ISSN No:-2456-2165

# Prevalence of Anti-Cytomegalovirus Anticorps in Children at the Chantal Biya Foundation Mother Child Centre, Cameroon

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**ABSTRACT**

**Background:** The cytomegalovirus is an infectious pathogen that causes a disease that can cause major difficulties in infants, allograft recipients, and people with any type of immunodeficiency. Because of their exposure to contaminating elements, developing countries are the most afflicted, with a prevalence of 97 percent in Cameroonian adults. It's an illness with a high cumulative incidence for which paediatric epidemiological data is scarce. Furthermore, the efficacy of measures to prevent transmission is poorly understood. The goal of this study was to determine the prevalence of anti-cytomegalovirus antibodies among new-borns in order to provide better prenatal care.

**Methods**: From January to May 2015, a prospective cross-sectional study with a descriptive goal was undertaken at the Chantal Biya Foundation's Mother and Child Centre in Yaoundé. The data was collected using a technical form that included demographic information and an Immunoglobulin G ELISA type serological test to assess the children's serological status.

**Results**: We chose 188 children aged 0 days to 12 years from our study population, with an average age of 3 ± 4 years. CMV was found to be present in 66% of the people in our research. Between the ages of 0 and 24, the prevalence was high and constant. After a drop in prevalence between 25 and 36 months, the prevalence of CMV steadily increased from 43.5 to 77.8% between 25 and 12 years of age. Apart from age, no other factor was discovered to predispose to HIV infection.

**Conclusion**: The prevalence of cytomegalovirus in children aged 0-12 years in our population was high and increased with age.

**Keywords:** Cytomegalovirus, child, antibody, prevalence, Cameroon.

## I. INTRODUCTION

Cytomegalovirus (CMV), also known as human herpesvirus 5, is a large virus that infects humans. HCMV infection is usually asymptomatic in most individuals [1]. It is the most common cause of hearing loss in children worldwide [2]. The virus can be transmitted vertically or horizontally through contact with virus-containing bodily fluids like saliva, tears, urine, faeces, breast milk, sperm, and other bodily secretions such as blood [3]. CMV is most typically acquired early in life, from childhood to early adulthood, through contact with infected individuals'; because the virus has been demonstrated to survive for up to 6 hours on certain surfaces, transmission via vomits is a possibility [4]. During pregnancy, CMV infection can cause Intrauterine infection of the fetus and congenital CMV illness. Congenital CMV infection is most frequent in babies born of moms who had primary CMV infection while pregnant, in this setting, infection transmission has been estimated to occur in roughly 40% of instances [5]. In developing area, especially in Cameroon, CMV seroprevalence was found to be 89.4 % in survey conducted studies [6]. The prevalence rises with age; it may be as low as 20.7 % in children aged 1 to 5, but it is up to 100 % in elderly persons in underdeveloped nations [7]. The rate of CMV seroprevalence varies greatly depending on (a) geographic location, with higher rates in developing nations; (b) age, with the rate increasing directly with increasing age; and (c) socioeconomic level, with the greatest rates among congested and economically challenged populations. Thousands of children are born with or develop lasting problems as a result of congenital CMV infection each year, including, visual loss, motor and cognitive deficiencies (cCMV) [8]. Even after transplantation, cytomegalovirus infection is a common and it can be classified as latent infection, active infection, viral syndrome, or invasive disease, it can be transmitted from the transplanted organ, reactivated latent infection, or after a primary infection in seronegative patients [9]. However, both pregnant women and healthcare providers are unaware of cCMV and its

ISSN No:-2456-2165

consequences. In Cameroonian Human cytomegalovirus (CMV) infection usually occurs during the first year of life [10]. It's one of the most common congenital infections in this country, and it's a major opportunistic pathogen for immune-compromised people [6]. The goal of this study was to find out how common CMV infection is and to increase awareness among as many women as possible in order to improve infection management.

## II. METHODOLOGY

*A. Study design*

This was a prospective cross-sectional study with a descriptive aim, that took place between January and May of 2015. The study's initial phase, which involved participant recruiting and biological sampling, took place at the Chantal Biya Foundation's Mother and Child Centre in Yaounde. The biological investigation of the samples was done at the CAMDIAGNOSTIC Annex Laboratory in Douala, which is a structure belonging to the Institute of Medical Research and Medicinal Plant Studies (IMPM) in Yaoundé.

*B. Study population*

Children hospitalized to the Chantal Biya Foundation's paediatric ward made up the study population. Children hospitalized to the paediatric ward and whose parents or guardians offered informed agreement for their involvement in the study were included from the study. Children whose parents or guardians did not consent to their participation in the study were excluded.

*C. Sampling*

With a total of 188 children comprising the complete study population, the sample size was established using the exhaustive and sequential sampling approach.

*D. Samples collection*

A skilled nurse took blood samples after obtaining free and informed consent from the parent or guardian. The humeral and inguinal veins were used as sample points. In a dry tube, a 2 mL sample of venous blood was taken while adhering to strict cleanliness and biosafety guidelines. The blood was centrifuged for 10 minutes at 3000 rpm after it had clotted, and the serum was decanted and stored in the refrigerator for analysis.

*E. Testing for CMV antibodies in the laboratory*

To allow CMV-specific antibodies to attach to the antigen-coated wells, diluted serum samples (1:100) were incubated for 20 minutes. After washing, specific Immunoglobulin G was identified using rabbit anti-human Immunoglobulin G coupled with horseradish peroxidase. The unbound conjugate was rinsed away after 20 minutes of incubation, and the TMB enzyme substrate was added for 10 minutes. If anti-CMV antibodies were present, a blue color formed. The optical densities of controls and samples were measured using a microplate reader at 450nm after the stop solution was added.

*F. Interpretation of the result was qualitative.*

A negative result (OD <OD of 3 IU/ml) indicates that CMV infection is not present or has never been present. These people were thought to be vulnerable to the main infection. Immunoglobulin G antibody levels may not be identifiable in samples taken too early in a primary infection. If a primary infection is suspected, a second specimen should be collected within 8-14 days and evaluated for seroconversion in the same assay as the original. A positive test (OD>/= OD of 3 IU/ml) confirmed CMV infection, either present or prior. Both acute and convalescent sera were to be evaluated in the same assay to appraise them. Seroconversion had occurred and CMV infection was indicated if the acute specimen was negative and the convalescent specimen was positive.

*G. Data analysis*

The CSPRO software was used to enter the data collected. The database was verified and cleaned with the help of Excel and SPSS. SPSS software was used to analyze the data. The variables were condensed and ordered using descriptive statistics. The graphical representations of qualitative variables, such as bar or pie charts, were used to express them. Some quantitative data were expressed with extremes as mean/median. The Chi-square test was used to determine the relationship between two categorical variables, while the student's t-test was employed to compare the subgroup averages. The statistical significance level was set at 0.05.

## III. RESULTS

*A. Characteristics of the study populations*

In total, 188 young people were recruited between January and May 2015. The following **table 1**

shows the socio-demographic data: The study comprised 188 children with an average age of 3 ± 4 years, with [0 to 6] months being the most represented age group, followed by 60 months and older. With a gender ratio of 1.06, men account for 51.6 per cent of the population (**Table 1**). Only 31.4% of children attended school, while 46.3% were not yet of school age, according to the distribution of the population by educational attainment. In terms of parental or guardian income, 56 % of those who attend the foundation came from a middle-class family, earning between 50.000 and 100.000 Fcfa.

ISSN No:-2456-2165

**Table 1:** Socio-demographic data

| Caracteristics | Effectives | Percentages (%) |
|---|---|---|
| **Gender** | **188** | **100** |
| females | 90 | 48.4 |
| Males | 98 | 51.6 |
| **Ages** | **188** | **100** |
| 0-6 Months | 53 | 28.2 |
| 7-12 Months | 27 | 14.4 |
| 13-24 Months | 11 | 5.9 |
| 25-36 Months | 23 | 12.2 |
| 37-48 Months | 20 | 10.6 |
| 49-60 Months | 9 | 4.8 |
| 61 Months++ | 45 | 23.9 |
| **Level of study** | **188** | **100** |
| Primary | 59 | 31.4 |
| Non school | 42 | 22.3 |
| Not available | 87 | 46.3 |
| **Familly incomes** | **188** | **100** |
| Low | 56.4 | 30 |
| Middle | 105.28 | 56 |
| High | 26.32 | 14 |

*****(Less than 50 000 FCFA)
** (50 000 - 100 000 FCFA)
*** (100 000 FCFA et +)

*H. Hospital services and co-morbidities*

The study population was distributed across the wards as follows:

The **table 2** below presents distribution of CMV infection according to hospital service. The youngsters were divided into 12 sections of the Chantal Biya Foundation's Mother and Child Centre. The patient distribution by department was consistent across all services. Children hospitalized to the neonatal ICU had the highest rate of CMV-positive infections. Children had a CMV infection incidence of more than 5% in most departments, according to the statistics.

**Table 2:** Hospital services and CMV infection

| Characteristics | Effectives | Percentages (%) |
|---|---|---|
| Nephrology | 15 | 7.98 |
| Sicklecell | 17 | 9.04 |
| Cardiology | 13 | 6.9 |
| ECP for children born to HIV-infected mothers | 17 | 9.04 |
| Neurology | 15 | 7.98 |
| Neonatalogy | 32 | 17.54 |
| Pneumology | 16 | 8.5 |
| Endocrinology | 14 | 7.5 |
| Gastroenterology | 16 | 8.5 |
| Oncohaematology | 17 | 9.04 |
| Infectiology | 15 | 7.98 |
| **Total** | **188** | **100** |

*I. Prevalence of anti-CMV*

The prevalence of CMV in the overall study population was 66% (**Figure 1Figure 1**). According to the repair of the disease by age group, a high and stable prevalence was observed between 0 and 24 months, followed by a drop between 25 and 36 months and a regular progression to reach 77.8% after 5 years with a P= 0.24 showing a non-significant difference between the different age groups (P>0.05). According to gender, there were more Cytomegalovirus positive males in the study population (P>0.05).

ISSN No:-2456-2165

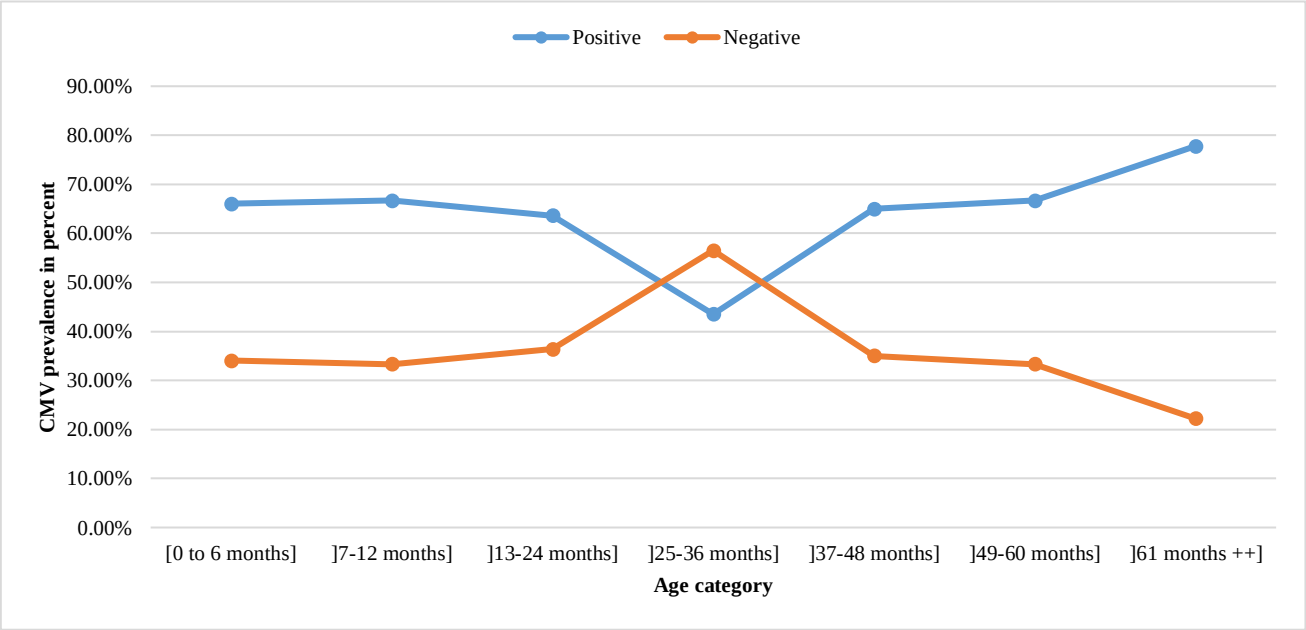


**Figure 1** : CMV prevalence by age category.

*J. CMV distribution based on schooling and hospital ward*

The **table 3** below presents, CMV distribution based on schooling and hospital ward. CMV antibodies were found in the highest number of non-school-aged children (P= 0.54), indicating that schooling has little effect on CMV prevalence. Despite a non-significance (P= 0.58), the distribution of CMV infection by income in our study population demonstrates that the greater the income, the higher the percentage of infected children. The incidence varied by department, ranging from 40% in nephrology to 86.7 % in infectious diseases (all P>0.05).

**Table 3:** CMV distribution based on schooling and hospital ward

| | Effectives | Positives CMV distribution (%) | CMV status of the patient | |
|---|---|---|---|---|
| | | | Positive (%) | Negative (%) |
| School level of the child | 188 | 66.00 | | |
| Primary | 57 | 30.30 | 66.70 | 33.30 |
| Secondary | 10 | 5.30 | 60.00 | 40.00 |
| No level | 57 | 30.30 | 59.60 | 40.40 |
| Baby | 64 | 34.00 | 71.90 | 28.10 |
| Services | 188 | 66.00 | 65.80 | 34.20 |
| Nephrology | 15 | 8.00 | 40.00 | 60.00 |
| Sikclecell | 17 | 9.10 | 52.90 | 47.10 |
| Cardiology | 13 | 7.00 | 53.80 | 46.20 |
| ECP for children born to HIV-infected mothers | 17 | 9.10 | 58.80 | 41.20 |
| Neurology | 15 | 8.00 | 60.00 | 40.00 |
| Néonatalogy A | 17 | 9.10 | 64.70 | 35.30 |
| Pneumology | 16 | 8.60 | 68.80 | 31.30 |
| Endocrinology | 14 | 7.50 | 71.40 | 28.60 |
| Gastro-nutrition | 16 | 8.60 | 75.00 | 25.00 |
| Oncho-hematology | 17 | 9.10 | 76.50 | 23.50 |
| Neonatalogy B | 15 | 8.00 | 80.00 | 20.00 |
| Infectiology | 15 | 8.00 | 86.70 | 13.30 |

**CMV distribution according to outcomes**

The **table 4** below present'sdistribution of CMV. We observed that, the higher the income, the more afflicted the children were. Our results indicated that CMV susceptibility was unrelated to income.

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**Table 4:** Distribution of CMV by income

| Outcomes | CMV Statut of the patient | | P value |
|---|---|---|---|
| | Positive (%) | Negative (%) | |
| Low* | 37.5 | 62.5 | |
| Midle** | 34.3 | 65.7 | 0.48 |
| High*** | 25.9 | 74.1 | |

*****(Lessthan 50 000 FCFA)
** (50 000 - 100 000 FCFA)
*** (100 000 FCFA et +)

## IV. DISCUSSION

The primary goal of this study was to establish the prevalence of CMV in the Chantal Biya Foundation's kid population. The children in the study were ranged in age from 0 to 12 years old, with an average age of 3±4 years. The male-to-female ratio was 1.06 in favor of the boys. The number of studies on CMV in these age ranges is very low. This pattern of distribution could be attributable to the fact that this virus is significantly more common in youngsters, as Concetta *et al.* discovered in their study[11]. In our study we obtained a seroprevalence of 66%, however a systematic review study of the published literature to describe the global seroprevalence of CMV IgG antibodies, estimated a global CMV seroprevalence of 83% [12].These findings from the total systematic review match those from the Essomba *et al.* investigation, which likewise found a substantially greater percentage than ours in the same country [6] and Rihwa *et al.*[13] . This observed difference could be explained by the fact that Essomba and collaborator's sample in Cameroon included people of a significantly broader age range than our study cohort (0-12 years); this peculiarity could explain the observed difference. Children who were hospitalized in nephrology for a renal disease had a frequency of 7.98 %. These data are insignificant when compared to the statistics obtained by Battegay and colleagues, which totalled about 50% [14].We believe that this low frequency is due to the fact that CMV is an opportunistic virus that is more commonly encountered in immunocompromised people, as Ferh *et al.* have demonstrated [15]. Despite the fact that the nephrology service was over 7% represented in this analysis, we found a significant incidence among children admitted to neonatology (17 %). Indeed, several authors have demonstrated that the CMV is very common among children, he is the most prevalent prenatal infection, affecting 45-50 % of all live infants, is cytomegalovirus, which is the leading nongenetic cause of congenital sensorineural hearing loss and neurological impairment. Congenital CMV can develop after a main or secondary infection in the mother [16]. In our data, there was an unexpected rise in the prevalence of antibodies depending on parental wealth, which could be related to early schooling or societal views. The incidence of CMV rises with the number of children in the sibling group, but it reaches a halt after three children. Although age appears to be a distinguishing factor, there is no causal relationship between the prevalence of CMV and any other factor. Many authors came to the same conclusion, demonstrating that there is no distinguishing factor in the probability of CMV infection [13,17].

## V. CONCLUSION

The goal of our research was to find out how common CMV contamination is and how it changes over time in order to stop it from spreading and reducing the risk of infection. Following were the results: There are two periods of pollution that we noticed. A maternal-foetal period of around 40%. A time in school when the prevalence of CMV rises with age. The prevalence of cytomegalovirus in our study population was 66%. Thus, the most appropriate period for preventive action is the pre-school period.

## ACKNOWLEDGEMENTS

The authors want to thank all patients for taking part in this study. We would like to thank the Chantal Biya Foundation Mother and Child Centre in Yaounde and the CAMDIAGNOSTIC Laboratory in Douala.

## FUNDING

This study did not receive any funding in any form.

## COMPETING INTERESTS

The authors declare no competing interest.

## DECLARATIONS

All authors have read and approved the final manuscript.

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