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Cytomegalovirus (CMV) in Pregnant Women in Nakhchivan Autonomous Republic

Abstract

Cytomegalovirus (CMV) hominis virus, belonging to the Herpesviridae family, is widespread in all societies around the world, and in developing countries, most people encounter CMV in early childhood. It is second place after HIV in developing countries.

Anthroponosis is a disease. The source of the disease is those who carry the virus or are sick with one or another form of the disease. Agents are found in blood, saliva, cervical, vaginal secretions, eye drops, sperm, amniotic and cerebrospinal fluid, breast milk, feces. Infection occurs with these specified biological materials and secretions, as well as with transplants. The main infection mechanism is aspiration, it is transmitted by airborne droplets. There is a 25 % chance of transmission from mother to fetus through sexual contact.

Seasonality is not characteristic of the disease. The immunoresistance of CMV is striking. So, despite the presence of antibodies against it, CMVs can circulate in the human body and pass to other people and to the fetus in pregnant women. Persistence and multiplication of viruses in the body without showing symptoms causes the infected person to remain a virus carrier throughout his life. Cellular immunity plays a key role in the pathogenesis of CMV infection. Therefore, this infection is considered an indicator of cellular immunity deficiency. It should be noted that latent CMV infection in pregnant women does not always lead to fetal infection.

Keywords: *cytomegalovirus, causative agent, prevalence index, types, age range*

Introduction

Cytomegalovirus (CMV), an enveloped double stranded DNA herpes virus is the most common congenital viral infection. It is also known as human herpesvirus 5 (HHV-5) and like other herpes viruses it becomes latent after a primary infection but can reactivate with renewed viral shedding or from a new strain (Manicklal et al., 2013, pp. 86-102). A recently published systematic review and meta-analysis estimated a global CMV seroprevalence of 83 % in the general population, 86 % in women of childbearing age, and 86 % in donors of blood or organs. For each of these three groups, the highest seroprevalence was seen in the World Health Organisation (WHO) Eastern Mediterranean region (90 %) and the lowest in WHO European region 66 % (Osric et al., 2021, pp. 216-222). The contamination of women during pregnancy, which is the most common cause of intrauterine infection, leads to fetal and infant development deficits (Wen et al., 2002, pp. 111-116).

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Research

Cytomegalovirus (CMV) is the second most common cause of congenital viral infections in the developing countries, after HIV.

This is an anthroponosis. The source of the disease is carriers of the virus or patients with one or another form of the disease. Pathogens are found in blood, saliva, cervical and vaginal secretions, tears, sperm, amniotic and cerebrospinal fluid, breast milk, and feces. Infection occurs with these biological materials and secretions, as well as transplants. The main mechanism of infection is aspiration, transmitted by airborne droplets. Contact, sexual, transplacental transmission from mother to fetus or infection of the fetus in the birth canal are possible. The probability of transmission from mother to fetus is 25 % (Asher et al., 2006, pp. 399-409).

The disease has no seasonality. The immunoresistance of CMV is amazing. Thus, despite the presence of antibodies to it, CMV can circulate in the human body and be transmitted to other people and the fetus in pregnant women. Persistence – the reproduction of viruses in the body without manifestation of symptoms – causes the infected person to remain a virus carrier throughout his/her life. Cellular immunity plays a key role in the pathogenesis of CMV. Therefore, this infection is considered an indicator of cellular immunity deficiency. It should be noted that latent CMV in pregnant women does not always lead to fetal infection (Mussi-Pinhata et al., 2009, pp. 522–528).

Exacerbation of latent infection, and development of viremia increase the probability of fetal infection. The probability of fetal infection is higher during pregnancy. Thus, the absence of antibodies to the virus in the mother's blood and, as a result, its inability to be transmitted to the fetus, as well as viremia developing as a result of fresh infection, contribute to the transmission of infection to the fetus (Boppana, 2006, pp. 73–86).

Methods

We conducted a systematic literature search for this narrative review summarizing the seroprevalence/prevalence of CMV and associated risk factors among pregnant women (Cannon, Hyde, & Schmid, 2011, pp. 240-55).

The absence of characteristic symptoms of cytomegalovirus infection makes its clinical diagnosis difficult. Therefore, laboratory tests are the main diagnostic method.

Currently, the following methods are used to diagnose cytomegalovirus infection:

- Cultural – material taken from biological fluids is cultured in a special nutrient medium;
- PCR – allows detecting even a small amount of viral DNA in the examined material (urethral, vaginal, cervical swabs, urine, blood, cerebrospinal fluid or saliva);
- IFA – the most widely used method based on the detection of specific antibodies formed against the virus in the blood;
- Cytological method – the examined material (tissues taken by biopsy) is examined under a microscope.

In everyday clinical practice, the IFA method is mainly used. This inexpensive and relatively technically simple examination is carried out using special automatic devices. It can be carried out as often as necessary, which significantly facilitates dynamic monitoring of the course of the infectious process.

IFA Resolution

IFA determines the titer of immunoglobulins M and G (Ig M and Ig G) in the blood. These are different classes of specific protective antibodies produced by immune cells. If the analysis for cytomegalovirus during pregnancy is positive, the ratio of these antibodies is necessarily assessed (Zuhair et al., 2019).

Detection of IgM in the blood indicates that an active infectious process is currently occurring in the body (Sahiner et al., 2015, pp. 465-471).

This requires choosing a treatment tactic, and in the case of pregnancy, assessing the risks to the fetus. Detection of IgG indicates good immunity. They are formed soon after infection and persist for life. It is the antibodies of this class that reliably protect the body from viruses, preventing their reproduction and spread. If IgM is positive against the background of a questionable IgG result, this

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indicates the presence of the first – initial stage of infection. If the Ig M titer is not too high, and the G level, on the contrary, is good – this is a sign of reactivation of a chronic infection. If only Ig G is positive, an inactive phase of the disease is diagnosed – remission (Kenneson & Cannon, 2007, pp. 253-76).

The duration of the disease has prognostic significance. If a woman has chronic activation of cytomegalovirus during pregnancy, the antibodies currently present will prevent its spread. In this case, the risk of intrauterine infection of the fetus is only 3-5 %. With a fresh infection, the transmission of the virus from the placenta to the fetus reaches almost 60 %, which is explained by the lack of antibodies capable of blocking the pathogen.

ELISA does not always provide the necessary information to determine the duration of the infection. A more accurate result can be obtained by determining the avidity of the detected G antibodies to cytomegalovirus, which determines the strength of antibodies' adhesion to viral antigens.

The more stable the resulting immune complexes are, the more time has passed since the infection. Avidity over 35 % indicates that more than 3 months have passed since the infection. An indicator over 50-60 % is considered transitional, indicating the transition of the disease to the chronic phase. High-avidity antibodies are a sign of carriage or chronic infection.

We conducted our study on 94 pregnant women. Of these, Ig M was detected in 2 patients, and Ig G in 92 patients (Diagram 1).

Diagram 1

The distribution area by region is shown in the diagram 2 below

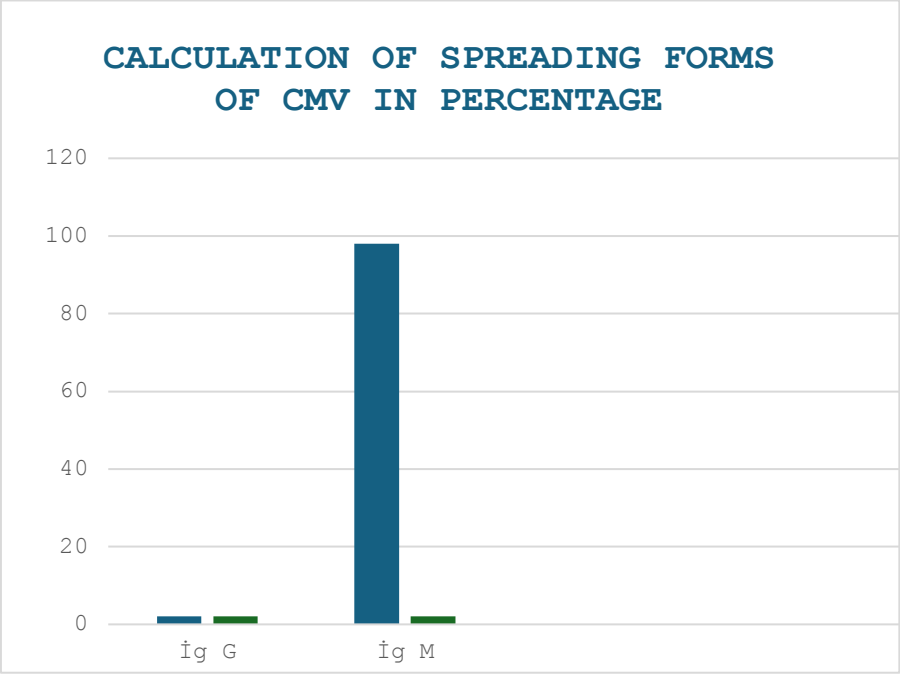

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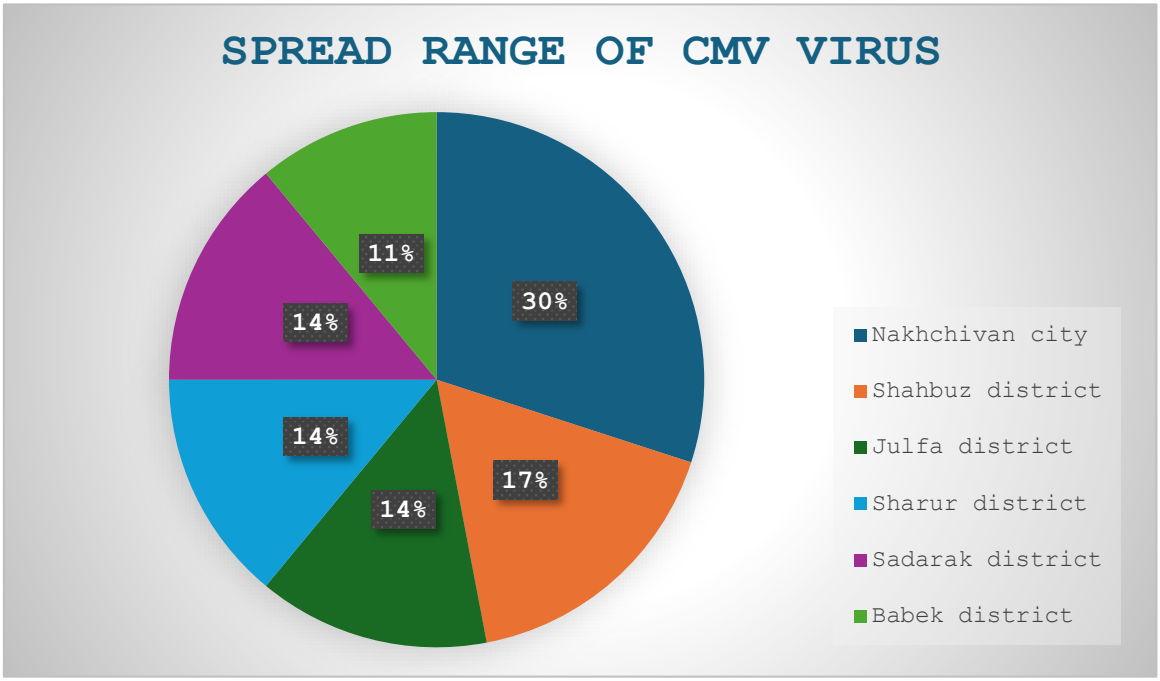
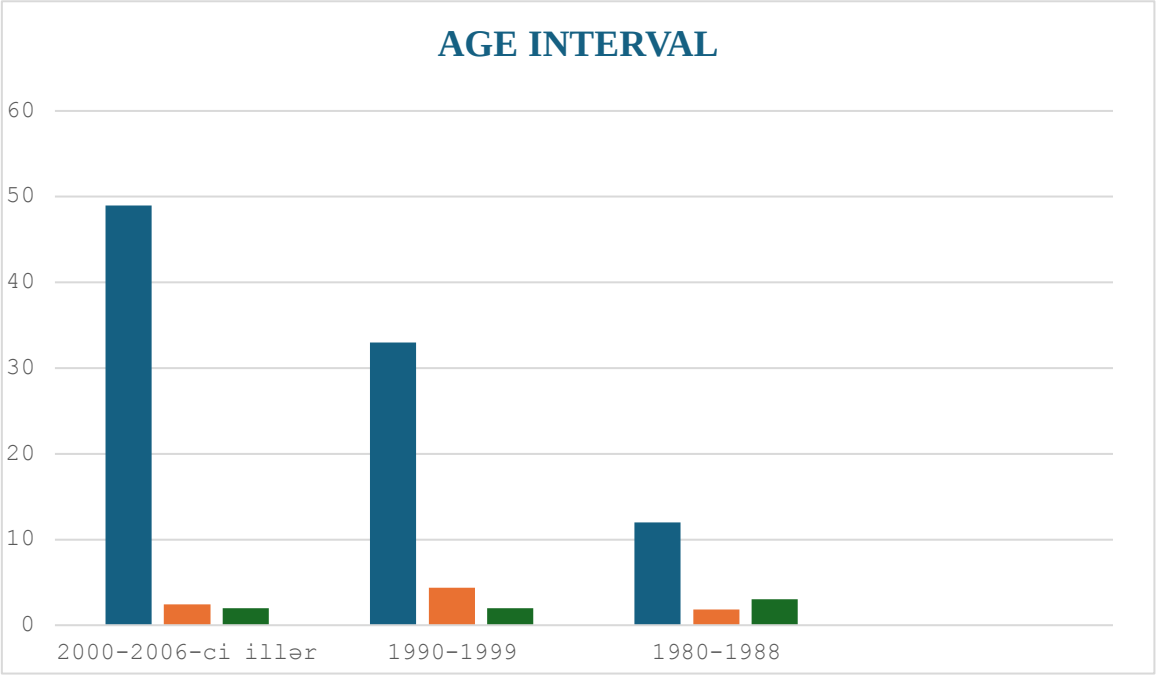
Diagram 2

In our study, we determined the most recent age intervals in which it is more common (Diagram 3)





Infection of pregnant women with cytomegalovirus is not a rare occurrence. However, despite the widespread prevalence of the disease among our young women and the ease of testing, most women do not know that they have this disease and inadequately assess the risks to the future child (Permar, Schleiss, & Plotkin, 2018).

Although cytomegalovirus is included in the TORCH group of infections, even a new infection of a pregnant woman does not lead to serious damage to the fetus. Moreover, if cytomegalovirus is treated in the early stages of pregnancy, the infection quickly goes into an inactive phase and damage to the fetus does not occur.

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Conclusion

The aim of the study was to conduct a statistical analysis of the age of young mothers infected with cytomegalovirus in Nakhchivan city and districts of the Nakhchivan Autonomous Republic. As a result, it was revealed that pregnant women aged 18-24 are more common in Nakhchivan city. The course of pregnancies of these pregnant women will be monitored and analyzed.

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