

Association of Cytomegalovirus Infection with Hypertension in Iraqi Patients

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ABSTRACT

Hypertension associated viral infection is an important issue and requires a better treatment approach. This study was done to assess the association between cytomegalovirus (CMV) and hypertension in Iraqi individuals. The study involved 800 patients; their blood samples were subjected to Anti-CMV IgM and the blood pressure status was reported for each patient. The study showed that the 256 patients were positive to Anti-CMV IgM, 105 of them were combined with high blood pressure out of 800 patients. These results revealed that the infection with CMV may trigger increase in blood pressure which should be taken into consideration in treatment approach.

Keywords: Cytomegalovirus, infection, hypertension.

1. INTRODUCTION

Human cytomegalovirus (HCMV) is one of the member of herpes virus family. HCMV infection is ranked as one of the most common viral infections in adults. Once acquired, the infection persists lifelong. The infection has severe complication in HIV infected individuals and in organ-transplant recipients. The virus may cause hearing loss and vision also can cause mental retardation in infected children. Most cases of children suffer from serious disabilities are those of congenital CMV [1].

CMV infection is followed by latent infection which may be periodic reactivated [2]. CMV may transmit mostly from one to another via close and sexual activity [3,4]. The incidence of CMV infections has been investigated in small populations, like pregnant women. However, a study made in United Kingdom revealed that there are three seronegative women in 100 seroconvert in a year [4].

The infection CMV mainly associated with cardiovascular diseases [5]. Also other viruses may lead to increase of blood pressure, like herpes virus type 8 and 6 [6]. There is no clear explanation about the

mechanisms of how these viruses contribute to hypertension. In a study in mouse model with pulmonary hypertension the inflammation after the infection and the Th2 immune response can be the reasons of hypertension [7]. CMV has been found to infect the endothelial cells. theexistence of viral antigen in endothelial cells triggers the immune response mediated by secretion of chemokines [8]. Furthermore the infection may cause atherosclerosis. Other studies, found no association between CMV infection and atherosclerosis [9]. The role of CMV in atherosclerosis could be inducing vascular injury and result in hypertension inducing atherosclerosis. Therefore treatment should be targeting CMV or introducing vaccine to prevent the viral infection. CMV infection has an important role in cardiovascular and myocardial infarction which can lead to death [10].

Cytomegalovirus causes congenital infection. Infection could lead to severe persistent pulmonary hypertension (PPH). One 30-year-old woman case Chest X-Ray of her second infant showed alveolo-interstitial pneumonitis. Along with Antibiotic therapy, mechanical ventilation but hypoxemia developed

during 12 hours of life. The echocardiogram showed a normal heart structure and pulmonary hypertension was diagnosed. Although high-frequency ventilation, inhaled nitric oxide and inotropic support with surfactant the infant's situation was deteriorated. Also a woman of 33 years old, her second infant echocardiography showed a structurally normal heart and pulmonary hypertension [11].

One study showed that CMV-seropositive patients have endothelial dysfunction which can be conventional risk factor and also associated with the increase of atherosclerosis burden. There are evidences that chronic infection with specific organisms can be associated with atherosclerosis including herpes viruses. Studies in epidemiological atherosclerosis have suggested that there is interaction between human cytomegalovirus infection and atherosclerosis [12,13].

2. MATERIALS AND METHODS

Blood specimens were collected from 800 Iraqi patients in 2016. Serum samples were subjected to Anti-CMV IgM using TORCH kit, Once Step Rapid Test (Healgen). The procedure was done according to the kit instructions. The blood pressure status was reported for each patient.

3. RESULTS AND DISCUSSION

The study showed that 256 patients out of 800 were positive for Anti-CMV IgM, 105 of them were combined with high blood pressure. These results revealed that the infection with CMV may trigger the increase in blood pressure which should be taken into consideration in treatment approach.

Table 1: The results of Anti-CMV IgM and number of Infected Patients have hypertension.

	No. of seropositive	Percentage %	number of Infected Patients having hypertension	Percentage %
Total number of Patients with infection	256	31%	105	42%



CMV Positive: Two colored lines appear in the 'CMV' Section. One line is the control (C) and the other is the test (T).

In a study which was done *in vivo* and *in vitro* showed that CMV infection alone results in a significant elevation in blood pressure. Also molecular studies analyses showed that CMV infection can stimulate the cytokine expression, which can cause an increase in blood pressure [14,15].

CMV infection induces the expression of renin in human vascular endothelial and in mouse renal cells. Furthermore, it was found that the serum of CMV infected mouse has an increase in angiotensin II level which, subsequently led to an increase in blood pressure. For these reasons, CMV acts as a co-factor to induce atherosclerosis in the aorta. It was found that independent of the high cholesterol diet, Infection with CMV cause significant increase of blood pressure. The study revealed that CMV infection triggered a significant elevation in pro-inflammatory cytokine

expression in the blood and may participate in the blood pressure increase *in vivo*. [16, 17].

An investigation was done to assess the prospective epidemiological relation between exposure to some microorganisms like, *Chlamydia pneumoniae*, *Helicobacter pylori*, cytomegalovirus, and hepatitis A virus, and human cardiovascular disease on 3168 Canadian patients, showed that the exposure to CMV but not the other organisms was associated with an excess risk of myocardial infarction, stroke and cardiovascular death [18].

In a molecular study, in which clinical records and myocardial autopsy samples were collected from patients who had myocarditis as the cause of death in Finland between 1970 and 1998, findings of Polymerase chain reaction (PCR) and *in situ* hybridization method, were resulted in detection of

viral genomes cytomegalovirus and some viruses in heart samples. Viral nucleic acids were detected in the hearts of 17 patients (43%), cytomegalovirus was in 15 patients. The study suggested that cytomegalovirus is the most common reason for patients with fatal myocarditis [19]. Cytomegalovirus is a co-factor in atherogenesis and vascular occlusion. A vascular explant model investigates revealed that the CMV infection in human coronary artery, internal mammary artery and saphenous vein, can increase atherosclerotic blood vessels in contrast to atherosclerosis-free vascular equivalents [20].

4. CONCLUSION

The results revealed that there is an association between high blood pressure and CMV infection, which may guide the treatment approach of patients with hypertension.

5. REFERENCES

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