Original Research Article

SEROPREVALENCE OF CYTOMEGALOVIRUS AMONG PAEDIATRIC PATIENTS WITH SEIZURE ATTENDING FEDERAL NEUROPSYCHIATRIC HOSPITAL, KADUNA , NORTH WEST NIGERIA.

ABSTRACT

INTRODUCTION: Cytomegalovirus causes a congenital infection, which poses a great public Health challenge such as hearing loss, seizure and mental disorder among children.
METHODOLODY: Enzyme Linked Immunosorbent Assay (ELISA) was used to screen serum samples (90) collected from Patients diagnosed with Seizure between the ages 0-13 years for Cytomegalovirus IgG specific antibodies.
RESULT: The presence of CMV IgG specific antibody among Seizure patients obtained from this study recorded a prevalence of 68(75.5%). The age groups 9-13 years presented highest CMV (IgG) specific antibodies response 36(40.0%), followed by ages 5-8 years 22(24.4%) and least for ages 0-4 years 10 (11.1%), P>0.005. The CMV (IgG) specific antibodies response with respect to gender presented male with highest prevalence 50 (55.5%) than their female 18 (20.0%) counterparts P<0.005. The study has indicated significant association between the CMV (IgG) specific antibodies response and Seizure.
CONCLUSION: Therefore CMV is highly prevalent within the study area and the need for necessary facilities to be available in screening pregnant women of the virus in other to prevent the spread vertically to their fetus thereby increases the risk of Seizure.

Key Words: Cytomegalosvirus, Seizure, IgG, ELISA

INTRODUCTION

Cytomegalovirus (CMV) is a member of the Herpes family with double stranded DNA that measure approximately 200nm [1,2]. The virus is responsible for a wide range of infections in human of all ages [3]. CMV causes enlargement of cells in the body, hence the prefix Cytomegalo [4]. Infection with CMV is asymptomatic at all ages, unlike in foetus and neonates that could lead to neurological complications and death [5].

The Virus could remain latent in the body. However, severe recurrent infection may occur in immunocompromised patients [6,7]. Separate studies by other researchers have proved that Cytomegalovirus causes congenital infection and brain damage which could lead to defects in babies of infected mothers [8,9,10].

The Virus can be transmitted through close contact with body fluids of an infected person[11,12,13]. This infection poses important public health problem because of its frequency in severe congenital anomalies such as microcephaly, intrauterine, growth retardation, mental retardation, inguinal hernia in male, seizure, loss in hearing and neuromuscular abnormalies [14,15].

Congenital CMV infection has been reported in various countries,15-20% of sensor neural hearing loss and 7% of Cerebral palsy in United Kingdom, and rates of 0.15-2.2% of live birth from United States of America [2,16,17]. On the same hand, sero-prevalence rate of CMV IgG antibodies among pregnant women In Singapore, Thailand, Iran, Turkey and Spain have also been reported as; 87%, 100%, 93%, 98.5% and 84% respectively [19,20,21,22].

In Nigeria, Cytomegalovirus infection was also reported as 45% and 33% in breast milk,86.15% (IgG) among expected mothers, 77.1% (IgG) among primigravid women in Bida, 97.2 % (IgG) among pregnant women in Lagos, 80.5%(IgG) among children hearing

impairment and 10.5%(IgM) among pregnant women in Kafanchan Kaduna State [23,24,25,26,27].

Cytomegalovirus Congenital seizures disorder account for 10% of babies born with symptomatic infection and it is a very common abnormality associated with the infections. It is usually associated with children severely affected by systematic CMV infections of the nervous system. A seizure may occur at birth or within six months of life with varying severity[8]. The aim of this study therefore is to determine the seroprevalence rate of cytomegalovirus among pediatric patients clinically diagnosed of seizure at Federal Neuropsychiatric Hospital, Barnawa, Kaduna State.

METHODOLOGY

Study design/Area:

The study was a cross sectional study carried out at Federal Neuropsychiatric Hospital Kaduna a Tertiary Mental Health Hospital with 200 beds capacity. It is an institution for training Mental Health Professionals. Patients who were diagnosed clinically of seizure from ages 0-13 years at the Child and Adolescent unit where used for this research.

Sample Size:-

The sample size was calculated using the descriptive studies formula [28]

$$n = \frac{z^2pq}{d^2}$$

Where the P = Value of proportion of interest (If no information is known about p then p= 0.5)

d= Tolerance eg within 0.05

Hence: $n = \frac{1.96^2 \times 10/100\ (1-10)}{0.05^2} = 136$ samples.

Ethical Matters/ Demographic Data

An ethical approval was obtained from Federal Neuropsychiatric Hospital Kaduna ethical committee before embarking on the work. Also consent form was designed and issued to the patients to seek their parent /guardian approval. A questionnaire was designed to collect demographic data of the entire patients.

Inclusion Criteria

The study included paediatric patients clinically diagnosed with seizure within ages 0-13 years whose patient/guardian consented for the investigation.

Exclusion Criteria

The study excluded patients outside the ages 0-13 years whose patient/guardian did not consent to the investigation.

Sample Collection:

Two mililiters of blood were collected via the ante cubical vein using sterile vacutainer into a sterile plain tube and labelled appropriately. The blood was centrifuged at 3000rpm for 5minutes. The sera was harvested into clean cryo-vials and stored at -20^{o}C until it is required for use. A total of 90 samples were collected during three months of this research.

Detection of IgG Antibodies Using Enzyme Linked Immunosorbent Assay (ELISA)

Samples were analyzed for the presence of IgG antibodies using the Enzyme Linked Immunosorbent Assay (ELISA) method according to the kit's manufacturer's instruction made by ASIA –LION Biotechnology Company China. Samples were incubated with mouse monoclonal antibody against human IgG bound to the solid surface for a microtitre well. Patient IgG is captured by the surface bound antibody. Unbound serum component are washed away, patient antiCMV IgG antibodies are detected and bound by an immunocomplex enzyme conjugate, consisting of CMV antigen which is conjugated to horse radish peroxidase. Unbound conjugate is removed by aspiration and washing. Substrate is then added and incubated in the presence of bound enzyme the substrate is converted to end product. The absorbance of this end product is read spectrophotometerically at 450 nm and is directly proportional to the concentration of IgM antibodies to CMV antigen present in the sample [26].

RESULT

A total of 90 samples were collected from Patients diagnosed with Seizure between the ages 0-13 years and screened for Cytomegalovirus IgG specific antibodies. The presence of CMV IgG among seizure patients obtained from this study was presented as prevalence of 68(75.5%).

Table 1. however present the seroprevalence of CMV IgG in relation to the age groups of the patients. CMV seroprevalence IgG specific antibody was highest in ages 9 - 13 years 36(40.0%) and least in ages 0 -4 years 10(11.1%).While ages 5-8 years has 22(24.4%) prevalence. The value however is statistically significant with X^2= 0.024, df= 2 P>0.05 CL=95%.

Table 2 shows relationship between IgG antibodies with the genders. The Males presented prevalence of 50(55.5)% IgG specific antibodies response while the females presented 18(20.0%). However, there was no statistical significant difference between the sero-prevalence IgG specific antibody responses in relation to gender from this study with X^2=27.7, df=1, CL=95%, P<0.05.

Fig (i) is a pie-chart showing the frequency distribution of patient parent/guadiant occupation. The data shows that 41% are civil servant, 32% businessmen, and 17% are farmers.

Fig (ii) is a pie-chart showing the frequency distribution of patients area of residence. The chart reveals 57% living in Urban settlement, 14% semi-urban and 19% in rural area.

Fig (iii) is a pie-chart demonstrating the patients educational status. The chart shows that 54% are in school, 8% have been withdrawn from school while 28% were not in school

Table 1: Prevalence of **CMV (**IgG) Among Patients in Relation to Age Group

Age(years)	Samples Screened	Sex		CMV (IgG)	CMV (IgG)
		Males	Female	Positive	Negative
0 – 4	16	16	0	10(11.1%)	6(6.6%)
5 – 8	32	24	8	22(24.4%)	10(11.1%)
9 – 13	42	30	12	36(40%)	6(6.6%)
TOTAL	**90**	**70**	**20**	**68(75.5%)**	**22(24.4%)**

$X^2 = 0.024$ df= 2 p>0.05 CL = 95%

TABLE 2: Prevalence of CMV (IgG) in Relation to Gender

Gender	Samples Screened	CMV (Positive)	CMV(Neg)
Male	70	50(55.5%)	20(22.2%)
Females	20	18(20.0%)	02(2.2%)
TOTAL	**90**	**68(75.5%)**	**22(24.4%)**

$X^2 = 27.7$ df = 1 P<0.05 CL= 95%

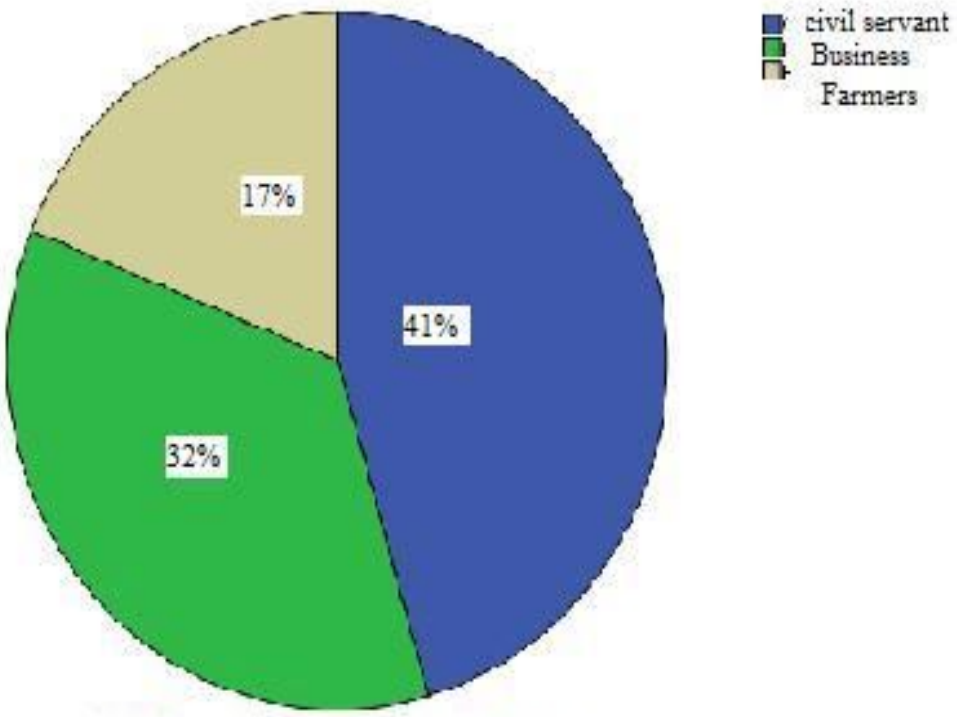

Fig.1: CMV (IgG) Positive Parents/Guadian Occupation

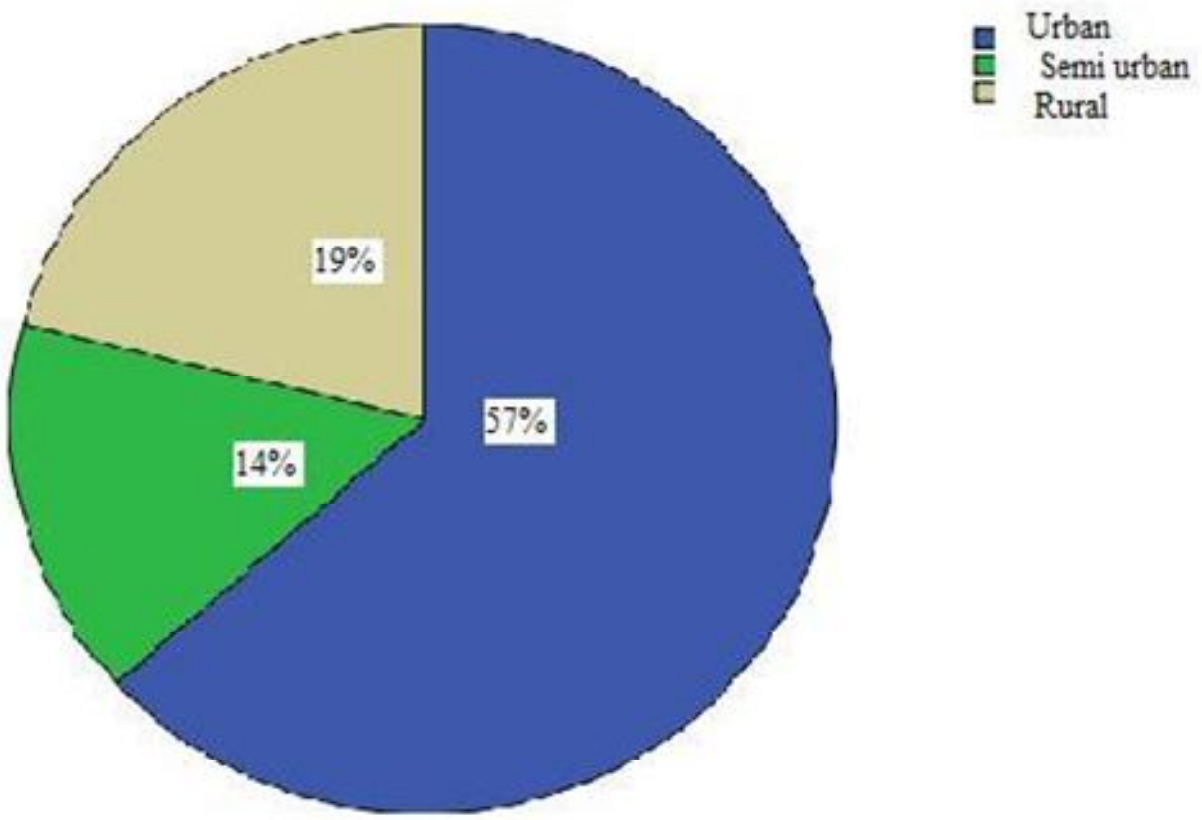

Fig.2: Frequency Distribution of CMV (IgG) Positive Patients with Respect to Residence

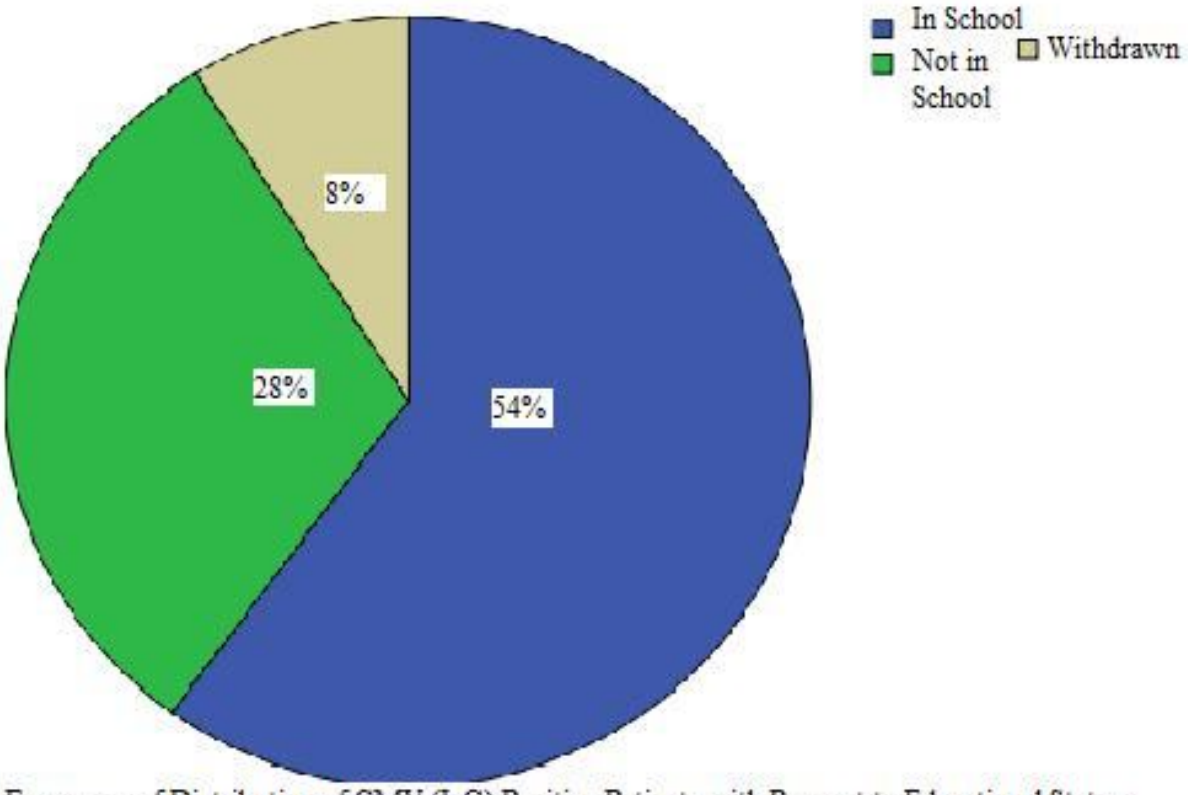

Fig.3:Frequency of Distribution of CMV (IgG) Positive Patients with Respect to Educational Status

DISCUSSION

Cytomegalovirus infection is commonly spread in developing and low social economic countries. CMV infection was also earlier reported to be the viral cause of birth defects in industrialized countries [29]. This study however has recorded a prevalence of 75.5% of CMV (IgG) in Seizure patients.

In other separate previous studies, it revealed 80% prevalence of CMV infection in children who attend daycares, particularly children younger than 2 years was reported [26,30,31,32]. The 75.5% prevalence obtained in this study however is similar to the work of Redwan, *et al*.,[30]who also reported prevalence of 80.7%. Similarly a separate study, Adisa, *et al*., [31] reported higher prevalence of 98.9% IgG specific antibodies to CMV in samples of 94 mothers while their corresponding newborns had 86.2% sero prevalence rate. More so, Yeroh *et al*.[33] recorded 94.8% of CMV IgG among pregnant women in Kaduna state. Although infection of the mother during pregnancy could be without consequence, however, there may be a serious effect on the fetus [2]. Other reports from other countries was also documented; In Singapore, Thailand, Iran, Turkey and Spain the seroprevalence rate of CMV IgG antibodies among pregnant women was reported as; 87%, 100%, 93%, 98.5%, and 84% respectively [19,20,21,22].

In Nigeria, a study conducted in 2008, reported a prevalence of 45.0% and 33% IgM antibodies among breastfeeding mothers and their infants [23]. Similarly, Okwori *et al*.[24] in a study among expectant mothers in Bida, Nigeria, reported IgG antibody prevalence of 86.1% among multigravid women and 77.1% among primigravid women. Therefore, there is justification on high rate CMV in Children since it can be transmitted from mother to child.

From this study it was revealed that ages 9-13yrs had the highest prevalence 68(40%), followed by ages 5-8yrs 22(24.4%) and least for ages 0-4yrs 10(11.1%). This trend had

earlier been explained by Redwan, *et al.*,[30] who explained that CMV Sero prevalence increases gradually with age. This findings however shows statistically significant with X^2= 0.024, df=2, CL=95%, P>0.05.

In this studies males 50(55.5%) have a higher frequency than female 18(20.0%) as shown in table 2. This is not in agreement with the work of Redwan, *et al.*,[30], where females have a 86.8 % and males 75%. This shows a gradual increase in the prevalence between female and male. However, there is no statistical significant difference between the two genders towards contracting the infection with X^2= 27.7, df=1, CL=95%, P< 0.05.

This study further reveals, that 41% of the patient's parent/guardian of CMV positive (IgG) patients were civil servants, while 32% were businessmen and 17% farmers. This trend with high value from civil servants was explained earlier by other authors that civil servants and business class keep their children to a daycare during their working hours and this could predispose the children to the virus since most of the care givers are either secondary school level graduate or not even knowledgeable of the virus since is not common like the HIV [26,31,32].

The study further reveals that 54% of the patients are in school, 8% were withdrawn from school by parent and 28% are not in school. This suggests that Seizure has a greater negative effect on children, especially on their educational and social status. Some parent will prefer their children at home due to the stigmatization and trauma associated to seizure in any episode that occur to the patient. Seizure is attributed to believes by most Africans that is associated with Evil spirit, and most times such patients are taken to prayer houses or native doctors especially those in the rural area before resolving to the orthodox.

Conclusion

Cytomegalosvirus is highly associated with Seizure, therefore the need for public awareness with the purpose of educating the populace on CMV and its public health challenge associated with it, in order to eradicate stigmatization in relation to the patient's condition, traumatization that comes with seizure and its social economic challenge . There is a need for training for community and primary Health care workers so that they can be involve in managing of such patients. The need of awareness to day care and crèche worker and pregnant women on how to prevent the spread of the disease through hygienic way of live.

Recommendation

Based on our findings from this study it is recommended that:

-Aggressive awareness is highly needed to the populace on the consequences of the infection.

-Routine screening of sexually active women is needed to avoid transmission from mother to foetus of the infection

- Hand wash should encourage especially after changing diapers

- Personal hygiene should encourage especially to those handling children and pregnant women.

- There is a need to develop Vaccine or any prophylaxis against CMV infection

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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