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Prevalence of Cytomegalovirus in Paediatric Age Group

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Abstract

Human Cytomegalovirus virus is one of eight human herpes viruses and infection caused by this virus is prevalent throughout the world. The disease caused by Cytomegalovirus ranges from asymptomatic disease in normal hosts to life threatening infection in newborn and immunocompromised children..This study was done to assess the prevalence of cytomegalovirus among paediatric age groups. This study was conducted in the Microbiology Department in Saveetha medical college,Thandalam.50 serum samples of paediatric age groups and 50 serum samples of other age groups were collected and processed using ELISA technique for the detection of Cytomegalovirus IgM antibodies.In the paediatric age group,14 out of 50 samples were positive and and in the other age groups,2 out of 50 samples were positive for Cytomegalovirus IgM antibodies.Among the pediatric samples,2 out of 4 samples in the age group of less than one year were positive and 12 out of 36 samples in the age group of 2-14 years were positive for Cytomegalovirus IgM antibodies. Thus, seropositivity is higher among neonates who mainly acquire infection through maternal transmission. Hence antenatal screening is essential in reducing the occurrence of Cytomegalovirus in neonates.

Keywords: Antenatal screening, cytomegalovirus, Immunocompromised children, Maternal transmission, new born, seropositivity.

INTRODUCTION

Human cytomegalovirus is one of eight human herpesviruses and the infection caused by the virus is prevalent throughout the world .Infection ranges from asymptomatic disease in normal hosts to life threatening disease in immunocompromised children.Congenital cytomegalovirus infection is a major cause of hearing loss and congenital anomalies in children[1][2][3]Cytomegalovirus can be acquired in utero,or during infancy,early childhood or adolescence.Mother-to-child transmission of cytomegalovirusoccurs transplacentally through breast milk.Mother to child transmission of cytomegalovirus can also occur if the mother was infected in the past or during the present pregnancy[7]..During infancy and early childhood,infection usually occurs after ingestion of virions present in the breast milk of Cytomegalovirus-infected mothers or through visions in urine or saliva..Infection at younger age group is common in locations where sanitation is poor.Mortality of children with symptomatic disease is around 30 %.Approximately 40 % to 58 % of infants with symptomatic disease who survive at birth may have late complications,including substantial hearing loss,mental retardation,chorioretinitis etc.(4)Premature infants who acquire Cytomegalovirus postnatally can be asymptomatic or can suffer from diseass such as hepatitis,thrombocytopenia or pnuemonitis[8]. Upto 57 % of infants whose mother shed Cytomegalovirus at or around delivery become infected with Cytomegalovirus and can become Cytomegalovirus infected[9].Seropositive children spread infection to seronegative children.hence,it is very essential to diagnose Cytomegalovirus.This study, assessing the prevalence of Cytomegalovirus in pediatric age groups further stresses the importance in diagnosis and treating the disease.

Aim and objectives

This study was done to assess the prevalence of cytomegalovirus among paediatric age groups.

MATERIALS AND METHODS

This study was conducted in Department of Microbiology,Saveetha Medical

College,Thandalam,Chennai.48 Serum samples of pediatric age groups and 50 serum samples of other age groups were collected and processed using ELISA technique for the detection of IgM Cytomegalovirus Antibodies.The steps performed in ELISA is as follows:

Step 1 : 100 microlitre of diluted sample/controls is placed in the wells of the strips ,incubated for 45 minutes at 37 degree Celsius and washed 4 times.

Step 2:100 microlitre of immunocomplex is aadded to each well,Incubated for 45 minutes at 37 degree Celsius, and Washed four times.

Step 3: 100 microlitre of substrate is added to each well and incubated for 15 minutes at room temperature.

Step 4: 100 microlitre of stop solution is added. Absorbance is read at 450 nm within 30 min

Samples diluted 1:101 =10 microliter of serum into 1 ml of diluent.100 microliter of each diluted sample is dispensed per well.UNDILUTED calibrators are placed in strip(100 microliter in each well).One well is left for the blank,performed using 100 microliter of the substrate mixture.

Wells were covered with protective and incubated for 45 minutes at 37 degree Celsius.After washing four times for 30 seconds(300 microliter(+ or -)75microliter),100 microliter of immunocomplex L antigen(monoclonal antibodies named t peroxidise) is added to each well and incubated again for 45 minutes at 37 degree Celsius,covering the wells with the protective film,the plate was washed again4 times as described above.Finally ,the substrate was distributed 100 microliter /well. After 15 minutes at R.T,the enzymatic reaction was stopped with 100 microliter of stop solution. The adsorbance(O.D) is read at 450 nm (or)450/620 nm within 30 minutes. Positive – 1 of the ratio is >1.2 Negative – 1 of the ratio is > 20.8

RESULTS AND DISCUSSION

In this study,94 samples were included,out of which 44 samples belonged to the pediatric age group and rest 50 samples belonged to other age group.Out of 44 pediatric samples,14 samples gave positive result for Cytomegalovirus IgM Antibodies.Out of 50 other age group samples,2 samples gave positive result for Cytomegalovirus IgM Antibodies.(Table 1)

Table 1. Distribution of Cytomegalovirus among different age groups

	CMV IgM		TOTAL
	Positive	Negative	
Paediatrics	14	30	44
Others	2	48	50
Total	16	78	94

Table 2. Distribution of Cytomegalovirus in paediatric age groups

AGE GROUP	NO.OF SAMPLES	NO.OF POSITIVES
<1	4	2
2-14	36	12

Out of 50 pediatric samples,4 samples were within the age of 1, out of which 2 were positive.36 samples were in the age group between 2 to 14 out of which 12 were positive(Table 2).Cytomegalovirus is the most common congenital viral infection with an overall birth prevalence of approximately 0.6 %.Approximately 10 % of congenitally infected infants have symptoms of disease at birth and these symptomatic infants have increased risk for acquiring diseases including sensorineural hearing loss(SNHL),mental retardation,microcephaly,seizure disorders etc.[2]Premature babies who are at a higher risk of acquiring Cytomegalovirus infection may have symptoms ranging from decrease in count of neutrophils to worsening of respiratory status with the progress of infection.The incidence of symptomatic disease in infants is much greater when there is primary maternal Cytomegalovirus infection.It is said that 1 -4 % of Cytomegalovirus seronegative mothers will become infected during pregnancy and 30-40 % of these infected women will transmit virus to fetus.Non primary maternal Cytomegalovirus infections can also result in fetal transmission.[4]In a cross sectional study that was performed to determine the age specific prevalence of Cytomegalovirus seropositivity in Chinese children,it was found that seropositivity 52 % in those aged less than one yaer and 60 % between four and seven years.It is said that most young mothers are primiparous and that primiparous women increase chance of acquiring infection through vertical transmission and thus contributing to the increased

infection rate among the neonates.[5]The chance of acquiring the infection rapidly increases in the 1-5 years and 5-10 years population. High prevalence in neonates but relatively low prevalence in infants suggests maternal transmission rather than intrauterine infection.[6].A study to estimate cytomegalovirus positivity among Iraqi children under five years of age, 15% and 0.9% symptomatic and asymptomatic children proved to have positive specific IgM respectively. The prevalence of Jaundice and hepatosplenomegaly is around 56 %and 41.7 % among the symptomatic infected children respectively.[11]Often, congenital Cytomegalovirus infection goes undetected at birth because the majority of affected infants are asymptomatic or present with symptoms that are sufficiently nonspecific.Virus isolation from urine or saliva in tissue cultures has been the standard method for diagnosing congenital Cytomegalovirus infection[12].PCR has increased the diagnostic possibilities.[13][14]In many countries,dried blood spots (DBS) have been considered as a practical screening specimen for congenital Cytomegalovirus infection.The main diagnosis of congenital Cytomegalovirus infection is represented by virus isolation in human fibroblasts in the first 2 weeks of life, because subsequent virus excretion may represent infection acquired in the birth canal or following exposure to breast milk or blood products[15].Cytomegalovirus seroprevalence among U.S children 1 to 5 years old was assessed in which the overall seroprevalence of IgG was 20.7 %,that of IgM was 1.1 % and that of low IgG avidity was 3.6 %.[16]A positive Cytomegalovirus IgG result indicates past or recent Cytomegalovirus infection whereas the presence of Cytomegalovirus IgM is transient and can indicate a recent primary infectio,reactivation or reinfection.[17].In a study to show the prevalence of Cytomegalovirus antibodies among children aged 1 day to 15 years in Ankara,Turkey,the overall prevalence of Cytomegalovirus antibodies was 90.6 % among children which concluded that Cytomegalovirus infections in the first year of life are transmitted from mother to infant and this is the main source of infection in Turkey.[18]Symptomatic neonates are given antiviral drugs.Oral valganciclovir 16 mg/kg is given in neonates with congenital Cytomegalovirus infection.[19]A vaccine to prevent congenital Cytomegalovirus is under development.However,a trial in whichCytomegalovirus hyper immune globulin was given to pregnant women did not prevent the occurrence of congenital Cytomegalovirus infection.[20]

CONCLUSION

Thus the study supports the fact thatamong the pediatric age groups,the prevalence is more among neonates who mainly acquire Cytomegalovirus infection through maternal transmission.Hence,antenatal Cytomegalovirus screening and neonatal screening is required which is very helpful in reducing the occurrence of Cytomegalovirus in pediatric age groups.Further treatment is mainly supportive which includes neonatal antiviral therapy.Parenteral ganciclovir improves the developmental outcomes.These are mainly aimed at preventing the occurrence of cytomegalovirus and improving the quality of life of infants with Cytomegalovirus infection.

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