

Research Article

Seroprevalence of Cytomegalovirus Infection Among Pregnant Women with Prior Miscarriages in Dhaka, Bangladesh

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Abstract

Objectives: Compared to other infections, cytomegalovirus (CMV) infection is significantly more complicated during pregnancy since the virus frequently reactivates at this time, potentially increasing the risk of adverse pregnancy outcomes. Therefore, the purpose of this study was to assess the prevalence of human CMV infection among women who had a history of miscarriage.

Methods: The anti-CMV IgG was measured using the chemiluminescence method. A total of 300 pregnant women who had a number of previous miscarriages were tested. Women from a variety of socioeconomic backgrounds were taken into consideration.

Results: Among the study women, 246 women showed positive results, giving an 82% prevalence rate. Significantly higher prevalence rates ($P < 0.05$) were observed with an increasing number of prior miscarriages. All of the study participants who had experienced three or more miscarriages were positive, compared to about 80% of participants with just two or fewer miscarriages.

Conclusion: It may be concluded that women with varying numbers of prior miscarriages had significantly different prevalences of anti-CMV IgG antibodies.

Keywords: anti-CMV IgG, Bangladesh, Cytomegalovirus, pregnant women, miscarriages

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Cytomegalovirus (CMV), a ubiquitous agent, is a significant contributor to intrauterine infections. In adults, the infection is typically asymptomatic, but when it happens during pregnancy, its relevance is substantially increased.

^[1] In developed nations, the seroprevalence of CMV in pregnant women ranges from approximately 40 to 70%, but above 95% in developing countries including Bangladesh.^[2-7]

^[7] The data in Bangladesh, however, may not be representa-

tive of the general population in both urban and rural locations because it was mostly obtained from hospital-based pregnant women in the capital city. A nationwide study of seroprevalence in pregnant women is still required.

A member of the Herpesviridae family, CMV is a double-stranded DNA virus.^[8] In the adult population, seroprevalences of CMV range from 45 to 100%, rising with age and varying with location and socioeconomic status.^[9] The pri-

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mary CMV infection, which can be contagious, is shed from the body for months or even years after it occurs most frequently during pregnancy. It typically has a latency period and can be reactivated, causing illness. In 40–50% of cases, if the mother has the primary infection, the fetus also has it.^[10] A recurring infection in the mother increases the risk of infection in the fetus by 1%, thereby increasing the risk of mental impairment, hearing loss, and eventually abortion.^[11, 12]

Due to the serious consequences for offspring, numerous studies conducted globally have focused primarily on the seroprevalence status of CMV in pregnant women.^[13] To limit the transplacental transmission of a virus to the fetus, early detection is necessary to begin the right treatment on time.^[14] The current study aimed to determine the prevalence of CMV infection in pregnant women with a history of miscarriage and to investigate the association between maternal CMV infection and prior miscarriages along with adverse pregnancy outcomes in Dhaka, Bangladesh.

Methods

Study Population

In this study, 300 pregnant women with a history of miscarriage and ages ranging from 18 to 40 were involved. Additionally, data on the study participants' gestational age, education level, employment, access to basic sanitation, gravidity and parity were recorded. Prior to the start of the experimental method spanning an 18-month period, from January 2021 to June 2022, verbal informed consent from the study population or their family members was obtained.

Sample Collection and Serological Analysis

Serum samples were obtained after centrifugation of blood samples that had been collected. Prior to serological analysis, the serum samples were promptly stored at -20°C . Following the manufacturer's instructions, the chemiluminescence immunoassay method (Liaison, DiaSorin, Saluggia, Italy) was used to quantify the anti-CMV IgG-specific antibodies where all antibody levels were represented as AU/mL and the cut-off index (COI) for negative versus positive antibody levels was set as anti-CMV IgG <2 vs. >2 AU/mL.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) software for windows version 21.0 (SPSS Inc., Chicago IL., USA) was used for data analysis. The Chi-square test with Pearson modification was used for comparisons between the categorical variables. The statistical significance criterion was set as $p < 0.05$.

Results

Demographic Characteristics

The study pregnant women were 18–40 years old (mean, 26.5 ± 5.6), with more than half being between the ages of 18 and 27 ($n=181$, 60.3%). The first, second, and third trimester were experienced by 82 (27.3%), 125 (41.7%), and 93 (31.0%) of them, respectively. Among the individuals, 119 (39.7%) were nulliparous, 103 (34.3%) had parity 1, and 78 (26.0%) had parity 2. Regarding educational level, 133 (44.3%) had less than five years of schooling (55 were illiterate or had only a basic education), 104 (34.7%) had 5–10 years of schooling, and 63 (21.0%) had higher education (≥ 10 years of schooling). The majority of women ($n=193$, 64.3%) worked outside the home (either as employees or students), compared to 107 (35.7%) homemakers. More than three-fourths of the pregnant women ($n=236$; 78.7%) reported having a basic sanitation at home, but 64 (21.3%) did not (Table 1).

Prevalence of Anti-CMV IgG-Specific Antibodies

All of the women selected for the study had a history of miscarriages (mean, 1.5 ± 0.7). 182 (60.7%) of the total had the fewest number of miscarriages, 86 (28.7%) had two,

Table 1. Demographic characteristics of pregnant women participated in the study

Characteristics	Frequency	Percentage
Age (years)		
18-22	101	33.7
23-27	80	26.7
28-32	73	24.3
33-37	33	11.0
≥ 38	13	4.3
Gestational age		
1 st trimester	82	27.3
2 nd trimester	125	41.7
3 rd trimester	93	31.0
Parity		
Primigravida	119	39.7
1	103	34.3
≥ 2	78	26.0
Education		
≤ 5 years of schooling	133	44.3
5-10 years of schooling	104	34.7
≥ 10 years of schooling	63	21.0
Employment		
Employed or students	193	64.3
Homemakers	107	35.7
Access to basic sanitation		
Yes	236	78.7
No	64	21.3

and 32 (10.7%) had three or more. IgG-specific antibodies were present in 246 (82.0%) individuals overall. When compared to women who had two or less prior-miscarriages, the prevalence of IgG-specific antibodies was considerably higher in study pregnant women who had higher miscarriages (≥ 3) (214/268 vs. 32/32, $p < 0.05$) (Table 2).

Discussion

This study was conducted to look into the seroprevalence of anti-CMV IgG among pregnant women with a history of miscarriage. Our research revealed an 82.0% overall prevalence of anti-CMV IgG, indicating that the majority of the patients who took part had previously been exposed to the virus.

In different population groups, the frequency of CMV antibodies during pregnancy varies substantially. According to the varying accessibility of the virus and its rate of community circulation, developed countries have a lower prevalence rate of CMV IgG antibodies (40–80%) compared to developing countries, which have a higher rate (90–100%).^[7, 15] The increased incidence of unhygienic circumstances and lower socio-economic status, as well as the lower levels of education, could all be contributing causes to the higher prevalence of CMV in developing nations.^[16–19] In this study, 35.7% of pregnant women were homemakers, 60.3% had children, 44.3% had less than five years of education, and 21.3% did not have access to basic sanitation.

The seroprevalence of anti-CMV IgG in this study is similar to that of some previous reports.^[20, 21] Our results demonstrated that in Bangladesh, compared with the prior prevalence of 97.0–100.0%, the seroprevalence of CMV in pregnant women has significantly dropped over the last few years, showing a notable advancement in the public health care system.^[7, 22] However, our finding is lower than that estimated for India (87.4%), Pakistan (93.2%), and Turkey (98.5%).^[1, 23, 24] Contrarily, the prevalence rate is higher than what has been reported in developed countries like Japan, the USA and European nations.^[9, 25–27]

Furthermore, the IgG seropositivity rate was correlated

with the previous miscarriages in a statistically significant ($p < 0.05$) manner. With the rise in the frequency of prior miscarriages, seropositivity increased. Approximately 80% (146/182 for 1, 68/86 for 2) of pregnant women with at least two previous miscarriages were positive, while the women who had ≥ 3 miscarriages were all positive. Additionally, we observed that some study participants who received medical assistance delivered healthy babies, whereas women who did not receive any support miscarried again, which will require further and more detailed investigation.

Our study has some limitations. First, we were unable to determine whether the patients had current infections and could not be followed up with. Second, we were unable to prove an association between CMV infections during pregnancy and the bad results. Future research should take these limitations into consideration.

Conclusion

The current study demonstrates that CMV infection is common among pregnant women, especially those who have experienced numerous miscarriages. Age, parity, employment, education, and access to adequate hygiene are a few epidemiological characteristics that may make pregnant women more susceptible to this infection. More emphasis should be put on educating women about the effects of CMV infection in pregnancy, the ways to prevent the infection, and their own prospective screening in order to decrease miscarriages in the future since there is no effective treatment or vaccine against CMV.

Disclosures

Ethics Committee Approval: The institutional ethics committee gave its approval to the study (Ref No: IRB/21/17).

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – A.I.; Design – A.I.; Supervision – A.I.; Materials – F.S.; Data collection and/or processing – F.S.; Analysis and/or interpretation – M.H.; Literature search – M.H.; Writing – M.H.; Critical review – F.S., M.A.I.

Table 2. Anti-CMV IgG distribution among the pregnant women with previous miscarriages history

Previous Miscarriage No	Frequency (%)	Seroprevalence of anti-CMV IgG		p
		Positive (%)	Negative (%)	
1	182 (60.7)	146 (48.7)	36 (12.0)	0.048
2	86 (28.7)	68 (22.7)	18 (6.0)	
≥ 3	32 (10.7)	32 (10.7)	0 (0)	
Total	300	246 (82.0)	54 (18.0)	

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