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RESEARCH ARTICLE

CONGENITAL ANOMALIES AND VIRAL INFECTIONS IN INFANT-KHARTOUM STATE – SUDAN

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ABSTRACT

Background: Some viruses, such as rubella and human cytomegalovirus, are known to cross the placental barrier and infect the fetus. In other cases of maternal viral infections, such as herpes simplex, evidence for transplacental passage is less convincing and fetal damage or neonatal disease may be coincidental or associated with prenatal infection. Certain cases of fetal or neonatal disease following maternal viral infections may be associated with disease in the mother which affects her metabolic processes or the placenta in such a way as to interfere with development of the fetus and infant (Neighbors and Tannehill-Jones, 2010).

The possible effects of transplacental viral infections are several. Fetal loss may occur by means of abortion or stillbirth. There may be infection of the fetus, with clinical manifestations such as rash, or without clinical manifestations. The infant may be born with congenital defects, including such deformities as cataracts, cardiac anomalies, mental retardation or cerebral palsy. (Huong Mc Lean, 2014)

Objectives: the aim of this study was to assess the common viral infection as a causative agent in congenital babies in Khartoum state- Sudan.

Results: The results of the study revealed presence of Rubella *IgM* in (10) cases and *IgG* in (90) cases, Cytomegallo virus *IgM* in (10%) of cases. HSV-1 *IgM* was detected in (20%) of cases. HSV-2 *IgM* is not detected in all cases while HSV-2 *IgG* is positive in 10 cases.

All viruses in study Assimilation 40% of Congenital babies causative Agents.

In 80% of positive cases related to Rubella (*IgM)* there were maternal Antibodies (IgG).

In Cytomegallo virus *IgM*; (7) of (10) cases there were maternal Antibodies (IgG).

In HSV-1 *IgM* all (20) cases there were maternal Antibodies *(IgG)*; 100% of cases has maternal Abs).

Conclusions: There were presumptive evidences that the maternal viral infection is considered as a common causative agent for congenital anomalies in Sudan.

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INTRODUCTION

Congenital anomalies are a medical condition that is present at or before birth. These conditions also referred to as birth defects, can be acquired during the fetal stage of development or from the genetic makeup of the parents. There are many causative agent and predisposing factors for the congenital abnormality as infectious abnormality (virus, bacteria and parasite), chromosomal and genetic abnormality. (Rubella, 2014) The common virus that cause congenital abnormality HSV, Rubella and cytomegallovirus (Donald G. McNeil Jr, 2015).

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Herpes simplex virus

The herpes simplex virus, also known as HSV, is an infection that causes herpes. Herpes can appear in various parts of the body, most commonly on the genitals area and mouth. There are two types of the herpes simplex virus. HSV-1, also known as oral herpes, can cause cold sores and fever blisters around the mouth and on the face. HSV-2 is generally responsible for genital herpes outbreaks (Public Health Image Library, 2015).

Rubella

Rubella is a mild and preventable disease caused by a virus. If you catch it you may feel unwell, with swollen glands, a slight temperature, or a sore throat and rash but some people have no

symptoms at all and so are unaware that they may be infectious and may be passing on the disease. (Edlich *et al*., 2005) Rubella is very serious if a pregnant woman catches it in the early stages of her pregnancy because it can profoundly damage the development of her unborn child. It can result in deaf blindness or raise the possibility of a termination. (Robert Kliegman *et al*., 2006) Ensuring that children are routinely vaccinated helps to protect pregnant women and their babies. (Robert Kliegman *et al*., 2006)

Cytomegalovirus

It is a common herpes virus; many people do not know they have it, because they may have no symptoms. But the virus, which remains dormant in the body, can cause complications during pregnancy and for people with a weakened immune system. The virus spreads through bodily fluids, and it can be passed on from a pregnant mother to her unborn baby. Also known as HCMV, CMV, or Human Herpes virus 5 (HHV-5), cytomegalovirus is the virus most commonly transmitted to a developing fetus. (Weisinger and Pesudovs, 2002) There are three main types of CMV infections: acquired, recurring, or congenital. Acquired, or primary, CMV is a first-time infection. Recurring CMV is when the patient is already infected. The virus is dormant and then becomes active due to a weak immune system.

- Congenital CMV is when infection occurs during pregnancy and affects the unborn child.
- CMV is generally not a problem, except when it affects an unborn child or a person with a weak immune system, such as a recent transplant recipient or a person with human immunodeficiency virus, or HIV.
- A pregnant woman has a very small risk of reactivation infecting her developing baby. If infection is suspected, she may consider amniocentesis, which involves extracting a sample of amniotic fluid to find out whether the virus is present. (Koichi Yamanishi *et al*., 2007)

MATERIALS AND METHODS

Study design

Cross- sectional descriptive study conducted at Khartoum state during the period from July 2016 to December 2017. (100) congenial infected babies diagnosed and classified by pediatrician as case group.

Sampling

Venous blood was collected from participants by clean venipuncture in plain blood tubes. Samples were centrifuged at (3000) rpm for no less than (10) minutes. Serum removed from the tube within (60) minutes using a plastic pipette and stored in labeled Eppendorf safe–lock tubes with cap.

Ethical consideration

Ethical consideration was taken verbally from the mothers of the babies. This study posed no physical risk to participants though an interview of (10) min, might have been convenient to some participants. It is a convenient study, thus neither the participants name nor his institution in use in any of the study materials and each participant was assigned a unique identification number. Collected data will be secured in a computer protected by password.

Laboratory tests (Western Blot Technique)

Identification of the viral Agent that cause the infection using Western Blot Technique, which is widely used Analytical technique to detect specific protein in sample.It uses gel electrophoreses to separatenative protein by 3-D structure or denaturate proteins by the length of polypeptide.

Principle of the test method

Gelelectrophoresis (SDS-PAGE)

Western blotting usually involves two major processes, namely, SDS-polyacrylamide gel electrophoresis and protein blotting and testing. SDS-polyacrylamide Electrophoresis separation describes a phenomenon that charged particles move towards opposite electrode under the influence of electric field. It is used to separate proteins according to their electrophoretic mobility which depends on charge, molecule size and structureof the proteins. Polyacrylamide gel(PAG) is a three-dimensional meshnetworks polymer composed of acrylamide and a cross-linker (methylenebisacrylamide) under the catalyzation of ammonium persulfate. (Ryan and Ray eds. 2004)

Quality assurance of laboratory analysis

Control design Proper control design is essential to western blot. It will guarantee accurate and specific test result by identifying various problems quickly and precisely.

Control types

Positive control: A lysate from a cell line or tissue sample known to express the protein you are detecting. Positive control is designed to verify working efficiency of the antibodies.

Negative control: A lysate from a cell line or tissue sample known not to express the protein you are detecting. Negative control is to check antibody specificity. Nonspecific binding and false positive result will be identified.

Secondary antibody control (No primary antibody control): The primary antibody is not added to the membrane. Only secondary antibody is added. This is to check secondary antibody specificity. Nonspecific binding and false positive result caused by secondary antibody will be indicated.

Blank control: Both primary and secondary antibody is not added to membrane. This is to check membrane nature and blocking effect.

Loading control: Loading control is used to check sample quality and the performance of secondary antibody system.

Statistical analysis

All data was analyzed using statistical analysis soft ware (SPSS) version (16). Statistical analysis included description of the data distribution, percentage and incidence rate.

RESULTS AND DISCUSSION

The statistical analysis of gathered data shows presence of Rubella IgM in (10) cases and IgG in (90) cases, Cytomegallo virus IgM in (10) cases and IgG in (90) cases, HSV-1 IgM in (20) cases and IgG in 95 cases, and IgG in (10) cases. All viruses in study Assimilation 40% of Congenital babies causative Agents. Rubella IgM (10%), Cytomegallo virus IgM (10%), HSV-1 IgM (20%), HSV-2 IgM (0%), this agree with the research done in Canada by (Brown *et al*., 2003) they report HSV-1 more likely than HSV-2 to transmitted to the neonate. In Rubella 8 of 10 cases (IgM) positive there were maternal Antibodies (IgG). (80% has maternal Abs and 20% hasn't maternal Abs). In Cytomegallo virus 7 of 10 cases (IgM) there were maternal Antibodies (IgG). (70% has maternal Ab and 30% hasn't maternal Abs).

Table 1. Percentage of detected immunoglobulin (IgM) among cases

Rubella (IgM)	CMV (IgM)	HSV-1 (IgM)	HSV-2 (IgM)
10%	10%	20%	0%

Table 2. Percentage of positive maternal Antibody (IgG) among cases

Rubella (IgG)	CMV(IgG)	HSV-1 (IgG)	HSV-2 (IgG)
80%	70%	95%	100%

Table 3. Distribution of positive immunoglobulin (IgM) according to gender

Positive IgM	male	percentage	female	percentage
Rubella	7	70%	3	3%
CMV	5	50%	5	50%
HSV-1	14	70%	6	30
HSV-2	0	0%	0	0%

Table 4. Distribution of positive immunoglobulin (IgM) according to age group

Positive IgM	Less than 2 years	Percentage	(2- 5) years	Percentage
Rubella	4	40%	6	60%
CMV	8	80%	2	20%
HSV-1	17	85%	3	15%
HSV-2	0	0%	0	0%

In HSV-1 all 20 cases (IgM) there were maternal Antibodies (IgG) (100% has maternal Abs). This study also agree with the research (infectious aetiology of congenital cataract based on TORCH screening in a tertiary eye hospital in chenni, Tamil Nadu, India done by Mahalakshmi *et al*. India JMed Res. 2010. Another agree of this study with the study (Antenatal screening for congenital infection with Rubella, CMV and Toxoplasma) done by Robert R. Jarrett, *et al*. (2015).

Conclusion

Maternal infection is one of the common recent infections which may lead to death of children, the viral infection that cause congenital anomalies represent (40%). HSV-1 is the common cause of congenital viral infection in Sudanese congenital neonate.

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