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Sero-Detection of cytomegalovirus and rubella virus igg antibodies among sudanese pregnant women in Khartoum State-Sudan

Abstract

Background: Cytomegalovirus and Rubella virus are the most common causes of congenital infections, which increase morbidity and mortality at birth and one of the common causes of abortion in developing countries.

Methodology: plasma samples obtained from 87 pregnant women's, the samples were obtained from Omdurman Friendship Hospital 53(61%), AL-Saudi Specialized Hospital 21(25%) and Ultra lab Diagnostic Centre 13(14%). all samples were examined for presence of *CMV* and *Rubella* virus IgG antibodies by using an ELISA test.

Results: The result showed that out of 87 blood samples investigated, 64(73.6%) were positive for *CMV*, while the result 23(26.4%) were negative and 85(97.7%) were positive for *rubella*, while the result 2(2.3%) were negative, where was 62(71.2%) samples had both *CMV* and *Rubella* virus IgG antibodies, 25(28.8%) had either *CMV* or *Rubella virus* IgG antibodies and there was no sample negative for both *CMV* and *Rubella* virus IgG antibodies.

Conclusion: the present study observed the high prevalence rate *of CMV* and *rubella virus* IgG antibodies among pregnant women in Khartoum State. The level of infections is higher in pregnant women without history of miscarriage than those aborted women.

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Introduction

Congenital CMV infection is one of the TORCH infections (toxoplasmosis, rubella, CMV, and HSV), which carry a risk of significant symptomatic disease and developmental defects in newborns Ljungman et al.[1] Human cytomegalovirus (HCMV) belongs to the β-herpesvirus subfamily, and although most healthy individuals remain asymptomatic subsequent to infection, the pathogen is a major contributor to birth defects and to life-threatening disease in immunocompromized patients Dollar et al.[2] Ross et al.[3] Gerna et al.[4] As with all viruses, HCMV depends on the host cell to provide macromolecular building blocks for vision production, and throughout the course of its evolution, HCMV has adapted to manipulate numerous fundamental cellular processes, including RNA accumulation Yurochko.[5] translation McKinney.[6] metabolism Yu Y et al.[7] secretary pathways Lee and Bowden.[8] and the cell cycleFrey.[9] Cytomegalovirus infection during pregnancy is a major cause of congenital infection worldwide with an incidence of 0.2 – 2.2% of live births. Up to 15% of such children have newborns following intrauterine CMV infection Adler.[10] Infection in the newborn can be acquired through close contact (via contaminated blood, urine, and secretions), vertically through Trans placental transmission, and postnatal through breast milk Bhide.[11]

Rubella virus (RuV) is a small enveloped single-stranded RNA virus and the sole member of the Rubivirus genus. Rub virus and alpha viruses together comprise the Togaviridae Hobman.[12] While alpha viruses are generally transmitted by mosquito vectors, RuV spreads by airborne transmission between humans Alzeidan et al.[13] The only known hostLee et al.[8] RuV causes a mild childhood disease commonly referred to as German measles.[8,9,12] Rubella (initially known as German measles) is associated with an 80% risk of usually multiple congenital abnormalities if acquired in the first 12 weeks of pregnancy Best.[14] especially the first 8-10 weeks, and leads to fetal growth problems or still birth WHO.[15] The virus initially replicates in the nasopharyngeal mucosa and local lymph nodes, and in pregnancy infects the placenta and developing fetus WHO.[15]

Methods and techniques

Study design and duration

A descriptive Cross-sectional study was conducted to detect Human Cytomegalovirus and Rubella virus IgG Antibodies among pregnant women attending Omdurman Friendship Hospital, Al-Saudi Maternity Hospital and Ultra Lab Diagnostic Centre, Khartoum, Sudan. During the period from May to June 2016.

Collection and preparation of samples

A peripheral blood specimen was collected from each pregnant woman into EDTA-containing vacutainer tubes, centrifuged at 3000 RPM for 5 minutes and the obtained plasma was stored at -20°Cuntil used.

Immunoassay for HCMV and Rubella virus IgG antibodies detection

Plasma samples were examined for anti HCMV and Rubella virus IgG antibodies by an indirect Enzyme-linked Immunosorbent Assay (ELISA) kit (foresight, Acon laboratories, Inc., 10125 Mesa Rim Road, San Diego, CA92121, and USA).

Data Analysis

Statistical analysis was done by using Statistical Package for Social Science program (SPSS- version 16).

Results

A total of eighty seven blood samples (n=87) were collected from pregnant women in Khartoum State. All specimens were examined for the presence of *CMV* and *Rubella*virus IgG antibodies using an ELISA kits. Out of 87 blood samples investigated, 85(97.7%)

and 64(73.6%) were reactive for *anti-CMV* and *anti-Rubella* IgG antibodies, respectively. Of particular interest, 62(71.2%) samples were reactive for both *anti-CMV* and *anti-Rubella* IgG antibodies, whereas there was no sample showed non reactive result for neither *anti-CMV* nor *anti-Rubella* virus IgG antibodies (Table 1). Out of 38 women with history of abortion 31(81.6%) and 37(97.4%) were reactive for *anti-CMV* and *anti-Rubella* virus IgG antibodies, respectively, with P-value (0.882). Moreover out of 49 women without history of abortion 32(65.3%) and 47(95.9%) were reactive for *anti-CMV* and *anti-Rubella* virus IgG antibodies, respectively, with *P*-value (0.106) (Table 2).

Table 1 Prevalence of CMV and Rubella IgG antibodies among pregnant women

Result	CMV IgG Antibodies		Rubella IgG Antibodies		CMV and Rubella IgG Antibodies	
	No	Percentage	No	Percentage	No	Percentage
Positive	64	73.60%	85	97.70%	62	71.20%
Negative	23	26.40%	2	2.30%	25	28.80%
Total	87	100%	87	100%	87	100%

Table 2 Distribution of CMV and Rubella virus IgG antibodies according to history of abortion

Result		CMV IgG Antibodies		Rubella IgG Antibodies	
		No	Percentage	No	Percentage
Abortion (n=38)	Positive	31	81.60%	37	97.40%
	Negative	7	18.40%	1	2.60%
No abortion (n=49)	Positive	32	65.30%	47	95.90%
	Negative	17	34.70%	2	4.10%

Discussion

Human cytomegalovirusand Rubellavirus are two of the vertically transmitted infections that lead to congenital abnormalities and pregnancy problems. Studies showed that women who are exposed to *cytomegalovirus* and/or *Rubella virus* for the first time during pregnancy may have a higher risk of miscarriage. These infections can lead to important complications on pregnancy for maternal and fetal health Best et al.[16] Griffiths.[17] The present study aimed for detection of *anti-CMV* and *anti-Rubella virus* IgG antibodies among pregnant women in Khartoum State. A total of 87 blood samples investigated, 67(73.6%) and 85(97.7%) were positive for *anti-CMV* and *anti-Rubella* virus IgG antibodies, respectively. Our CMV result (73.6%) was similar to that obtained in western Sudan Hamdan et al. [18] Who reported that 72.2% of pregnant women were anti-*CMV*-IgG antibodies reactive, but higher than result obtained in Mexico, (65.6%) by Alvarado-Esquivel C et al. [19] and less than those obtained in Nigeria (91.1%) by Hamid et al.[20] in Palestine (96.6%) by Tahani et al.[21] and in China (98.7%) by Lingqing et al.[22]

These differences might be attributed to endemic variations of these countries with *CMV* infections and different health policies enrolled in these countries. Of particular interest, the highest frequencies of reactive *anti-CMV* IgG antibodies were observed among the first trimester of pregnancy and those without history of miscarriage. However, no significant difference (P > 0.05) was observed among the three trimesters of pregnancy. While *Rubella virus* results (97.7%) were higher than that obtained in Nigeria and Sudan 70% and 65.3%, respectively Hamdan et al.[18] Onyenekwe et al.[23] and in line with the result obtained in Mozambique is almost 100% Barreto et al.[24] Lawn et al.[25] A number of studies reveal variable results of the Seroprevalence of rubella over different continents; 54.1% in Nigerian Bukbuk et al.[26] 76% in Sri Lanka Palihawadana et al.[27] 77.5% in Russian Odland *et al.*[28] and 93% in Eritrea Tolfvenstam et al.[29] These differences may be due to endemicity variations of these countries with rubella infections and recent introduction of *Rubella* vaccine alone or in combination as MMR vaccines in national immunization schedule. In the present study, the higher (54%) incidence of seropositivity for *rubella virus* IgG antibody was observed in pregnant women without history of miscarriage than that of the normal pregnancy (43.8%) outcomes group, suggested that rubella could be a cause of repeated pregnancy wastage in those women. Similar evidence was seen in Punjab, India that higher (73.2%) incidence was seen in the adverse pregnancy outcome group than the normal (69.5%) obstetric outcome group Singla et al.[30] Our finding detected that the highest seropositivity of rubella virus was reported in those pregnant women within the third trimester (55.2%) of gestation than others. However.[31] no significant difference (P >0.05) was observed among the three pregnancy trimesters.

Acknowledgments

None.

Conflicts of interest

None.

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