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Cytomegalovirus Infection Burden Among Patients Attending a Tertiary Care Hospital in Jharkhand

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A B S T R A C T

Cytomegalovirus (CMV) is a herpes virus that causes severe illness and death in people who are immunocompromised, including organ and bone marrow transplant recipients, HIV infected people, those on immunosuppressive drugs and newborns infected during pregnancy. Aim: To estimate the disease burden of Cytomegalovirus infection among the patients attending Rajendra Institute of Medical Sciences. Samples of clinically suspected cases of cytomegalovirus infection from all the age groups were collected and sent to the Department of Microbiology, RIMS, Ranchi, from January 2021 to December 2021. The samples were tested for IgM by ELISA. Results: During the study period, a total of 618 samples from clinically suspected cases were received for testing out of which, 67 samples tested positive. Of the total positive cases, 41 were males and 26 were females. Conclusion: Anti-CMV drugs are available now-a- days for the treatment of severe infections in immunosuppressed patients. Developments of vaccine to protect pregnant women from primary infection are in progress.

Introduction

Cytomegalovirus (CMV) is a human herpes virus which is prevalent worldwide with an estimated seroprevalence of 45% to 100% in the general population (Cannon *et al.*, 2010). Cytomegalovirus (CMV), can cause life-threatening disease in immunocompromised individuals as well as in fetuses (Mocarski *et al.*, 2007). The highest risk of transmission and fetal infection occurs if a seronegative mother acquires CMV during pregnancy. This intrauterine transmission can result in microcephaly, mental retardation, developmental delay, visual impairment/retinitis, convulsions, and frequently hearing loss (Dollard *et al.*, 2007).

CMV is the single most frequent cause of infectious complications in the early period following kidney transplantation, with the overall incidence of CMV infection and disease during the first 100 days post-transplantation being 60% and 25%, respectively, when no CMV prophylaxis or presumptive therapy

is given (Sagedal *et al.*, 2000). Infection with CMV is more common in developing nations and the people belonging to the lower socioeconomic section of the society (Pass, 2001; Gunter and Luban, 1996). Like all human herpes viruses, cytomegalovirus (CMV) establishes a lifelong latent infection following primary infection that can periodically reactivate with shedding of infectious virus (Mocarski *et al.*, 2007).

In children and adults, both primary CMV infections and reactivations are typically asymptomatic (Lasry *et al.*, 1996; Murph *et al.*, 1991 and Pass *et al.*, 2009); as a result, many people are unaware that they have been infected (Lasry *et al.*, 1996; Murph *et al.*, 1991; Pass *et al.*, 2009; Jeon *et al.*, 2006 and Ross *et al.*, 2008).

CMV is a public health burden, although the major burden is due to congenital CMV infection (Griffiths, 2012; Lancini *et al.*, 2014 and Rafailidis *et al.*, 2008). A vaccine would be necessary to significantly and permanently reduce congenital (and other) CMV infections. To date, there is no licensed vaccine available that protects against CMV. However, several vaccine candidates are currently being tested in clinical trials (Smith *et al.*, 2013; Bernstein *et al.*, 2016 and Pass *et al.*, 2009).

Objectives of this study

Describe the disease burden of Cytomegalovirus infections in Jharkhand region between January 2021 and December 2021.

To study the various demographic variables.

In our study, we also described about the seroprevalence of IgM and IgG antibody of CMV in TORCH profile.

Materials and Methods

Case selection for the purpose of this study: Participants were selected on the basis of having a medical condition for CMV. Blood samples were received in the Department of Microbiology from IPD of Rajendra Institute of Medical Sciences.

µ capture IgM ELISA method was used for CMV detection.

TORCH profile was also done for the patients coming from OPD and IPD of Rajendra Institute of Medical Sciences by Chemiluminesent immunoassay (CLIA).

Results and Discussion

During one year period, from January 2021 to December 2021, total number of samples tested were 618, out of which, 67 were positive, 5 samples tested equivocal and 546 were negative.

Maximum number of positive cases was found in the age group of 13-24 yrs., followed by 2-12 yrs of age group. Least number of cases were found in 56-65yrs. age group.

Of total positive cases, 41(61.19%) were males and 26 (38.80%) were females.

Maximum positive cases were in the month of October (14 cases). This was followed by 11 cases in the month of November and December each. 8 cases were positive in September, 6 cases in July, 5 cases in March and August each. 3 cases were positive in January month, 2 cases in February and 1 case in May and June each.

The TORCH profile was performed by CLIA and out of 135 sample received from different departments, maximum number of samples were received from the Paediatrics department (80 samples). Out of these 80, 75 were IgG positive and 5 samples were IgM positive.

From Obstetrics & Gynecology department, 48 samples were received. Out of these 48, 45 were IgG positive and 3 samples were IgM positive.5 samples were received from Medicine department and 2 from Ophthalmology department.

CMV infection appears to be endemic in childhood in some countries but not in others.

A negative cytomegalovirus (CMV) IgM result suggests that the patient is not having acute or active infection. However, a negative result does not rule-out primary CMV infection.

Positive CMV IgM results indicate a recent infection (primary, reactivation, or reinfection). IgM antibody responses in secondary (reactivation) CMV infections have been demonstrated in some CMV mononucleosis patients, in a few pregnant women, and in renal and cardiac transplant patients. Levels of antibody may be lower in transplant patients with secondary rather than primary infections.

Positive cytomegalovirus (CMV) IgG results indicate past or recent CMV infection. These individuals may transmit CMV to susceptible individuals through blood and tissue products.

Equivocal CMV IgG results may occur during acute infection or may be due to nonspecific binding reactions. Submit an additional specimen for testing if clinically indicated. Individuals with negative CMV IgG results are presumed to not have had prior exposure or infection with CMV and are therefore considered susceptible to primary infection.

With regard to the age group affected, in our study, maximum number of positive cases was found in the age group of 13-24 yrs., followed by 2-12 yrs of age group. Least number of cases were found in 56-65yrs. age group. This finding is similar to some studies, but this finding is in contrast to the concept that the increase of CMV seroprevalence with age is well known and results from cumulative exposure to CMV throughout life. CMV seroprevalence generally increased with age in all 32 studies that examined this risk factor, as would be expected since antibody tests measure cumulative past exposure to infection. The exception to this trend was seen in four studies that included infants (Almeida *et al.*, 2001; Collaborative, 1970; Deibel *et al.*, 1974 and Embil *et al.*, 1969); in these studies, seroprevalence among infants less than 6 months of age was higher than that of children who were somewhat older, probably reflecting the transient presence of maternally acquired passive antibodies among infants. In most of the studies that stratified by age, seroprevalence reached 60% or more in persons older than 50.

In case of gender distribution, of positive cases, of total positive cases, 41(61.19%) were males and 26 (38.80%) were females. Thirteen studies compared CMV seroprevalence by sex. In 10 of these studies females had higher seroprevalences than males, though in most instances the differences were small. In contrast, two studies from Africa found significantly higher seroprevalences among males, although differences were also small. One study in the United States showed a 7% higher seroprevalence among males, but the study was small and was carried out among children, so that sex-based differences may have not yet been manifest.

The present study constitutes the disease burden due to CMV in the overall population. These data indicate that a substantial proportion of women in childbearing age were susceptible to primary CMV infection. Further studies with more recent data are necessary to evaluate CMV disease burden in various age group including the immunocompromised individuals in the Indian population and to better understand the epidemiology of CMV infection. As long as no effective vaccine is commercially available, the primary prevention measure should be educating women about CMV risk reduction measures.

Table.1 Total number of cases of CMV

Total Number of Samples tested	Positive Cases	Equivocal	Negative
618	67	5	546

Table.2 Age-wise distribution of CMV positive cases

Age group	Total CMV positive cases
< 2 yrs.	7
2-12 yrs.	12
13-24 yrs.	13
25-35 yrs.	7
36-45 yrs.	7
46-55 yrs.	8
56-65 yrs.	6
>65 yrs.	7

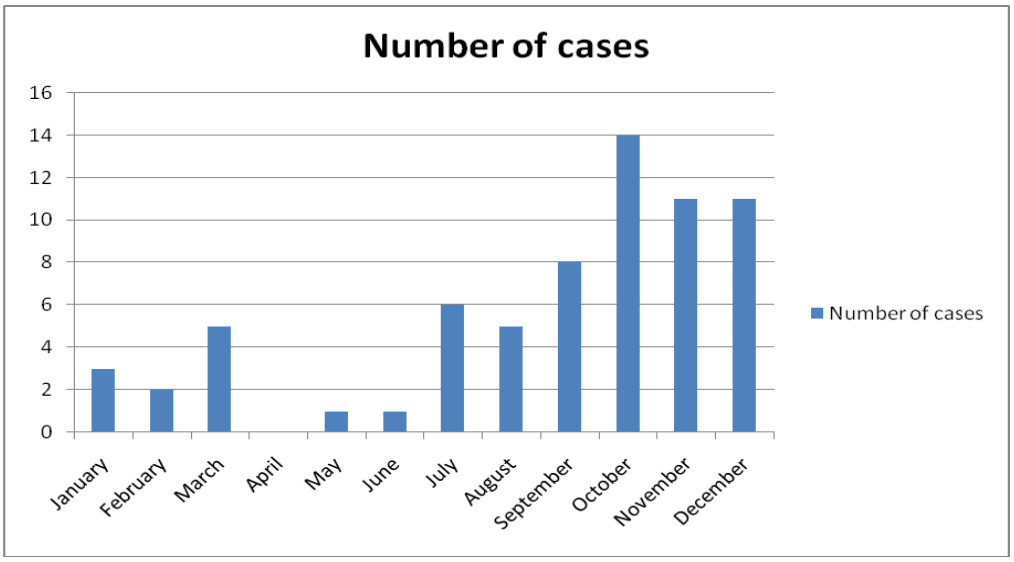
Table.3 Gender-wise distribution of CMV positive cases:

Gender	Total CMV positive cases
Male	41
Female	26

Table.4 Department -wise distribution of samples for TORCH profile

Department	Total	CMV IgM positive	CMV IgG positive
Paediatrics	80	5	75
Obstetrics & Gynecology	48	3	45
Medicine	5	1	5
Ophthalmology	2	-	2
Total	135	9	127

Fig.1 Month-wise distribution of cases



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