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Original Research

Cytomegalovirus infection among women with previous history of abortion in Dhamar City, Yemen: A retrospective study

Amat Al-Khaleq O. Mehrass[1*], Mohammed Y. Akabat[1], Fathia M. Alazzi[2], Waleed E. Mohammed[3], Mohammed A. Al-Manari[1], Mahyoub H. Dows[1], Ali M. Al-Otair[1], Mokhtar A. Hizam[1], Amar M. Al-Magribi[1], Salah K. Dabwan[1]

[1]Department of Gynecology & Obstetrics, Faculty of Medicine, Thamar University, Dhamar, Yemen
[2]Department of Anatomy, Faculty of Medicine, Thamar University, Dhamar, Yemen
[3]Department of Pathology, Faculty of Medicine, Thamar University, Dhamar, Yemen

[*]For Correspondence:
Amat Al-Khaleq O. Mehrass
Faculty of Medicine, Thamar University, Dhamar, Yemen
Tel: +967 770862676
Email. amatmehrass@gmail.com

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Abstract

Background: Cytomegalovirus is an enveloped DNA virus from the *Herpesviridae* family. It is the most common cause of congenital infection. CMV is more widespread in developing countries and communities with lower socioeconomic status.

Aim: The study aimed to estimate the prevalence of CMV infection among women with a history of previous abortion and to detect the relationship between CMV infection and abortion in women.

Methods: The study was a retrospective study by getting required data from patient files (299 cases) of pregnant and non-pregnant women during the period from December (2017) to January (2019), in age groups (15 – 45) years attending health centers and hospitals in Dhamar City, Republic of Yemen.

Results: The seroprevalence of cytomegalovirus infection among women with previous history of abortion was 99.3 % of IgG and 3.7 % of IgM antibodies in the total study cases (299 cases). There was no statistical significance detected between IgG and IgM and abortion (*P* value > 0.05).

Conclusion: The seroprevalence of CMV antibodies among women with previous history of abortion in Dhamar city is a high rate of CMV IgG and a low rate of CMV IgM. It may be the main factor causing abortion and the possibility that women were positive for CMV (IgM) antibodies at the time of pregnancy.

Keywords: Cytomegalovirus infection, Abortion, Dhamar, Yemen.

1. Introduction

Human cytomegalovirus (CMV) is a double stranded DNA virus and is a member of the *Herpesviridae* family. CMV is transmitted from person to person via close contact with an individual who is excreting the virus through the placenta, blood transfusion, breast milk and through sexual transmission [1]. Cytomegalovirus (CMV) infection can be transmitted to the fetus during pregnancy, causing spontaneous abortion, fetal death or congenital malformation [2]. The absence of a program for early diagnosis and treatment of maternal infections can considerably increase the rates of perinatal morbidity and mortality. Therefore, early antenatal surveillance is essential for preventing vertical transmission of these.

There are many confounding studies describing the association between CMV infection and abortion, which show that the human cytomegalovirus (HCMV) can result in abortion or stillbirth. HCMV acts as an immune modulator by using an array of immune evasion strategies to avoid elimination from the host, and its viral proteins are involved in the regulation of cellular gene expression

and the induction of pro-inflammatory cytokines or an autoimmune response [3, 4].

At least 60 % of the USA population has been exposed to CMV [1] with a prevalence of more than 90% in high-risk groups [6] e.g.; female sex, homosexuals and low socioeconomic status. The prevailing age of infections varies worldwide. The incidence of CMV seropositivity rises with age and in US- based study was reported to increase from 36 % in children aged 6 to 11 years to 91 % in individuals older than 80 years [7].

In developing countries, most infections are acquired during childhood, in developed countries up to 50 % of young adults are CMV seronegative [8]. The aim of this study was to determine the seroprevalence of CMV in women with a previous history of previous abortion at different ages.

2. Methods

Study Design and Area

This is a retrospective study was conducted from December 2017 to January 2019, performed on women with previous history of abortion (age range, 15 to 45 years) attending Health Centers and Hospitals in Dhamar city, Republic of Yemen.

Study Group

A total of 299 participants, ranging in age from 15-45 years (mean ± SD: 24.3 ± 6.1 years), they who agreed to participate in the study and provided the information required for evaluation. Participants were selected female patients with a previous history of abortion from the target area for the study.

Data Collection

These study data were obtained from the medical archive files of patients with a previous history CMV. Relevant data were drawn from each of the 299 patients' files and recorded on a special form designed for this purpose.

Statistical analysis

Data entry, checking and analysis was done using Statistical Package for Social Science (SPSS) software (version, 14). The descriptive statistics were carried out to represent, the categorical variables by the frequency distribution and percentages. To determine whether there was an association (P. Value) between the categorical data, a Chi square test was used.

Ethics

Approval for this study was obtained from the Thamar University Medical Ethics Committee that belong to the Faculty of Medicine. In addition, agreement was made with the owner of medical centers and hospitals.

3. Results

Demographic characteristics of study group

A total of 299 medical archive files of female patients with a previous history of abortion were reviewed in this study. The majority (31.4%) of them were aged 21-25 years followed by those with aged 15-20 years (30.1%) the majority of cases (32.1%) were women with marriage period (> 8) years, followed by those with marriage period (≤ 2) years by
(23.4%). (Table 1).

Table 1: Demographic characteristics of study group (n= 299)

Variable	Frequency	%
Age / Year		
15 – 20	90	30.1
21 – 25	94	31.4
26 – 30	70	23.4
31 – 35	31	10.4
> 35	14	4.7
Address		
Urban	123	41.1
Rural	176	58.9
Marriage period/Year		
≤ 2	70	23.4
3-4	63	21.1
5-6	33	11
7-8	37	12.4
> 8	96	32.1
No. of pregnancies		
1 – 3	209	69.9
4 – 6	66	22.1
> 6	24	8.0
No. of deliveries		
0 – 1	212	70.9
2 – 3	61	20.4
> 3	26	8.7
No. of abortions		
1 - 2	242	80.9
3 - 4	44	14.7
≥ 5	13	4.4
Total	299	100

Table 2 shows the relationship between the seroprevalence of anti-CMV antibodies among aborted women and some sociodemographic characteristics. The total cases of CMV IgM seropositivity were in the age group less than 35 years old, and the high positivity (45.5%) & (36.4%) presence was in age groups 26- 30 and 15 -20, respectively. There was statistically significant with *P*- value =0.033.

Additionally, the positive prevalence rate of CMV IgM antibody in this study was found to be higher in rural areas than in urban areas with percentages of 63.6% and 36.4%, respectively.

The relationship between the seroprevalence of CMV-IgG antibodies among aborted women and some sociodemographic characteristics. The total CMV seropositivity cases were highly positive (30%), (31%) and (23.6%) in the age groups 15-20, 21-25, and 26-30 years, respectively, and it decreases with increasing age, there was no statistically significant with *P* value =0.24.

Additionally, the seropositive rate of CMV IgG antibody in this study was found to be higher in rural areas than in urban areas with percentages of 58.9% and 41.1%, respectively.

Table 2: Relation between the serological results and Abortion, Address, Age

		IgM								IgG					
		Negative		Grey zone		Positive				Negative		Positive			
Variable	Total	no	%	no	%	no	%	%*	*P*	no	%	no	%	%*	*P*
Abortion															
1 – 2	242	226	93.4	7	2.9	9	3.7	81.8	0.817	0	0.00	242	100.0	81.5	0.065
3 – 4	44	41	93.2	2	4.5	1	2.3	9.1		0	0.00	44	100.0	14.8	
≥ 5	13	12	92.3	0	0.0	1	7.7	9.1		2	15.38	11	84.6	3.7	
Address															
Urban	123	115	93.5	4	3.3	4	3.3	36.4	0.93	1	0.81	122	99.2	41.1	1.000
Rural	176	164	93.2	5	2.8	7	4.0	63.6		1	0.57	175	99.4	58.9	
Age/Years															
15 – 20	90	84	93.3	2	2.2	4	4.4	36.4	0.033	0	0.00	90	100.0	30.3	0.356
21 -25	94	91	96.8	2	2.1	1	1.1	9.1		2	2.13	92	97.9	31.0	
26 -30	70	64	91.4	1	1.4	5	7.1	45.5		0	0.00	70	100.0	23.6	
31 – 35	31	26	83.9	4	12.9	1	3.2	9.1		0	0.00	31	100.0	10.4	
> 35	14	14	100.0	0	0.0	0	0.0	0.0		0	0.00	14	100.0	4.7	
Total	299	279	93.3	9	3.0	11	3.7	100.0		2	0.67	297	99.3	100.0	

* The percentage is calculated to the total positive results

Table 3: Seropositive prevalence of CMV antibodies (IgM & IgG) among aborted women

Serological results	IgG		IgM	
	No.	%	No.	%
Positive	297	99.33	11	3.7
Negative	2	0.67	288	96.3

A total of two hundred and ninety-nine women with a previous history of abortion were investigated for seroprevalence of CMV antibodies. As presented in Table 3, the seroprevalence of CMV IgG was 297 (99.33 %), while CMV IgM was 11 (3, 7%).

Figure 1 shows that the highest frequency of abortions (94 cases) of the total study cases was in the age group (21-25) years, while the lowest frequency of abortions (14) of the total study cases was in the age group (> 35) years

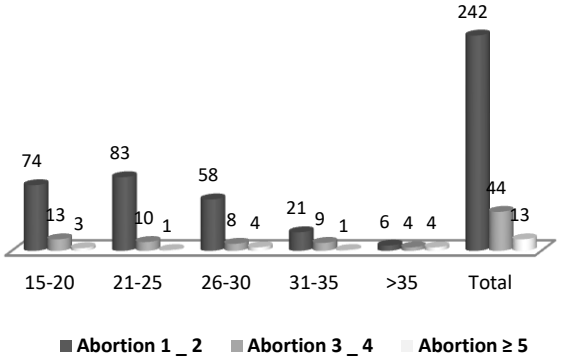

Figure1: Relation between abortion and Age

4. Discussion

This is the data on CMV infections among women with a previous history of abortion in Dhamar city, Yemen. The present study was performed to detect the seroprevalence and correlates of CMV infection in women with a previous history of abortion in Dhamar city, Yemen. We found that 99.3% seroprevalence of CMV IgG and 4% seroprevalence of IgM. These findings were similar to previous studies in Sana'a city Yemen (100%) seroprevalence of CMV IgG [9]; Arab countries in Saudi Arabia (92.1%) seroprevalence of CMV IgG[10], Qatar (96.5%) seroprevalence of CMV IgG [11], Bahrain (100%) seroprevalence of CMV IgG[12], Iraq (100% seroprevalence of CMV IgG [13], Egypt (100%) seroprevalence of CMV IgG [14], Sudan (97.5%) [15], and in other countries as Tunisia (96.3%) seroprevalence of CMV IgG [16]; and also Turkey(100%) seroprevalence of CMV IgG [17], Iran (98.8%) seroprevalence of CMV IgG [18], and the African countries Nigeria (94.8%) seroprevalence of CMV IgG[19], and Ethiopia (88.5%) seroprevalence of CMV IgG [20].

Seroprevalence in Yemen, reported by Edrees, 2010 at a rate of 68% seroprevalence of CMV IgG among pregnant women in Ibb city [21] and regional study in Sudan (72.2%) seroprevalence of CMV IgG among pregnant women [22]. However, the high lower seroprevalence of IgG reported in developed countries. France (43.7%) seroprevalence of CMV IgG [23], Germany (43.3%) seroprevalence of CMV IgG [24], and Belgium (30.2%) seroprevalence of CMV IgG [25].

The prevalence of CMV infection observed in this study was similar to that reported in other developing communities but higher than in the developed communities. This study showed a statistically significant association ($P < 0.05$) between seropositive of IgM and age group and showed a statistical insignificant association ($P > 0.05$) between seropositive of IgM and number of abortions.

But this study showed a statistically insignificant association ($P > 0.05$) between the seroprevalence of IgG and age group, also no statistical significance between the seroprevalence of IgG and the number of abortions.

5. Conclusion

The findings of our study indicated, the seroprevalence of CMV antibodies among women with previous history of abortion in Dhamar city is a high rate of CMV IgG and a low rate of CMV IgM. It may be the main factor causing abortion and the possibility that women were positive for CMV (IgM) antibodies at the time of pregnancy.

Moreover, the results showed that the seroprevalence of CMV IgG in aborted women living in rural areas was extra than in those residing in urban.

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Competing interests
The authors declare that they have no competing interests.

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