SEROPREVALENCE OF CYTOMEGALOVIRUS ANTIBODIES IN PREGNANT WOMEN, BENUE STATE, NIGERIA

By

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OUTLINE

- INTRODUCTION
  - OBJECTIVES OF STUDY
- MATERIALS AND METHODS
- RESULTS
- DISCUSSION/CONCLUSION

INTRODUCTION

- CYTOMEGALOVIRUS
  - BELONGS TO THE HERPES GROUP OF VIRUSES
  - IS A LEADING CAUSE OF CONGENITAL VIRAL INFECTIONS
  - CAUSES SERIOUS DISEASE IN PERSONS SUCH AS
    - **PREGNANT WOMEN**, BABIES *IN UTERO*,
    - HIV-INFECTED PERSONS,
    - ORGAN TRANSPLANT RECIPIENTS, AND
    - THOSE ON IMMUNOSUPPRESSIVE THERAPY

- TRANSMISSION
  - VIRUS CAN BE TRANSMITTED
    - TO DEVELOPING FOETUS DURING ACTIVE INFECTION IN PREGNANCY
    - THROUGH BODY FLUIDS SUCH AS BLOOD, SALIVA, SALIVA, SEMEN, BREAST MILK

OBJECTIVES OF STUDY

- STATEMENT OF PROBLEM
  - AWARENESS OF THE VIRUS AND ITS CONCOMITANT RISKS FACTORS IS POOR, AND
  - PREVIOUS STUDIES HAVE FOCUSED ON FEW AREAS IN NIGERIA

- **OBJECTIVES OF STUDY WERE** TO:
  - DETERMINE THE SEROPREVALENCE OF CMV INFECTION IN PREGNANT WOMEN IN BENUE STATE, NIGERIA
  - RELATE THE INFECTION WITH
    - SOME SOCIO-DEMOGRAPHIC CHARACTERISTICS (E.G. AGE, …)
    - GESTATIONAL AGE, PARITY, ETC.
    - SOME CULTURAL PRACTICES (E.G. SCARIFICATION, TATOOING, MULTIPLE PARTNERS,

MATERIALS & METHODS

- STUDY AREA
  - MAKURDI, BENUE STATE, NIGERIA
  - LOCATED ON LATITUDE: 7° 43' 32" N AND LONGITUDE: 8° 33' 51" E
  - 23 ^{O}C TO 35 ^{0}C
  - HUMAN POPULATION BETWEEN 250,000 AND 500,000
  - MAIN OCCUPATION = SUBSISTENCE FARMING AND TRADING
- STUDY POPULATION
  - 375 PREGNANT WOMEN AGED 15 – 50 YEARS, AND ATTENDING ANTE-NATAL CLINIC AT A TERTIARY HEALTH-CARE FACILITY
- ETHICAL APPROVAL – WAS OBTAINED
- LABORATORY TEST – ENZYME LINKED IMMUNOSORBENT ASSAY KIT USED
- SPECIMEN COLLECTED – FIVE-ML VENOUS BLOOD
- INFORMATION ON SOCIO-DEMOGRAPHIC AND RISK FACTORS
  - THESE WERE OBTAINED THROUGH STRUCTURED QUESTIONNAIRES
- STATISTICAL ANALYTICAL TECHNIQUES – DESCRIPTIVE (PERCENTAGES) AND INFERENTIAL (E.G. CHI-SQUARE USED TO DETERMINE ASSOCIATIONS BETWEEN VARIABLES)

RESULTS

TABLE 1

- OVERALL SEROPREVALENCE
  - 93.3% - FOR IgG
  - 3.5% - FOR IgM

- INFECTION CATEGORIES
  - PRIMARY INFECTION = 13 (3.5%)
  - PREVIOUS EXPOSURE = 337 (89.9%)
  - RECENT PRIMARY INFECTION = 0 (0%)
  - SUSCEPTIBLE PERSONS = 25 (6.7%)

NOTE:

- IgG(+) IgM(+) = Primary Infection
- IgG(+) IgM(-) = Previous Exposure
- IgG(-) IgM(+) = Recent Infection
- IgG(-) IgM(-) = Susceptible persons

Table 1: Seroprevalence of anti-CMV IgG and IgM antibodies in Pregnant Women

	CMV IgM					
CMV IgG	positive		negative		Total	
	Numer	%	Number	%	Number	%
positive	13	3.5%	337	89.9%	350	**93.3**%
negative	0	.0%	25	6.7%	25	6.7%
Total	13	**3.5**%	362	96.5%	375	100.0%

RESULTS CONT'D

AGE WAS NOT SIGNIFICANTLY ASSOCIATED WITH PREVIOUS INFECTION OR PRIMARY INFECTION

SIMILARLY, GESTATIONAL AGE WAS NOT SIGNIFICANTLY ASSOCIATED WITH CMV SEROPREVALENCE

CMV SEROPREVALENCE (FOR BOTH IgG AND IgM) WAS HIGHER IN MULTIPAROUS WOMEN THAN IN WOMEN WHO HAD NOT BEEN PREGNANT EARLIER

TABLE 2: CMV SEROPREVALENCE BY AGE, PARITY, AND GESTATIONAL AGE

Age	entire group	IgG		IgM	
		Count	%	Count	%
15 - 20 yr.	20	17	85.0%	1	5.0%
21 - 30 yr.	266	247	92.9%	10	3.8%
31 - 40 yr.	81	78	96.3%	2	2.5%
41 - 50 yr.	8	8	100.0%	0	.0%
TOTAL	375	350	93.3%	13	3.5%
	Chi-square value	4.043 (P>0.05)		0.737 (P>0.05)	

No. of pregnancies	entire group	Count	%	Count	%
none	130	115	88.5%	0	.0%
one	109	101	92.7%	5	4.6%
two	51	50	98.0%	0	.0%
more than two	85	84	98.8%	8	9.4%
TOTAL	375	350	93.3%	13	3.5%
	Chi-square value	10.971 (P<0.05)		15.886 (P<0.05)	

Gestational age	entire group	Count	%	Count	%
1st trimester	44	39	88.6%	1	2.3%
2nd trimest	188	176	93.6%	7	3.7%
3rd trimester	143	135	94.4%	5	3.5%
TOTAL	375	350	93.3%	13	3.5%
	Chi-square value	1.849 (P>0.05)		0.225 (P>0.05)	

RESULTS CONT'D

CMV SEROPREVALENCE WAS NOT ASSOCIATED WITH HISTORY AND OF MISCARRIAGES AND NUMBER OF TIMES MISCARRIAGE OCCURRED

TABLE 3: CMV SEROPREVALENCE BY MARITAL STATUS, HISTORY OF MISCARRIAGE, AND NUMBER OF TIMES MISCARRIED

	entire group(%)	IgG Yes		IgM Yes	
		Count	%	Count	%
Marital Status					
married	374(100)	349	93.3%	12	3.2%
widowed	1(100)	1	100.0%	1	100.0%
TOTAL	375	350	93.3%	13	3.5%
	Chi-square value	0.072 (P>0.05)		27.921 (P<0.05)	
History of miscarriage					
yes	86(100)	81	94.2%	5	5.8%
no	287(100)	268	93.4%	8	2.8%
4	2(100)	1	50.0%	0	.0%
TOTAL	375	350	93.3%	13	3.5%
	Chi-square value	6.137 (P<0.05)		1.883 (P>0.05)	
No of Miscarriages					
once	54(100)	49	90.7%	3	5.6%
more than once	31(100)	31	100.0%	2	6.5%
TOTAL	85(100)	80	94.1%	5	5.9%
	Chi-square value	3.050 (P>0.05)			

RESULTS CONT'D

NONE OF THE FACTORS SHOWN IN THIS TABLE WAS SIGNIFICANTLY ASSOCIATED WITH CMV SEROPREVALENCE

TABLE 4: CMV SEROPREVALENCE BY SOME SOCIO-DEMOGRAPHIC FACTORS

CHARACTERISTICS	entire group(%)	IgG Yes		IgM Yes	
		Count	%	Count	%
Occupation of respondents					
salary earners	201(100)	189	94.0%	6	3.0%
non-salaried	174(100)	161	92.5%	7	4.0%
TOTAL	375(100)	350	93.3%	13	3.5%
	Chi-square value	0.338 (P>0.05)		0.300 (P>0.05)	
Level of education					
pri.+sec.	184(100)	174	94.6%	6	3.3%
tertiary	191(100)	176	92.1%	7	3.7%
TOTAL	375(100)	350	93.3%	13	3.5%
	Chi-square value	(P>0.05)		0.046 (P>0.05)	
Type of House					
one-room apartment	49(100)	47	95.9%	1	2.0%
one-bedroom flat	133(100)	126	94.7%	5	3.8%
two-bedroom flat	148(100)	135	91.2%	7	4.7%
more than two-bedroom flat	45(100)	42	93.3%	0	.0%
TOTAL	375	350	93.3%	13	3.5%
	Chi-square value	2.013 (P>0.05)		2.653 (P>0.05)	

RESULTS CONT'D

NONE OF THE BLOOD LETTING RISK FACTORS WAS ASSOCIATED WITH CMV SEROPREVALENCE

TABLE 5: CMV SEROPREVALENCE BY SOME RISK FACTORS

	entire group(%)	IgG Yes		IgM Yes	
		Count	%	Count	%
Blood transfusion					
yes	26(100)	26	100.0%	2	7.7%
no	349(100)	324	92.8%	11	3.2%
TOTAL	375	350	93.3%	13	3.5%
	Chi-square value	1.995 (P>0.05)		1.491 (P>0.05)	
Time after Transfusion					
< a year	11(100)	11	100.0%	2	18.2%
> one year	15(100)	15	100.0%	0	.0%
TOTAL	26(100)			2	7.7%
	Chi-square value	-*		2.955 (P>0.05)	
*No statistics are computed because CMV IgG is a constant					
Intravenous Drug Use					
yes	13(100)	13	100.0%	2	15.4%
no	362 (100)	337	93.1%	11	3.0%
TOTAL	375(100)	350	93.3%	13	3.5%
	Chi-square value	0.962 (P>0.05)		5.716 (P>0.05)	
Sharing needles					
no	13(100)	13	100%	2	84.6%
TOTAL	13(100)	13		13	100.0%
	No statistics are computed because Sharing Needles is a constant				
Tatoo					
yes	29(100)	28	96.6%	0	.0%
no	346(100)	322	93.1%	13	3.8%
TOTAL	375	350	93.3%	13	3.5%
	Chi-square value	0.523 (P>0.05)		1.129 (P>0.05)	
Scarification					
yes	41(100)	40	97.6%	2	4.9%
no	334(100)	310	92.8%	11	3.3%
TOTAL	375(100)	350	93.3%	13	3.5%

DISCUSSION/CONCLUSION

- Primary CMV infection is very important in pregnancy because many babies born to mothers with primary CMV could be born with congenital CMV infections.
  - From this study, 3.5% of the pregnant women who tested positive for anti-CMV IgM may be at risk of giving birth to babies with either acute CMV infections or asymptomatic forms of CMV resulting in
    - microcephaly and a late developmental problems like mental retardation, cerebral palsy, hearing loss and vision impairment (Stagno *et al* ., 1982; Istas *et al* ., 1995; Ivarson *et al* ., 1997).
- From this study, most of the participants were positive for anti-CMV IgG antibodies and very few were positive for anti-CMV IgM antibodies.
  - These results are consistent with previous studies in Nigeria (Akinsegun *et al*.(2011) and Ahmed *et al*.(2010) in which high anti-CMV IgG antibodies seroprevalence among pregnant women in Lagos and Sokoto respectively were reported.
- Our findings differ from those reported for more developed parts of the world where low anti- CMV IgG antibodies are reported.
  - For example Tookey *et al*.(1992), Knowles *et al*.(2005), and Seale *et al*.(2006) recorded lower anti-CMV IgG antibodies seroprevalence among pregnant women in London, Ireland and Australia respectively.
  - However Lubeck *et al*.(2009) and Paschale *et al*.(2009) reported higher anti-CMV IgG antibodies seroprevalence rates in Germany and northern Italy respectively.

DISCUSSION/CONCLUSION CONT'D

- Parity appeared to be a statistically significant factor for CMV infection. Seropositivity increased from 88.5% in women that had no children to 98.8% in those that had had two or more pregnancies.
- Previous nursing and contact with little children may have predisposed them to risk of infection.

- Most of the participants with past history of miscarriage were positive for anti CMV IgG/IgM antibodies in contrast to those who has no past history of miscarriage.

- In addition, all those who had miscarriage more than once tested positive for anti-CMV IgG antibodies and 6.5% of them tested positive for anti-CMV IgG antibodies.
  - History of miscarriage is likely to be an important factor in the transmission of CMV.

- Those that had informal education and live in one room apartment showed highest level of IgG seroprevalence compared to those that had tertiary education and live in flats.
- High prevalence rate could be as a result of poor hygienic practices and economic status as many people with informal or no education earn little and live in overcrowded conditions.

- CMV IgG infection rate increased gradually from 85.0% in 15-20 age group to 100% in 41-50 age group.
- Although rate of infection increased with age, these difference were not statistically significant and
- Increase in seropositivity could be attributed to the fact that the immune system of the elderly gets weaker with age Redwan *et al.*(2011).
  - These results agree with reports of Redwan *et al.,* (2011).

- In Makurdi, few people are aware of CMV disease.
- As a result, little is done in terms of control measures by both the governmental and non-governmental organisations
- Like in other parts of the world where several intervention measures that would reduce the incidence of CMV infections are in place,
- we recommend:
  - Immunization of susceptible pregnant women with vaccine,
  - Prevention of virus transmission by maintaining good hygienic practices especially in pregnancy.
  - Creating awareness of the infection and its consequences in the newborn.

THANKS FOR LISTENING!