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Prevalence of Human Cytomegalovirus IgG antibodies in pregnant women in the city of Port Harcourt, Rivers State, Nigeria

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ABSTRACT: Very little is known about the seroepidemiology of HCMV infection in pregnant women in Nigeria. The fetal consequences of HCMV infection have made it one of the most severe infections contracted during pregnancy. This study sought to determine the seroprevalence of HCMV IgG antibodies and correlates of HCMV IgG antibodies in pregnant women in Port Harcourt, Nigeria. A cross-sectional study design examined 90 pregnant women presenting at the University of Port Harcourt Teaching Hospital (UPTH) in Port Harcourt, Nigeria, for anti-HCMV IgG antibodies. A standardized questionnaire was used to obtain the pregnant women's socio-demographic, clinical and behavioural characteristics. Commercially available ELISA kits were used to detect HCMV infections using IgG antibodies. Of the 90 pregnant women examined, 87(96.7%) were seropositive for HCMV- IgG being in the acute stage of the disease, and 3(3.3%) were seronegative for HCMV IgG antibodies. Marital status, parity, and education, history of abortion were found to influence seropositivity significantly. The current study found a high prevalence (96.7%) of HCMV infection in pregnant women in Port Harcourt, Nigeria. This high prevalence calls for routine screening for HCMV infections and related risk factors in this setting.
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1. INTRODUCTION

Human Cytomegalovirus (HCMV) infection is the most common congenital viral infection and a leading cause of congenital disabilities and developmental disabilities (Cannon, 2009). The seroprevalence of HCMV among pregnant women is high. Research on pregnant and non-pregnant women in Kaduna indicates a prevalence of 94% and 100%, respectively, indicating the need for routine screening of HCMV for all antenatal women in the State due to high prevalence (Yeroh et al., 2014). A study by Stagno & Cloud (1994) deduces that HCMV seroprevalence varies regionally and is higher in populations with low socioeconomic status. In Africa, HCMV is acquired earlier, and most infections occur in childhood (Kaye et al., 2008).

HCMV infection can be classed as an either primary or secondary infection. It is a primary infection when newly introduced in a previously seronegative person or transmitted vertically. It is a secondary infection when there is intermittent excretion of the virus in the presence of host immunity due to either reactivation of an endogenous virus or exposure to a new virus strain from an exogenous source (Alford et al., 1990). Vertical transmission accounts for 24-75% (mean value 40%) of cases of HCMV, while only 1-2.2% of cases are reported from other sources (Kenneson et al., 2007). Though HCMV in pregnant women is as low as 0.3%- 2.4% in developed countries, the reverse is the case in developing and underdeveloped countries (Peckham, 1991). Despite advancements (like serology and virology) in detecting fetal HCMV, there is still no effective therapy. A study by Jeon et al. (2006) stipulates that though data is available about the epidemiology and pathogenesis of congenital HCMV infections, the infection remains unknown mainly. Most women in the USA, since most HCMV infections, are asymptomatic in the fetus.

The susceptibility rate to HCMV during pregnancy varies by ethnic or racial group, with African-Americans and Hispanics having the highest rates (Colugnati et al., 2007). Lifestyle activities are primarily associated with children less than two years, a significant risk factor for HCMV acquisition since children within this age bracket shed HCMV in urine and saliva for 6 to 42 months with a median of 18 months (Adler, 2004). To estimate the frequency/prevalence of CMV, it is essential to include a well-detailed questionnaire that considers high-risk factors leading to HCMV exposure.

This study aimed to determine the prevalence of HCMV IgG antibodies among pregnant women attending antenatal clinics in Port Harcourt, Rivers

State, Nigeria. A knowledge of high-risk factors and women, the different demographic factors, clinical history and parity that expose pregnant women to HCMV acquisition is also fully considered.

2. MATERIALS AND METHODS

2.1 Study Area

This study was conducted at the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Rivers State, Nigeria.

2.2 Study Design

This cross-sectional study involves pregnant women attending antenatal clinics in UPTH, Port Harcourt, Rivers State, Nigeria.

2.3. Ethical Consideration

Clearance from the health research ethics committee of the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Rivers State, Nigeria, was obtained by the code of ethics for biomedical research involving human subjects. Informed consent was also obtained from each subject after carefully explaining the study concept to them, and questionnaires were distributed.

2.4. Inclusion and Exclusion Criteria

The study included pregnant women attending an antenatal clinic at the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Rivers State, Nigeria. The exclusion criteria were men and women but not pregnant and also individuals who refused to give their consent.

2.5. Blood Collection and Analysis

Five (5) millilitres of blood were collected into EDTA bottles, centrifuged at 2000rpm for 15 mins and the plasma separated and stored at -20^{o}C until analysis was carried out. All samples were screened for HCMV-specific IgG antibodies using ELISA (Dia. Pro Diagnostic). The ELISA kits used for HCMV -IgG were manufactured by Dia. Pro Diagnostics (Milano), Italy. Results were interpreted according to the manufacturer's instructions. Samples with concentrations equal to or greater than 1.00µl/ml were considered seropositive to IgG antibodies, indicating prior exposure and recent exposure to the CMV virus, respectively. Samples with a concentration of 0.90 µl/ml or less are considered seronegative to IgG antibodies.

2.6. Statistical analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 22. The seroprevalence for HCMV was expressed as a percentage for the entire study group.

3. RESULT

3.1 Characteristics of Study Population

The total number of pregnant women included in this study was 90. The socio-demographic data for these samples were stratified and shown in Table 1. The age ranges from 20-49 years. The age groups 30 – 39 years constituted the most significant population making up 66.7%, followed by age groups 20-29 years (26.7%), while age groups 40-49 years were the least (6.7%).

3.2 Prevalence of HCMV IgG antibodies

Of the 90 specimens tested, only 87(96.7%) were seropositive for HCMV IgG antibodies, while 3 (3.3%) tested seronegative for HCMV IgG antibodies. Individual values of anti-HCMV IgG antibodies obtained in the 90 pregnant women studied are shown in Table 1. The General socio-demographic characteristics of the pregnant women surveyed are shown in Table 1. By bivariate analysis, none of the socio-demographic characteristics of pregnant women was associated ($P > 0.05$) with seropositivity to HCMV IgG antibodies.

3.3 Prevalence of CMV IgG antibodies with age

HCMV IgG antibodies increase with age. The prevalence of HCMV IgG antibodies concerning age is shown in Table 1. Regarding age, all three age groups were reactive to HCMV IgG antibodies. A higher prevalence of HCMV IgG antibodies was observed in the age group 40-49 years (100.0%) than age group 20-29 years (95.8%) and 30-39 years (96.7%). There was however significant relationship between the age groups and the prevalence of IgG antibodies against HCMV (χ^2= 2.169, df = 2, p>0.05).

3.4 Prevalence of HCMV IgG antibodies concerning marital status

Table 1 shows the seropositivity rate of HCMV IgG antibodies according to marital status. Higher HCMV IgG antibodies were observed among single pregnant women (100.0%) than married pregnant women (96.6%). Statistically, marital status was not significantly associated with the prevalence of IgG antibodies against HCMV (χ^2= 0.017, df = 1, p>0.05).

3.5 Prevalence of HCMV IgG antibodies concerning educational background

The level of education of the pregnant women attending antenatal care had a significant relationship with the prevalence of IgG antibodies against HCMV (p>0.05). All the pregnant women with no formal/primary education and those with secondary education had a higher seroprevalence of HCMV IgG antibodies (100.0%) than those with tertiary education (96.1%), as shown in Table 1.

3.6 Prevalence of HCMV IgG antibodies concerning the occupational status

Table 1 shows the seropositivity rate of HCMV IgG antibodies according to occupation. A higher prevalence of HCMV IgG antibodies was found among unemployed, pregnant women, artisans and business executives (100.0%) than in other occupations; students (88.9%), civil servants (96.6%) and traders (96.8%) were all seropositive for HCMV IgG antibodies. Statistically, there was no significant

relationship between occupation and prevalence of IgG antibodies against HCMV (p>0.05).

3.7 Prevalence of HCMV IgG antibodies concerning religion

A higher prevalence of HCMV IgG antibodies was observed among pregnant women with no religion (100.0%) than those who were Christians (96.3%) and Islam with zero prevalence (0.0%), as highlighted in Table 1. However, no significant association occurred between religion and the prevalence of IgG antibodies against HCMV (p>0.05).

3.8 Prevalence of HCMV IgG antibodies concerning the family type

Pregnant women with monogamous family type had a higher prevalence (97.3%) of HCMV IgG antibodies than those with the polygamous family type (93.3%), as shown in Table 1. However, no significant association was found between the family type and the prevalence of IgG antibodies against HCMV (p>0.05).

3.9 Prevalence of HCMV IgG antibodies concerning gestation period

Pregnant women in their first trimester had the highest prevalence (100.0%) of IgG antibodies against HCMV infection, while those in their second (97.7%) and third (94.7%) trimesters, as shown in Table 1. HCMV IgG antibodies decrease with a more prolonged period of pregnancy. However, no significant association was found between the gestation period and the prevalence of IgG antibodies against HCMV (p>0.05).

Table 1: The Prevalence of HCMV IgG antibodies concerning the socio-demographic characteristics of the pregnant women

Socio-Demographic Characteristics	Groups	No. Tested (%)	No. Positive for HCMV IgG	p value
Age	20-29	24(26.7)	23(95.8)	p = 0.88
	30-39	60(66.7)	58(96.7)	
	40-49	6(6.7)	6(100.0)	
Marital Status	Married	89(98.9)	86(96.6)	p = 0.85
	Single	1(1.1)	1(100.0)	
Educational Status	None	1(1.1)	1(100.0)	p = 0.77
	Secondary	12(13.3)	12(100.0)	
	Tertiary	77(85.6)	74(96.1)	
Occupational Status	Student	9(10.0)	8(88.9)	p = 0.79
	Unemployed	12(13.3)	12(100.0)	
	Civil servants	29(32.2)	28(96.6)	
	Trading	31(34.4)	30(96.8)	
	Artisans	4(4.4)	4(100.0)	
	Business Executive	5(5.6)	5(100.0)	
Religion	Christianity	81(90.0)	78(96.3)	
	Islam	0(0.0)	0(0.0)	p = 0.56
	None	9(10.0)	9(100.0)	
Family Type	Monogamous	75(83.3)	73(97.3)	p = 0.43
	Polygamous	15(16.7)	14(93.3)	
Gestation Period	1st Trimester	8(8.9)	8(100.0)	p = 0.65
	2nd Trimester	44(48.9)	43(97.7)	
	3rd Trimester	38(42.2)	36(94.7)	
Parity	0	34(37.8)	32(94.1)	p = 0.51
	1-2	38(42.2)	37(97.4)	
	3-4	18(20.0)	18(100.0)	
History of Abortion	Yes	30(33.3)	28(93.3)	p = 0.21
	No	60(66.7)	59(98.3)	
History of STDs	Yes	6(6.7)	6(100.0)	p = 0.64
	No	84(93.3)	81(96.4)	
HIV Status	Seropositive	3(3.3)	3(100.0)	p = 0.74
	Seronegative	87(96.7)	84(96.6)	
Total		**90(100.0)**	**87(96.7)**	

3.10 Prevalence of HCMV IgG antibodies concerning parity

A higher prevalence of HCMV IgG antibodies was found in multiparity pregnant women with 3-4 pregnancies (100.0%) than those with 1-2 parity (97.4%) and nulliparous (94.1%), as shown in Table 1. It shows that the prevalence of HCMV IgG antibodies increases with the number of pregnancies. However, no significant association was found between the parity and the prevalence of IgG antibodies against HCMV ($p>0.05$).

3.11 Prevalence of HCMV IgG antibodies concerning the history of abortion

Pregnant women with no history of abortion had a higher prevalence (98.3%) of IgG antibodies against HCMV infection than those with a history (93.3%), as shown in Table 3.2. However, no significant association was found between the history of abortion and the prevalence of IgG antibodies against HCMV ($p>0.05$).

3.12 Prevalence of HCMV IgG antibodies concerning the history of STDs

Pregnant women with a history of STDs had a higher prevalence (100.0%) of IgG antibodies against HCMV infection than those without a history (96.4%), as shown in Table 1. However, no significant association was found between the history of STDs and the prevalence of IgG antibodies against HCMV ($p>0.05$).

3.13 Prevalence of HCMV IgG antibodies concerning HIV Status

HIV seropositive pregnant women had a higher prevalence (100.0%) of IgG antibodies against HCMV infection than those with HIV seronegative status (96.6%), as shown in Table 1. However, no significant association was found between the history of abortion and the prevalence of IgG antibodies against HCMV ($p>0.05$).

4. DISCUSSION

Taking a close look at the assessment of the prevalence of HCMV is an issue that cannot be overemphasized, especially in a developing society like Nigeria. More so amongst HIV-positive pregnant women who could have diverse complications due to their immunosuppressed State and, more importantly, the effect it could have on their unborn children. Screening pregnant women early are the best way to detect possible sexually or congenitally transmitted infections and make way for possible interventions. Our previous study (Okonko et al., 2022) reported the prevalence of HCMV IgG among females of reproductive age in Port Harcourt. Therefore, the present study investigated the seroprevalence and correlates of HCMV infection in pregnant women in UPTH, Port Harcourt, Rivers State, Nigeria.

Serological surveys have shown CMV infections in virtually every population that have been tested (Okwori et al., 2008), with seropositivity ranging from 40 – 100% in different parts of the world (Seferi et al., 2009; Matos et al., 2010; Yeroh et al., 2015). This study reveals a prevalence of 96.7% for HCMV-IgG antibodies amongst pregnant women in Port Harcourt, Nigeria. As observed in previous studies in developing countries (Abu-Madi et al., 2010; Chibwe et al., 2017), a significant proportion of pregnant women were HCMV IgG seropositive (Chibwe et al., 2017). The prevalence of HCMV antibodies among women varies with geographical location, socioeconomic status and occupation. One of the most critical aspects of the epidemiology of the virus is its extremely high prevalence in both developed and developing countries (Khan et al., 2007).

The 96.7% observed in this study is comparable to the 97.2% reported in Lagos, Nigeria (Akinbami et al., 2011), 97.8% reported in Ilorin, Nigeria (Kolawole & Oluwajana, 2017) and the 96.0% reported in Egypt (Kamel et al., 2013). This figure disagrees with the 93.3% prevalence of HCMV IgG reported by Umeh et al. (2015) in Benue State, Nigeria. This figure also disagrees with 94.8% reported by Yeroh et al. (2015) in Kaduna, Nigeria. This value is also higher than the 86.6% and 83.0% prevalence of HCMV-IgG reported by Almoaish et al. (2018) and Kumar et al. (2017), respectively, who worked on pregnant women in India. This value is also higher than the 73.9% reported in the city of Mwanza, Tanzania (Chibwe et al., 2017), and the 10.5% reported in women in a Study done in Mashad, Iran (Safabakhsh et al., 2013). In Zanjan, Iran, 89.2% had HCMV IgG (Asadi and Esmaeilzadeh, 2006).

The rate of CMV infection is also high in other developing countries, similar to this study in Nigeria. In Canada, the CMV IgG antibody rates were 40.5% and 0.9%, respectively (Ziapour et al., 2016). In the US, the prevalence rate was 90.8% among those older than 80 (Staras et al., 2006). In Australia, the overall prevalence rate was 57.0% (Seale et al., 2006), and in Spain, the rate was 66.7% for women (Chibwe et al., 2017).

Among studies done in Nigeria, the value is higher than the prevalence of 60.0% reported in Osun State, Nigeria (Akende et al., 2016), the 84.2% among pregnant women reported in Bida (Okwori et al., 2008), the 94.8% reported among pregnant women in Kaduna

(Yeroh et al., 2014) and the 91.0% in Kano State (Hamid et al., 2014). The 96.7% reported HCMV IgG in this study is lower than the 100.0% reported among non-pregnant women in Kaduna (Yeroh et al., 2014). Our result is similar to the 97.2% among pregnant women reported in Lagos (Akinbami et al., 2011) and 98.7% among pregnant women reported in Sokoto State (Ahmad et al., 2011). These figures agree with the assertion of Saraswathy et al. (2001), that African continent has the highest prevalence rate of HCMV IgG antibodies.

Among studies done outside Nigeria, this seroprevalence of 96.7% is higher than the 65.6% and 89.6% seroprevalence found in pregnant women in Durango City and Aguascalientes, respectively (Alvarado-Esquivel et al., 2014; 2018). It is higher than the 89.2% seroprevalence found in a national survey of subjects aged 1 - 70 in Mexico (Conde-Glez et al., 2013). The 96.7% reported higher than the 77.3% reported in Kenya (Maingi & Nyamache, 2014) and the 77.2% reported in Sudan (Hamdan et al., 2011). In an international context, the seroprevalence found in pregnant women in Port Harcourt, Nigeria, is as high as the 88.5-100% seroprevalences reported in pregnant women in Ethiopia (Yeshwondm et al., 2016), China (Jin et al., 2017), Cuba (Correa et al., 2010), Iran (Erfanianahmadpoor et al., 2014), Brazil (Yamamoto et al., 2013), Palestine (Neirukh et al., 2013), Turkey (Aynioglu et al., 2015), and Nigeria (Akinbami et al., 2011). On the other hand, the seroprevalence found in pregnant women in Port Harcourt is also higher than the 42.3-66.0% seroprevalences reported in pregnant women in Germany (Enders et al., 2012), France (N'Diaye et al., 2014), Poland (Wujcicka et al., 2014), Japan (Shigemi et al., 2015), and Norway (Barlinn et al., 2014). The 96.7% reported HCMV IgG in this study is lower than the 99.6% reported among pregnant women in Zimbabwe (Mhandire et al., 2019).

The result of this present study is also consistent with reports from other parts of the world, including Nigeria (Akinbami et al., 2011; Umeh et al., 2015), in which a high seroprevalence of anti-HCMV IgG antibodies in pregnant women was reported as in this study (Leila et al., 2012). In another study undertaken in Shiraz, Iran, 98.9% had HCMV IgG (Motamedi et al., 2009). In Urumia, Iran, 100% had HCMV IgG (Juan et al., 2005). On the other hand, studies from developed parts of the world reported a low prevalence of anti-HCMV IgG antibodies in pregnant women (Knowles et al., 2005; Seale et al., 2006). However, the higher seroprevalence of anti-HCMV IgG antibodies has been reported in Germany (Lübeck et al., 2010) and northern Italy (De Paschale et al., 2009). In these studies, no significant associations were seen between age, the number of children, gender, educational level and HCMV infection. This is similar to the findings of this study. Our observation agrees with Mhandire et al. (2019) who reported no significant associations with HIV status, age, parity, gravidity, gestational age, income, education, partner age and marital status in Zimbabwe. It also aligns with Kolawole and Oluwajana (2017) who reported no significant associations with parity, education and marital status in Ilorin, Nigeria. Our observation contradicts Maingi and Nyamache (2014) who found that marital status, parity and education significantly influence seropostivity in univariate analysis.

Concerning age in this study, all three age groups were reactive to HCMV IgG antibodies. The study found a higher prevalence of HCMV IgG antibodies in the age group 40-49 years (100.0%) than age group 20-29 years (95.8%) and 30-39 years (96.7%). This observation is in agreement with another study in Benue State, Nigeria, by Umeh et al. (2015), who reported that the prevalence of anti-HCMV IgG antibodies was highest (100%) in older pregnant women aged 41-50 years but was lowest (85.0%) in younger ones aged 15-20 years. HCMV IgG antibodies increase with age, and as the age increases by one unit, the IgG seroprevalence increase by 1.1% and 3.3% in cognizance of Chibwe et al. (2017) in Tanzania. The infection rate increases with age, and the lowest rate occurs in those younger than 30. Similar observations occurred in our study and several other studies (Jindal & Aggarwal, 2005; Wang et al., 2011; Chibwe et al., 2017). In agreement with the current study, the prevalence rate of HCMV IgG was highest in the age range of 30–39 years, and the lowest rate occurred in those younger than 20 years in a study done in Mashad, Iran (Safabakhsh et al., 2013). In the US, the prevalence rate was 58.9% in those older than six years, 36.3% in the 6–11-year age range, and 90.8% in those older than 80 years (Staras et al., 2006). This observation aligns with Yeroh et al. (2015) and Akende et al. (2016) who reported no significant association between CMV infection and age in Kaduna and Osogbo, Nigeria, respectively.

Nevertheless, analysis of the result by age shows that there was no significant association between HCMV and age contrary to previous report (Okwori et al., 2008; Stadler et al., 2012) that used ELISA method.

Higher HCMV IgG antibodies occurred among the singles (100.0%) than the married pregnant women (96.6%). Statistically, marital status was not significantly associated with the prevalence of IgG antibodies against HCMV. This result aligns with what was reported by Umeh et al. (2015), who reported that

seroprevalence of anti-HCMV IgG antibodies was not significantly associated with the marital status of pregnant women in Benue State, Nigeria. This observation also aligns with Yeroh et al. (2015) who reported no significant association between HCMV infection and number of marriages in Kaduna, Nigeria. Also, this finding agrees with Akende et al. (2016) in Osogbo, Nigeria.

The level of education of the pregnant women attending antenatal care had no significant relationship with the prevalence of IgG antibodies against HCMV. In this study, the HCMV prevalence decreased insignificantly with increase in education. All the pregnant women with no formal/primary education and those with secondary education had a higher seroprevalence of HCMV IgG antibodies (100.0%) than those with tertiary education (96.1%). Even though most of the subjects screened had tertiary education, no significant difference existed. This observation is similar to a previous study by Mussi-Pinhata et al. (2018), who reported that 36 women (1.8%) who tested seronegative during their first trimester had more education compared with HCMV-positive women. It also agrees with Umeh et al. (2015). They reported that most of the subjects screened had tertiary education, and no significant difference existed between them and those with lower levels of education. This observation also aligns with Yeroh et al. (2015) who reported no significant association between HCMV infection and education in Kaduna, Nigeria. The decrease in HCMV prevalence with education aligns with previous reports (Hamdan et al., 2011; Yeroh et al., 2015) that showed that illiterate women are at higher risk of HCMV infection owing to exposure with contagious secretions from their own children and poor hygienic practice.

Occupational status is one of the predictors of socioeconomic status. Socioeconomic status has been shown to be a risk factor for HCMV infection (Brooks et al., 2007; Yeroh et al., 2015). The motive for this is perhaps since, high socioeconomic status infers aptitude to get educated and pay for better and healthy life styles which decreases contact to HCMV (Yeroh et al., 2015). This study revealed a higher prevalence of HCMV IgG antibodies among unemployed, artisans and business executives (100.0%) than in other occupations; students (88.9%), civil servants (96.6%) and traders (96.8%) were all seropositive for HCMV IgG antibodies. Likewise, there was no significant relationship between occupation and the prevalence of IgG antibodies against HCMV. Similarly, in the Umeh et al. (2015) study, seroprevalence did not differ significantly between the different occupational groups and types of the residential house owned by the subjects. This observation disagrees with Yeroh et al. (2015) who reported that infection with HCMV was strongly associated with employment status of the women in Kaduna, Nigeria.

A higher prevalence of HCMV IgG antibodies was observed among pregnant women with no religion (100.0%) than those who were Christians (96.3%) and Islam with zero prevalence (0.0%). However, no significant association was found between religion and the prevalence of IgG antibodies against HCMV.

Pregnant women with monogamous family types had a higher prevalence (97.3%) of HCMV IgG antibodies than those with polygamous family types (93.3%). However, no significant association was found between the family type and the prevalence of IgG antibodies against HCMV. This observation disagrres with Kolawole and Oluwajana (2017) who reported that marriage (family) type was significantly associated in Ilorin, Nigeria.

HCMV IgG antibodies decrease with a more prolonged period of pregnancy. Pregnant women in their first trimester had the highest prevalence (100.0%) of IgG antibodies against HCMV infection, while those in their second (97.7%) and third (94.7%) trimesters. The decrease in CMV IgG seropositivity with gestation age observed in the current study might be due to pregnancy hemodilution (Chibwe et al., 2017). Nonetheless, seroprevalence increased with an increase in the number of earlier pregnancies. In the same way, it agrees with the study by Umeh et al. (2015), who reported that gestational age was not significantly associated with HCMV seroprevalence for both IgG antibodies, even though prevalence was least in those who were in the first trimester of pregnancy. This observation also aligns with Yeroh et al. (2015) who reported no significant association between HCMV infection gestation age in Kaduna, Nigeria. This result disagrees with previous findings (Okwori et al., 2008; Ahmad et al., 2011; Yeroh et al., 2015) who reported a higher HCMV prevalence for second trimester. Their observation could be due to the fact that most pregnant women report for antenatal in their second trimester than in the first and third trimester.

A higher prevalence of HCMV IgG antibodies was found in multiparity pregnant women with 3-4 pregnancies (100.0%) than those with 1-2 parity (97.4%) and nulliparous (94.1%). It also shows that the prevalence of HCMV IgG antibodies increases with the number of pregnancies. However, no significant association was found between the parity and the prevalence of IgG antibodies against HCMV.

This result agrees with the study by Umeh et al. (2015), who also reported that seroprevalence of HCMV IgG antibodies was higher in multiparous pregnant women than in those who had never been pregnant. This observation also aligns with Yeroh et al. (2015) who reported no significant association between HCMV infection and gravida in Kaduna, Nigeria. Similarly, Okwori et al. (2008) reported no significant association between gravida and HCMV infection in Bida, Nigeria. In this study, the pattern of change of HCMV prevalence with gravida was not clear, though the highest prevalence occurred in multigravida. This result agrees with the findings of Hamdan et al. (2011) and Yeroh et al. (2015) that reported multigravida to be a significant risk factor for HCMV infection. This could be so as increase in gravida could imply increase in parity which also implies increase in age, which according to previous reports (Ludwig & Hengel, 2009; Stadler et al., 2012) is a significant predictor of HCMV infection.

Pregnant women with no history of abortion had a higher prevalence (98.3%) of IgG antibodies against HCMV infection than those with such a history (93.3%). However, no significant association was found between the history of abortion and the prevalence of IgG antibodies against HCMV. This observation aligns with a previous study in Benue State, Nigeria, which reported that neither history of miscarriage nor the number of times miscarriage occurred showed any relationship with seroprevalence of anti-HCMV IgG antibodies (Umeh et al., 2015).

Pregnant women with a history of STDs had a higher prevalence (100.0%) of IgG antibodies against HCMV infection than those with no such history (96.4%). However, no significant association was found between the history of STDs and the prevalence of IgG antibodies against HCMV.

HIV seropositive pregnant women had a higher prevalence (100.0%) of IgG antibodies against HCMV infection than those with HIV seronegative status (96.6%). However, no significant association was found between the history of abortion and the prevalence of IgG antibodies against HCMV. This observation agrees with Mhandire et al. (2019) who reported that HCMV seroprevalence was not associated with the HIV status of the pregnant women.

Therefore, a comparison of the seroprevalence found in this study with those reported in previous studies suggests that seroprevalence of HCMV infection in pregnant women in Port Harcourt, Nigeria, could be placed in a high position of endemicity. However, interpretation of this comparison of seroprevalences should be cautious since different laboratory methods for detecting anti-HCMV IgG antibodies are employed in the studies.

5. CONCLUSION

The current study found a high prevalence (96.7%) of HCMV infection in pregnant women in Port Harcourt, Nigeria. This high prevalence calls for routine screening for HCMV infections and related risk factors in this setting. Notably, HCMV seroprevalence was not connected to the HIV status of the pregnant women, possibly owing to the ubiquitous contact of these women to HCMV. Implementing health precautions to prevent CMV transfer to fetuses and screening tests in this population is essential.

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