Determination of the Positivity of Cmv Antibodies in A Sample of Patients with Type 2 Diabetes

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ABSTRACT

Diabetes mellitus is a white disease that is characterized by the level of sugar level in the blood, as the disease appears when the banks are not producing the sufficient decentralization from the insulin (which is a hunter that is controlled by the level of blood sugar in the blood) or when the body is unable to use the body (Evert et al, 2014).

This study was conducted to determine the positivity of cytomegalovirus (CMV) antibodies in a sample of patients with type 2 diabetes, where samples were collected from a general hospital in Baquba, with 80 samples, (50) samples from people with diabetes and (30) samples from non-diabetics. The results of this study, after conducting the test with IgG, IgM antibody, seropositive seropositive IgG and IgM rapid test strips in type 2 diabetic patients compared to the control group showed a statistical difference.

Keywords: Diabetes mellitus, Cytomegalovirus (CMV), IgG, IgM

1. Introduction

CMV spreads throughout the world and is similar to the viruses that cause chickenpox and infectious mononucleosis. Most people who carry this virus do not get sick, but infection with this virus can become very dangerous in infants and people who they have weak immunity. A mother can pass the virus on to her baby if she becomes infected during pregnancy. The virus does not harm most infants, but a small number of them may cause permanent disabilities (Gandhi and Khanna, 2004).

CMV spreads through close contact with the body fluids of an infected person, and body fluids include blood, saliva, urine and breast milk, and transmission of the virus through normal contact is unlikely, and the virus can also be transmitted through sexual contact, including semen and vaginal fluids. And sometimes, it can spread through transplanted organs and blood transfusions as well, and nurseries and incubators that include many children help spread this virus with ease, and young children usually start spreading this virus for many months after their first infection, as the child begins to transmit The virus can spread to others and its parents can contract the infection, but this case is not uncommon (Munoz et al, 1999).

It was found that there is an association between Cytomegalovirus infection and diabetes, so that CMV is considered a risk factor for the progression of diabetes (Faraj et al, 2019). Beta-cell degradation is induced by CMV either through programmed death, or through stimulation of cytokine production in infected β-cells (Hamer et al, 2016).

According to the current classification, there are two main types: Diabetes can be classified into the following types: Insulin Dependent Diabetes Mellitus (IDDM Type 1) this type is characterized by the destruction of the beta cells (β) in the pancreas, which secrete insulin and thus become unable to produce it due to the autoimmune destruction of these cells with a percentage of, 80–90% (Alsheri, 2017). This type occurs in the early stages of life, and children and adolescents are the most common age groups for this type (Karen et al, 2017). Most of the causes of this type are genetic and environmental factors and infection with viruses (Antnony et al, 2014), non-insulin-dependent diabetes mellitus (type II) is a complex and chronic metabolic disorder characterized by relative insulin deficiency and insulin resistance (principally in fat, liver and muscle cells). In some countries of the world, the number of affected people is expected to double in the next decade due to the increase in the aging population (Song et al, 2018).

2. Diagnosis

Diabetes is diagnosed according to the criteria set by the World Health Organization (WHO, 2011). Which

1- Measuring the level of glucose in the blood during fasting for at least eight hours, 126 mg/dL (7 mmol/L) (Magliano et al, 2008).

2- Measuring the blood glucose level at 200 mg/dL (11.1 mmol/L), and this is two hours after taking (75 g of glucose. (Barr et al, 2002).

3- Random blood glucose measurement of 200 mg/dL (11.1 mmol/L) as this measurement is made without regard to the time of the last meal eaten with the presence of symptoms of diabetes such as thirst, urination, weight loss, vision, and fatigue (Saudek, et al, 2008).

4- Measuring the level of glycated hemoglobin

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HAb1C (≥6.5) is also one of the methods for diagnosing diabetes (ADA, 2010).

CMV Cytomegalovirus the virus was described in 1956 by a group of researchers, Smith, Weller Smith, 1956; Rowe et al, 1956). The name herpesviridae derives from the Greek word herpein meaning to crawl. This family contains more than a hundred viruses that infect a wide range of families, including humans, animals, birds, plants, and fish. Only eight viruses cause human disease and are named by numbers and the common ones are from human herpes virus 1 to CMV. Human herpes virus 8 (HHV1-HHV8, the common name for human herpes virus 5HHV5), is classified in the beta-herpesvirinae family of the family herpesvirinae (Ablashi et al, 2013).

Electron microscopy examination shows that the shape of CMV is very similar to that of other herpesviridae that infect humans. CMV is the largest member of the family of herpes viruses, with a diameter of about 200 nanometers (Tsuyoshi, 2014), and the inner envelope of the virus consists of 64 nanometers in diameter. With a protein shell with a diameter of 110 nm, it is polygonal composed of 162 residues and each residue appears as a hexagonal structure with a hollow cross-section (Tsuyoshi, 2014). The protein envelope is surrounded by an outer envelope composed of a lipid membrane consisting of 4-8 unique layers of glycoproteins, three or four of which are dominant in the envelope and have molecular weights of 140,000 Daltons, 62,000 Daltons and 57,000 Daltons, on which a group of protrusions appear in the form of thorns of 25- 30 It has a protein structure and a glycoprotein, and it works to bind the virus to the receptors of the target cells. It is believed that these glycoproteins represent the places of antigens for the neutralizing antibodies (Anderson, 2008).

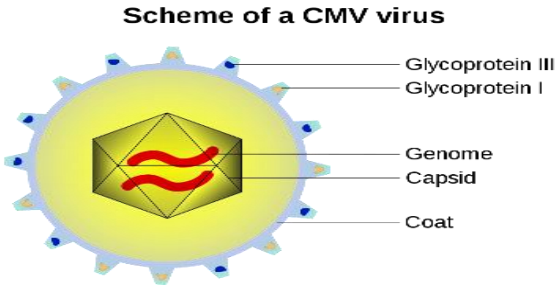

Figure 1: Cytomegalovirus structure (Viral Zone, 2015).

The region between the capsid and the envelope is filled with a substance consisting of phosphorylated proteins, the most important of which is phosphorylated protein 65 (pp65), which is one of the diagnostic proteins of this layer called the matrix (Bruchrer, 1998).

Immunoglobulins they are molecules composed of glycoproteins, consisting of heavy peptide chains (H) and light chains (L), and heavy and light peptide chains mean the molecular weight of the protein, which is globulin, and the light chains with a molecular weight of 25,000. It ranges between 50,000 and 70,000 daltons. (Levinson, 2016). Produced by plasma cells, and as a result of the immune response as they act as antibodies (Schroeder, 2010). The immunoglobulins were classified according to the amino acid sequence in the second region of the heavy chains into five types: IgM, IgG, IgD, IgE, and IgA (Abbas, 2018). IgG begins to form at the beginning of infection, and its concentration increases within a few weeks in the blood, so it contributes directly to the immune response and to the secondary immune response to antibodies (Schroeder, 2010). It is one of the most types of secondary response, and it constitutes an important defense factor against viruses and bacteria. As for IgM, the first immunoglobulin, it is synthesized in the fetus by B cells and induced by antigen. The normal serum of an adult human contains 70-200 mg/100 mL, which constitutes about 15-20% of the total antibody present (Najras, 2013). It is the main immune globulin produced early in the primary response (Levinson, 2016). It gradually decreases when IgG formation begins, and it is used to diagnose acute infections (Schroeder, 2010).

3. Materials and Methods

Experimental design and Blood sampling

Samples were collected from a general hospital in Baquba, with 80 samples (50) samples from people with diabetes and (30) samples from the control group by drawing venous blood into tubes that do not contain anticoagulants, then they were left at a temperature of (37°C) and centrifuged for five Minutes and at a rate of (3000 cycles/min) to obtain the blood serum, where the test was carried out using the rapid test strips for IgG, IgM antibodies, where the seropositivity of IgG means that the person had been infected with CMV virus earlier, while the seropositivity of IgM means that a person has recently contracted CMV.

The methods

1- All components and samples were placed at room temperature before testing

2- Take out the test kit and place it on a flat, dry surface

3- The blood serum sample was well added to the test stripes and left for about 30 seconds until the sample was completely absorbed using a micropipette and about 10 ml of serum was added.

4- We added 3 drops of the dilution solution to the sample well

5- Then the test started to work and notice the red color as it moves through the in the middle of the test device test stripes

6-We read the test results in 20-15 minutes.

4. Statistical Analysis

Statistical analysis was conducted using the statistical package (SPSS) program version (20) and the comparison between the totals was done using the t-test)) and the balance was done at the level of significant differences ($p \leq 0.01$, $p < 0.05$).

Table (1) Seropositive IgG and IgM for CMV in the two study groups					
Groups	IgM			IgG	
	Total number	NP	% Seropositivity	NP	% Seropositivity
Patients	50	16	32%	34	68%
Control group	30	0	0.00	3	10 %
P.value					0.0036 (<0.001)

The results of this study showed that the seropositivity of IgG and IgM was higher in patients with type 2 diabetes in the percentage (68%) and (32%) for IgG and IgM immunoglobulins, respectively, compared to the 10% control group. Chronic stress of the immune system is common with lifelong CMV infection, and they are activated intermittently or periodically (Soderberg-Naucler, 2006).

CMV may accelerate immune deterioration by stimulating the aggregation of differentiated T-cell CD4 and CD8+ cells and the production of pro-cytokines Furthermore, reports have revealed that pro-inflammatory cytokines have detrimental effects on pancreatic cells that may lead to an imperfect response to insulin resistance, resulting in the onset of diabetes, in addition to generating an additional pro-inflammatory environment (Simanek et al, 2011).

However, asymptomatic CMV infection is known to be a risk factor for the development of new-onset diabetes mellitus (PTDM) (Faraj et al, 2019).

CMV infection can lead to inflammation by inducing immune reactions and ultimately apoptosis of beta cells (Rabinovitch et al, 1998 and Hiemstra et al, 2001), indicating that HCMV can infect and damage B cells. Therefore, HCMV infection may be associated with T2DM by inducing and increasing apoptosis of B cells (Butler et al, 2003), however, the effect of human CMV infection on T2DM remains unclear and controversial (Roberts et al, 2005).

Seropositivity of IgG and IgM immunoglobulins for CMV for age in patients

The results of this study showed that the seropositivity of anti-IgG and IgM was higher among the older age groups (46-61) years, without a statistical difference of >0.05 P

Table (2) Seropositivity of IgG and IgM for CMV for age in the two study groups						
	IgG IgM					
Age (Years)	NT	NP	%	NT	NP	%
30-45	10	2	20%	10	6	60%
46-61	26	18	69.23%	26	8	30.76
62-77	14	11	78.57%	14	3	21.42
P. value	0.257 (>0.05)					0.178 (>0.05)

This means that the rate of CMV infection increases with age for people with D2M disease compared to younger ages due to various factors such as a marked decrease in immunity in elderly patients due to the presence of many chronic disorders that play a critical role in weakening the body's ability to fight the virus. Immunity suppression leads to reactivation HCMV. The high prevalence of CMV infection responsible for the immune disturbance and susceptibility to other infections may have been observed in diabetic patients (Kadhum *et al,* 2019).

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