

Seroprevalence of cytomegalovirus antibodies among aborted women in Ibb city-Yemen

Abstract

Abortion is one of the most common health problems in the world, its causes vary, and some of them are viral. Cytomegalovirus (CMV) is one of the causes of abortion. So, this study aims to investigate the seroprevalence of CMV antibodies among aborted women. This study was a cross-sectional study conducted in Ibb city-Yemen. Serum samples were collected between September 2021 to April 2022. The serum samples were analyzed for IgG and IgM antibodies to CMV by Electro-Chemiluminescence Immunoassay (ECLIA).

Overall, 150 aborted women were enrolled. Amongst these cases, 148 out of 150 (98.67%) were positive for CMV IgG antibodies. Additionally, 11 out of 150 (7.33%) of the samples were positive for CMV IgM antibodies. The CMV IgG seroprevalence was not significantly influenced by age, residence, education level, socioeconomic status and abortion time. In addition, the CMV IgM seroprevalence was significantly associated with education level, socioeconomic status and abortion time. In conclusion, the low rate of CMV IgM and a high proportion of CMV IgG for most major of abortion women in this study suggest that CMV may not be the common factor leading to abortion.

Keywords: seroprevalence, cytomegalovirus, CMV, aborted women, Ibb, Yemen

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Abbreviations: CMV, cytomegalovirus; Ig, immunoglobulin; ECLIA, electro-chemiluminescence Immunoassay; CNS, central nervous system

Introduction

Cytomegalovirus (CMV) is double-stranded DNA and an enveloped virus. CMV belongs to the family of Herpesviridae and the beta herpesviridae subfamily.¹⁻³ CMV is a globally distributed virus which infects humans of all ages.^{1,4}

CMV virus is transmitted in many different methods as the virus is shed almost in all body fluids, including saliva, tears, breast milk, urine, semen and vaginal and cervical secretions⁴. Moreover, this virus cross the placenta. Therefore, cytomegalovirus is considered the most common cause of congenital abnormalities causing fetal damage, thus resulting in abortion, stillbirth and a wide range of malformations in newborns such as hearing loss and mental retardation.⁵⁻¹⁰

Clinical manifestations of CMV include fever, headache, myalgia, cervical lymphadenopathy, splenomegaly and rash. Moreover, CMV may lead to complications such as pneumonia, retinitis, myocarditis, hemolytic anemia and hepatitis. Additionally, it can cause Guillain-Barre´ syndrome as a central nervous system (CNS) complication.¹¹

The clinical signs range from asymptomatic cases to more fetal damage, CMV causes death due to abortion. Cytomegalovirus infection during pregnancy is more dangerous than other infections due to the virus can often be reactivated during the child-bearing years and can be transmitted to the fetus. Cytomegalovirus is lead to abortion in more than 70% of abortion status.¹²⁻¹⁴

The relationship between abortions and CMV has not been studied in Ibb city, Yemen. Studying the distribution of CMV in aborted women in Ibb city has great importance to display the prevalence of CMV antibodies (immunoglobulin) Ig, IgG and IgM, in aborted women and assessing the relationship between abortion and CMV.

Material and methods

A descriptive cross-sectional study was conducted from September 2021 to April 2022. 150 aborted women attending maternity units in some hospitals, Ibb city-Yemen. Blood samples were collected from aborted women, and the sera were separated from blood samples immediately and frozen at -20°C until the time of testing. The serum samples were analyzed for CMV IgG and IgM using Electro-Chemiluminescence Immunoassay (ECLIA) technique on Cobas e411 analyzer (Roach Diagnostic GmbH, Mannheim, Germany). Demographic data were obtained via a questionnaire filled out by members of the research group. The data included age, residence, socioeconomic status, education level and abortion time.

Calibration and quality control were performed according to manufacturer recommendations. The ethical clearance for this research was granted by the Medical Laboratories Department, Faculty of Medical Sciences, Aljazeera University ethical committee after due process had been followed.

The data were analyzed using GraphPad software (version 5.01; GraphPad Inc. La Jolla, CA, USA). The results were presented as percentages and *P* values. *P* values <0.05 were considered statistically significant.

Results

In this study, one hundred and fifty aborted women were investigated for seroprevalence of CMV antibodies. AS presented in Table 1, the seroprevalence of CMV IgG was 148 (98.67 %), while CMV IgM was 11 (7, 33), these result was shown statistically significant (*P*-value <0.0001).

Table 2 shows aborted women's sociodemographic characteristics. Most of the aborted women 73 (48. 67%) were in first age group (16-25 years), followed by the second age group (26-35 years), the third age group (36-45 years) and finally, 46-50 age group were 66 (44 %), 10 (6.66 %) and 1 (0.67), respectively. More than two third of the

aborted women 103 (68.67%) were living in urban areas. Moreover, the number of abortion women at the primary level of education was 72 (48%) of the total women included in this study. Most of the aborted women 134 (89.33%) were of middle socioeconomic status. Additionally, most abortion occurred in the 1st trimester of pregnancy.

Table 1 Seroprevalence of CMV antibodies among aborted women in Ibb city, Yemen

Serological results	IgG positive		IgM positive		P-value
	No.	%	No.	%	
Positive	148	98.67	11	7.33	<0.0001
Negative	2	1.33	139	92.7	

Table 2 Socio-demographic variables of 150 aborted women in Ibb city, Yemen

Variable	Number (n)	Percentage (%)
Age		
16-25	73	48.67
26-35	66	44
36-45	10	6.66
46-50	1	0.67
Residence		
Rural	47	31.33
Urban	103	68.67
Education Level		

Variable	Number (n)	Percentage (%)
Illiterate	30	20
Primary	72	48
Secondary	35	23.33
University	13	8.67
Socioeconomic Status		
Low	6	4
Middle	134	89.33
High	10	6.67
Abortion time (trimester)		
First	118	78.67
Second	26	17.33
Third	6	4

As shown in Table 3, the relationship between seroprevalence of anti CMV antibodies among aborted women and some socio-demographic characteristics. All age groups showed high positive for the presence of CMV IgG antibody but there was not statistically significant. Additionally, the seroprevalence of CMV IgM antibody among the first two age groups was 6 (8.20%) and 5 (7.60%), respectively. The prevalence rate of CMV IgG antibody in this study was found that higher in rural than urban with percentages of 100% and 98.05% respectively. Moreover, the prevalence rate of IgM in rural was (12.76%) and in urban (4.85%), these differences were not statistically significant.

Table 3 Distributions of CMV antibodies with socio-demographical characteristic of the aborted women in Ibb city, Yemen

Category	Participants		IgG Positive		P-value	IgM Positive		P-value
	No.	%	No.	%		No.	%	
Age								
16-25	73	48.67	71	97.3	0.9145	6	8.2	0.4848
26-35	66	44	66	100		5	7.6	
36-45	10	6.66	10	100		0	0	
46-50	1	0.67	1	100		0	0	
Residence								
Rural	47	31.33	47	100	0.9373	6	12.76	0.1138
Urban	103	68.67	101	98.05		5	4.85	
Education Level								
Illiterate	30	20	30	100	0.9683	5	16.67	0.033
Primary	72	48	71	98.61		5	6.94	
Secondary	35	23.33	34	97.14		1	2.86	
University	13	8.67	13	100		0	0	
Socioeconomic Status								
Low	6	4	6	100	0.9924	3	50	0.0053
Middle	134	89.33	132	98.5		8	5.97	
High	10	6.67	10	100		0	0	
Abortion time (trimester)								
First	118	78.67	116	98.3	0.9547	6	4.24	0.0069
Second	26	17.33	26	100		2	7.69	
Third	6	4	6	100		3	16.67	

In this study, the association between educational levels and CMV IgG antibodies prevalence was not statistically significant. All aborted women at illiterate and university levels were positive for CMV IgG antibodies. It is noted that there is a relationship between education levels and CMV IgM antibodies ($P=0.033$). Of 30 cases in the illiterate level, CMV IgM antibodies were positive in 5 (16.67%) cases. Regarding cases of primary level, of those 72, 5 (6.94%) were positive for CMV IgM antibody. Of 35 cases in secondary levels, CMV IgM antibodies were positive in 1 (2.86%) case. Of 13 cases at the university level, the CMV IgM antibody was negative in all cases (100%). All aborted women in the second and third trimesters were 100% of CMV IgG seropositivity, whereas in the first trimester was 98.30% CMV IgG positive but there was not significantly.

Furthermore, CMV IgM prevalence was revealed significant ($P=0.0069$) in relation to abortion time.

Likewise, the seroprevalence of CMV IgG and socioeconomic status did not differ significantly. In this case, the prevalence of IgM antibodies against CMV and socioeconomic status was significant ($P=0.0053$).

As presented in Table 4, out of 60 aborted women with skin rash, CMV IgG antibody was positive in 59 cases (98.33%). Out of 32 aborted women with lymphadenopathy, 31 cases (96.87%) were positive for CMV IgG antibodies. In another hand, 5% of aborted women with skin rash were CMV IgM positive, and 6.25% of aborted women with lymphadenopathy were CMV IgM positive.

Table 4 Distributions of CMV with symptoms

Symptoms	Participants		IgG Positive		P- value	IgM Positive		P- value
	No.	%	No.	%		No.	%	
Skin rash	60	40	59	98.33	0.9817	3	5	0.9554
Lymphadenopathy	32	21.33	31	96.87		2	6.25	

Discussion

This first study was to report the prevalence of cytomegalovirus antibodies among aborted women in Ibb city. In this study, IgG was presented in 98.67 % of aborted women, indicating that the present data showed that a large proportion of aborted women had IgG antibodies to CMV, suggesting a previous exposure. Seroprevalence of IgM antibody was found in 7.33%, suggesting that abortion might have resulted from CMV infection in the course of pregnancy. The prevalence of CMV IgG antibody observed in this study was similar to that described in Thamar governorate, Yemen.¹⁰ In another study conducted in Kirkuk City, CMV IgG and IgM antibodies were detected in 37% and 1% of women with abortion.¹³ Our result showed a difference in CMV IgM from another study conducted in Chongqing, China. All aborted women were CMV IgM negative while CMV IgG was almost close (95 %).¹⁵ It may be due to the differences in traditions and social habits and hygiene standards. In the present study, the rate of CMV IgG and CMV IgM in aborted women living in rural areas than in those living in urban. Furthermore, there was no statistically significant between CMV IgG in aborted women and the socio-demographical characteristics including age, education levels, socioeconomic status and abortion time. On the other hand, there were significant between CMV IgM seropositive and education levels, socioeconomic status and abortion time.

Conclusion

The findings of our study indicated a high prevalence of CMV IgG among aborted women in Ibb city, Yemen. Moreover, our results showed that the seroprevalence of CMV IgG in aborted women living in rural areas was more than in those living in urban. Seroprevalence of CMV IgM was statistical significance with education levels, socioeconomic status and abortion time. Further investigations evaluating the causative agents of abortion in Ibb city and other cities in Yemen, with adequate sampling and sample size are required.

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Conflicts of interest

The authors have no conflict of interests to declare.

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