period [15, 16]. However HIV-1 and HIV-2 were not detected in this study, which was done during the first trimester.

Rubella virus is a recognized teratogenic pathogen to the fetus [17] that can lead to devastating congenital abnormalities in the fetus during pregnancy and thus continues to challenge health workers. Rubella, if acquired during the first trimester of pregnancy, can damage the developing fetus. Congenital infection in the 1st month of gestation results in a 50% chance of severe congenital malformation, 25% in the 2nd month and 10% in the 3rd. This risk is reduced to approximately 50% in the second

and third trimester [18, 19]. In a seroepidemiological study of rubella in southern Saudi Arabia, El-Mekki and Zaki [20] found a seropositivity of 94% in women in the child-bearing age-group. In our study, we found a prevalence of 93.3% of rubella IgG antibodies, suggesting a successful vaccination campaign.

The herpesvirus family, which includes CMV, VZV, HSV-1 and HSV-2, characteristically are latent infections, persisting perhaps during the lifetime of the host. A wide range of congenital infections are caused by this group of viruses. In this study, the pregnant women had high rates of antibodies against CMV (92.1%), HSV-1 (90.9%), VZV (74.4%) and HSV-2 (27.1%). Thus, passive transplacental immunity might be transferred at the same rate for all these herpesviruses. Similar findings have been reported by others [21, 22]. Despite the variability in social status among the 926 women studied, the close family contact that is part of the social structure in Saudi Arabia plays a major role in the transmission of CMV and the rest of the herpesviruses.

Since there is a high prevalence of infections in the general population that if acquired during pregnancy can adversely affect the infant, health care workers should be alert to the possibility of congenitally acquired infections

in the period following birth. Information obtained from careful examination of the infant is invaluable in deciding on the appropriate diagnostic test: (1) for congenital CMV infection, urine culture and shell vial assay; (2) for congenital toxoplasmosis, IgM serology; (3) for rubella, detection of serum IgM antibody, IgG antibody after several months or nasopharyngeal culture; (4) for HSV infection, culture of skin lesions, nasopharynx, conjunctiva, and CSF (with PCR).

Conclusion

Pregnant Saudi women commonly have IgG antibodies to *T. gondii*, VZV, rubella, CMV, and HSV-1 and -2. Serological evidence of HIV infection was not observed.

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References

- 1 Stamos JK, Rowley AH: Care of the infant: Timely diagnosis of congenital infections. *Pediatr Clin North Am* 1994;4:1017-1033.
- 2 Roitt I, Brostoff J, Male D: Immune response to viruses; in: *Immunology*. London, Gower Medical, 2001, pp 235-246.
- 3 Collier L, Oxford J: Intrauterine and perinatal infections; in: *Human Virology*. Oxford, Oxford University Press, 1993, pp 319-332.
- 4 Roitt IM, Delves PJ: Antibodies; in Roitt's *Essential Immunology*. London, Blackwell Science, 2001, pp 37-51.
- 5 Wittenburg RA, Roberts MA, Elliot B, Little LM: Comparative evaluation of commercial rubella virus antibody kits. *J Clin Microbiol* 1985;2:161-163.
- 6 WHO Weekly. *Epidemiol Rec* 1992;20:145-147.
- 7 Al-Amri OM: Prevalence of antibodies to *Toxoplasma gondii* among blood donors in Abha, Asir region, South Western Arabia. *J Egypt Public Health Assoc* 1994;69:77-88.
- 8 Al-Qurashi AR, Ghandour AM, Obied OE, Al-Mulhim AA, Makki SM: Seroepidemiological study of *Toxoplasma gondii* infection in the human population in the eastern Region. *Saudi Med J* 2001;22:13-18.
- 9 Yanaza A, Kumari P: Prevalence of *Toxoplasma* antibodies in blood donors in Al-Hassa. *Ann Saudi Med* 1994;14:230-232.
- 10 Remington JS: *Toxoplasma* in the adult. *Bull N Y Acad Med* 1974;50:211-227.
- 11 Desmonts G, Couvreur J: *Toxoplasma* in pregnancy and its transmission to the fetus. *Bull N Y Acad Med* 1974;50:146-159.
- 12 Abass SM, Basalamah AH, Serebour FE, Afonso MR: The prevalence of *Toxoplasma gondii* antibodies in Saudi women and the outcome of congenital infection among newborns in Saudi Arabia. *Saudi Med J* 1986;7:346-354.
- 13 Basalamah AH, Serebour FE: Toxoplasmosis in pregnancy: A survey of 1000 pregnant Saudi and non-Saudi attending King Abdul Aziz University Hospital, Jeddah. *Saudi Med J* 1981;2:125-130.
- 14 Ehrnst A, Lindgren S, Dictor M, Johansson B, Sonnerborg A, Czajkowski J, Sundin G, Bohlin AB: HIV in pregnant women and their offspring: Evidence for late transmission. *Lancet* 1991;338:203-207.
- 15 Douglas GC, King BF: Maternal-fetal transmission of human immunodeficiency virus: A review of possible routes and cellular mechanisms of infection. *Clin Infect Dis* 1992;15:678-691.
- 16 Pizzo PA, Butler KM: In the vertical transmission of HIV, timing may be everything. *N Engl J Med* 1991;325:652-654.
- 17 Gregg NM: Congenital cataract following German measles in the mothers. *Trans Ophthalmol Soc* 1941;3:35-41.
- 18 Alford CA, Neva FA, Weller TH: Virologic and serologic studies on human productions of conceptions after maternal rubella. *N Engl J Med* 1965;271:1275-1281.
- 19 Peckham GS: Clinical and laboratory study of children exposed in utero to maternal rubella. *Arch Dis Child* 1972;47:571-577.
- 20 El-Mekki AA, Zaki ZM: Screening for rubella antibodies among Saudi women of child bearing age. *Saudi Med J* 1998;19:575-577.
- 21 Basalamah AH, Abbas SM, Serbour FE: Intrauterine Infection. Riyadh, King Abdul Aziz City for Science and Technology, 1989, vol 24, pp 9-41.
- 22 Hossain A, Bakir TM, Ramia S: Immune status to congenital infections by TORCH agents in pregnant Saudi women. *J Trop Pediatr* 1986;32:83-86.