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Original Research

Haemodialysis Patients/Cytomegalovirus IgG Positive Infection in Babylon Governorate-Iraq

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Abstract

Cytomegalovirus (CMV) is common throughout the world. This virus belongs to the 2-strand linear DNA genome and capsid, which is enclosed by an envelope, is a part of the 2-herpes virinae subfamily of the Herpesviridae family. Renal failure in dialysis patients is associated with numerous causes, such as UTIs or systemic diseases, so patients are at higher risk of developing a CMV infection. The men had a higher infection rate compared to women, and CMV infection rose as an individual grew older. Examining whether there is a correlation between CMV IgG positivity and haemodialysis patients was the primary goal of this research. February 2025 to December 2025 was the time frame of this investigation. The participants included 110 patients aged between 15-75 years old who were receiving hemodialysis due to chronic kidney disease. There were 68 males and 42 females. The findings of this study revealed that compared to the control group, patients with infected CMV, those on haemodialysis without infection and those on haemodialysis with infection all had an increased serum IL-1β levels (17.00±0.41, 26.17±0.51 and 35.00±1.68 pg/ml respectively) compared to the control group (8.04±0.23 pg/ml). At the same time, IL-6 levels were higher than the control level (23.09±0.48 pg/ml) (41.71±1.90, 66.00±2.28 and 115.00±3.50 respectively). Although TNF-α was lower than control (8.09±0.24 pg/ml) at 12.98±0.34, 21.00±0.41, and 37.09±0.46, respectively.

Keywords: Cytomegalovirus, IgG Positive, Haemodialysis, Iraq

Introduction

Disturbances in kidney structure or function that last longer than three months and have an impact on a person's general health are the hallmarks of chronic kidney disease (CKD). The global outcome recommendations of kidney disease improvement states that a GFR below 60 mL/min/1.73 m2 signifies less kidney functions. End-stage renal disease (ESRD) or irreversible

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kidney activity is the most progressive type of chronic kidney disease (CKD), which is on the rise and prevails in 816% of the worldwide population. Hemodialysis (HD) is a kind of renal replacement therapy that is administered to patients with end-stage renal disease (ESRD) [1]. Cytomegalovirus (CMV) is a typical human virus. Almost all diseases can be spread from person to person by direct contact with sick people. It has been detected in numerous body fluids such as cervicovaginal secretions, blood, saliva, urine, sperm and breast milk. The human coronavirus (CMV) is a 120-200 nanometer diameter, dsDNA virus that belongs to the subfamily Beta-herpesvirinae of the herpesviridae family. The most widespread member of the human herpesvirus family, CMV, with a genome of 236 kbp and more than 80 viral proteins encoded by more than 200 open reading frames (ORFs). This category of proteins also includes other proteins that are involved in transcription and replication, glycoproteins as well as phosphoproteins [2, 3]. The viral virus has a wide range of cell types it can infect. Since everywhere we can find entrance receptors such as integrins and the epidermal growth factor receptor, we can observe much cellular tropism. They may also be a point of entry to CMV as they also occur in the pancreatic cells. The complicated natural history of a CMV infection can be generally divided into three types. A person's first case of disease after developing an immunity to the virus is called a primary infection. Once this has been done, the virus will then enter a dormant state, and in the future, it can be reactivated and infect once again [4-6]. Thirdly, re-infection occurs when an already-infected individual is in contact with another infectious individual and the already-infected individual is superinfected despite his or her natural immunity. Most individuals contract CMV at a tender age, but it hardly leads to any health complications. People with weakened immune systems are more vulnerable to CMV infections caused by blood transfusions. Latent or past infection of CMV may result in severe illness in individuals with weakened immune system or who have undergone a transplant. Once the infection is made, the virus may remain inactive and can hardly recur or have severe consequences unless the patient has an immune problem due to medication or illness. Cytomegalovirus, as well as many other human herpesviruses, may remain silent and become active under stress, immunosuppression or diseases. CMV can be latent in a wide range of cells, such as endothelial cells and macrophages. The majority of healthy adults become sick with minimal or no severe sickness as a result of CMV reactivation since T cell-specific immunity is very robust in making sure infection recurrence is inhibited. Besides the humoral immunity in the production of latent CMV, the T cell immunity is mediated by both the CD4+ and CD8+ T cells [7]. However, CMV can induce a variety of severe clinical manifestations, such as pneumonitis and colitis, in immunocompromised patients, including SOT or HSCT recipients. Most of CMV infections amongst patients who fail to receive CMV prophylaxis typically occur one to six months after SOT. Conversely, in case patients experience prophylaxis, the infection can occur in the post-treatment period, which is called late-onset CMV. Early onset CMV normally appears in the initial hundred days of HSCT in the population that has undergone the procedure. This timing also tends to change after 100 days following transplant to lead to late onset in CMV of those who receive preventive measures. The two main ways of curbing hepatitis C virus infections and diseases are preemptive treatment and universal prophylaxis. As part of universal prophylaxis, all SOT recipients are usually given an antiviral medication following transplant. Conclusions can be made on the basis of hospital- and patient-specific criteria and universal prophylactic therapy, as well as preemptive therapy have their virtues and drawbacks [8, 9]. Universal prophylaxis has a number of advantages, including a decrease in CMV infection and sickness, which may decrease the incidence of rejection and other illnesses. Moreover, a meta-analysis revealed that universal prophylaxis reduced mortality, bacterial and fungal and other infectious diseases infections. Tissue-invasive

CMV illness most often occurs in the liver and lungs, but can involve any organ. Histopathology is the diagnostic gold standard when it comes to diagnosing CMV infection in end organs. Thus, despite DNAemia, histopathology samples are to be taken in case of a strong suspicion of CMV illness.

Materials and Methods

Study design

One hundred and ten hemodialysis patients between fifteen and seventy-five years of age took part in the study. The normal healthy control group which was matched with the sick.

Place of research and time spent

The study was carried out in the Public Health Center-Hilla Teaching Hospital in Babylon, Iraq. Starting in February 2025 and ending in December 2025. Materials and procedures used in research. The quantity of blood used was 5 mL. The blood sample was then allowed to clot and then 15 minutes of centrifuging in an automated pipette with a centrifuge was performed to separate the serum and the packed red blood cells. Serological testing of the serum was done using the sterile Eppendorf containers and keeping the serum in -80 C.

Immune Sorbent Linked to Enzymes Analyses

The levels of virus-specific CMV IgG antibodies of all serum samples were also tested using enzyme-linked immunosorbent assays (ELISAs), which were measured at 450 nm as directed by the manufacturer. This was followed by 50 liters of stop solution being added to each of the wells and the optical density at 450 nanometers was then detected using an ELISA reader. Then the results were determined by plotting the standard curve. A test of (TNF- alpha, IL- 6 and IL- 1 Beta) was conducted using the enzyme-linked immunosorbent assay (ELISA) kits as per the instructions of the manufacturer. The ELISA reader was used to determine the optical densities of the sample at 450 nm in three separate experiments. The end result was taken to be the products that fulfilled the requirements laid down by the manufacturer.

Statistical analysis of data.

Statistical analysis was conducted using the SPSS software, version 20 that was created by IBM in New York, USA. To describe the population in the study, standard deviations (SDs) and means were calculated. We searched on the t-test of a student to find statistical significance of the groups. The p-value of below 0.01 was considered statistically significant.

Results and Discussion

The symptoms and infection by cytomegalovirus are collectively referred to as cytomegalovirus illness. Besides end-organ disease, the symptoms can also be caused by viral symptoms such as fever and generalized malaise. The seropositivity of cytomegalovirus (CMV) in adults is extremely high. Although CMV usually doesn't do much harm in healthy adults, it can inflict serious disease or death in people with impaired immune systems [10]. Moreover, the neonates with congenital CMV may experience morbidity, including brain damage and hearing impairment. The immunocompromised critically sick population too has quite a good incidence of this infection. Age, race, socioeconomic status, and level of education are all factors that affect the seroprevalence of coronavirus. The serum levels of IL-1β were significantly higher in patients with infected CMV (17.00±0.41, 26.17±0.51 and 35.00±1.68 pg/ml respectively) compared to the control group (8.04±0.23 pg/ml) in the current study (Figure 2). At the same time, the IL-6 was significantly different (Figure 3 41.71±1.90, 66.00±2.28 and 115.00±3.50 pg/ml, respectively) compared to the control group. Figure 4 shows that TNF-α levels were higher than the control level (8.09±0.24 pg/ml) at 12.98±0.34, 21.00±0.41, and 37.09±0.46 pg/ml, respectively.

Table 1. Clinical characteristics of the hemodialysis patients according to age and gender.

Age Groups (Years)	Male	%	Female	%	Total	%
15-25	8	7.27	5	4.55	13	11.82
26-35	10	9.09	9	8.18	19	17.27
36-45	5	4.54	2	1.82	7	6.36
46-55	11	10.00	6	5.45	17	15.45
56-65	19	17.27	9	8.18	28	25.45
66-75	15	13.64	11	10	26	23.64
Total	68	61.82	42	38.18	110	100

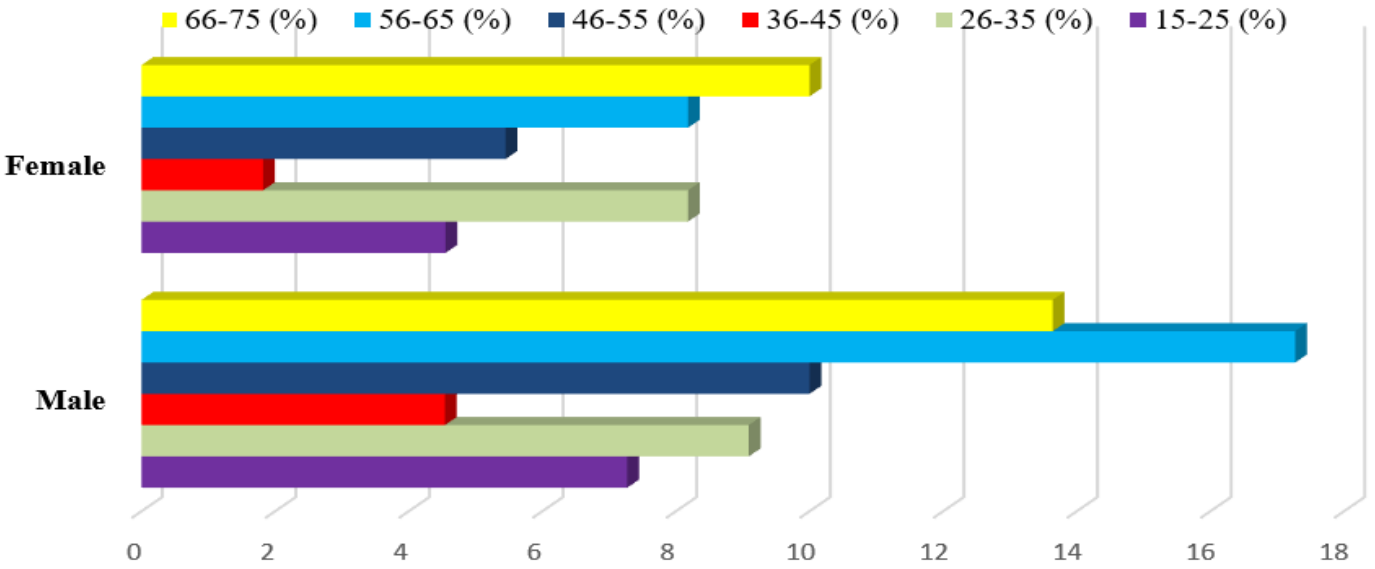

Figure 1. Clinical characteristics of the hemodialysis patients in this study according to age and gender

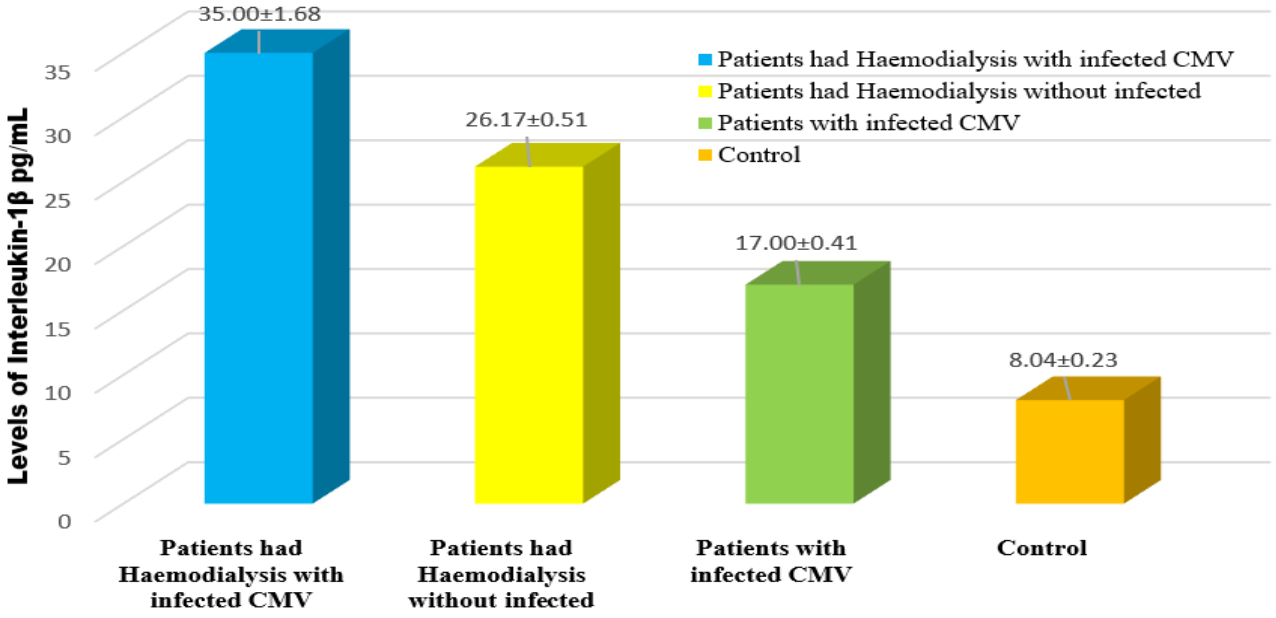

Figure 2. Levels of Interleukin-1β pg/mL in serum of patients with infected CMV, patients had Haemodialysis without infected CMV and serum of patients had Haemodialysis with infected CMV compared with control group

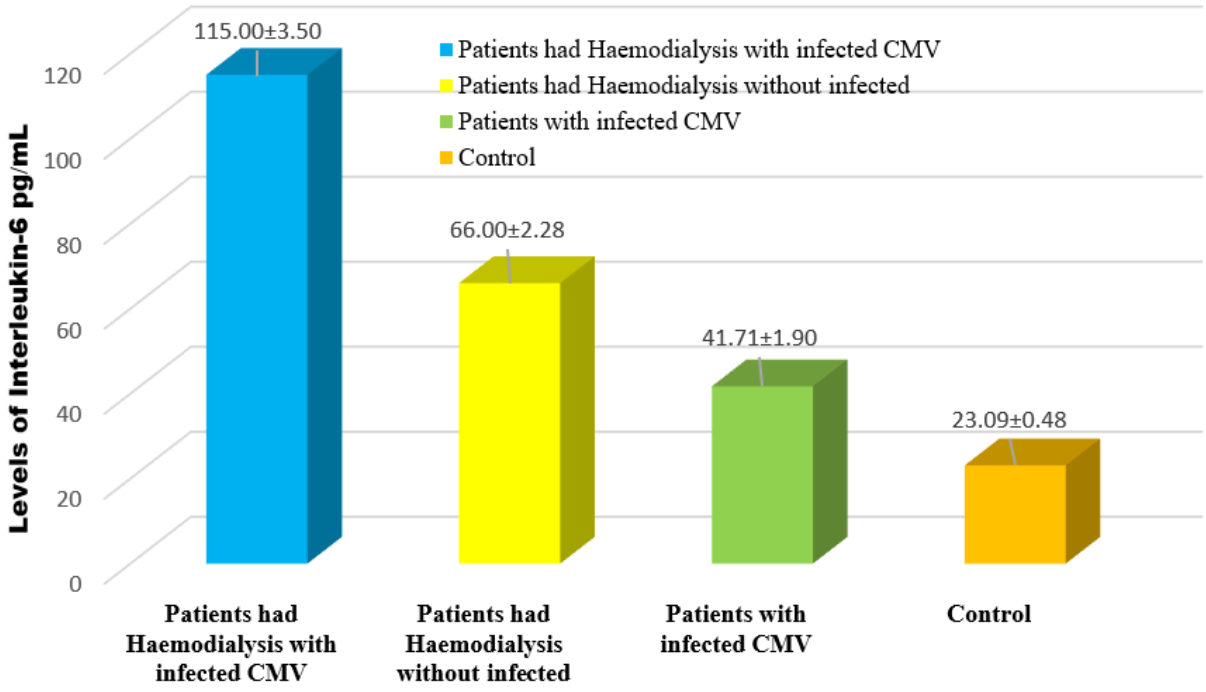

Figure 3. Levels of Interleukin-6 pg/mL in serum of patients with infected CMV, patients had Haemodialysis without infected CMV and serum of patients had Haemodialysis with infected CMV compared with control group

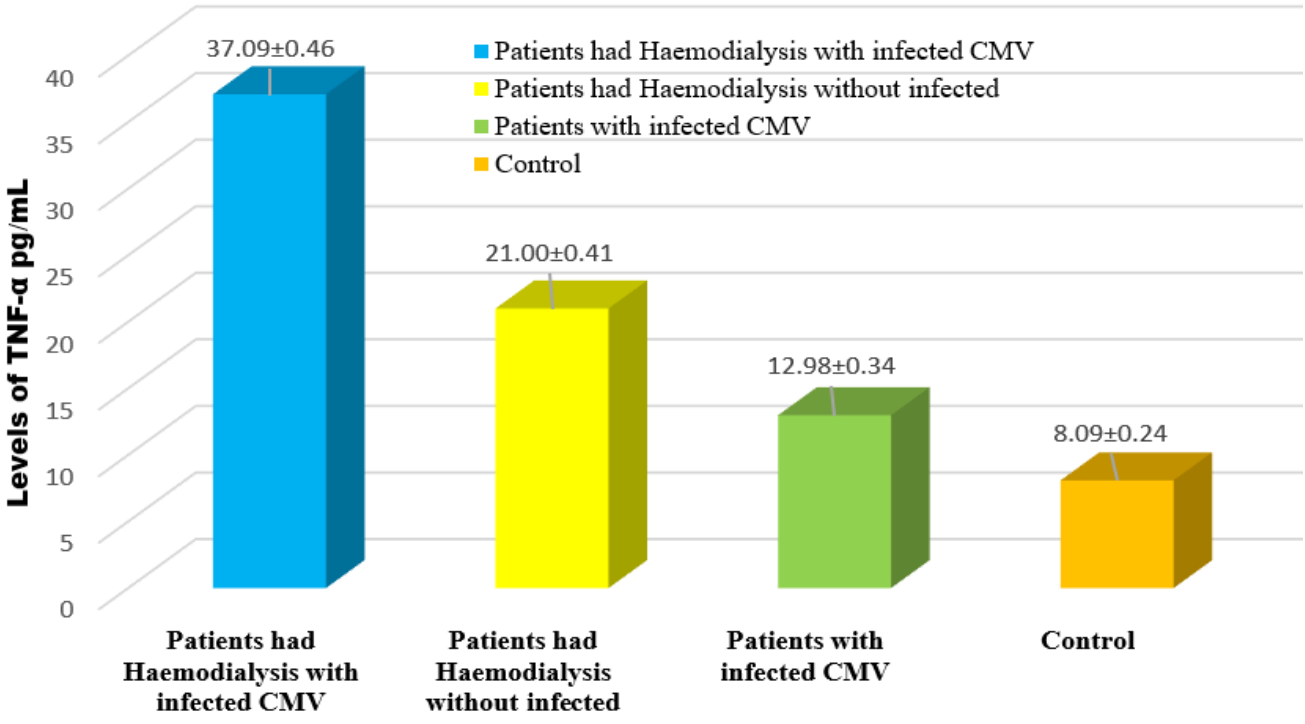

Figure 4. Levels of TNF-α pg/mL in serum of patients with infected CMV, patients had Haemodialysis without infected CMV and serum of patients had Haemodialysis with infected CMV compared with control group

CMV may be contracted by people. CMV infection of the mumps is a chronic infection that poses a health risk to humans throughout the year. Superinfection, reactivation, and original infection are the three stages of cytomegalovirus infection. Although kidney transplant recipients have 20% of CMV infections developing into silent illness, 60 percent of the infections are active infections.

Patients with renal failure have to undergo haemodialysis in order to survive. Nevertheless, there is a chance of contracting CMV by blood transfer during this treatment. The high viral seroprevalence of patients with haemodialysis or renal failure is due to the fact that they usually require transfusions of blood. A number of studies have demonstrated that the immune system of hemodialysis patients is impaired and this predisposes them to infections by viruses and other microorganisms including CMV [11, 12]. Primary CMV infection, reactivation of latent CMV, or reinfection with exogenous virus, which can be brought on by recurrent blood transfusions or kidney transplants, are the most common causes of infections in hemodialysis patients. One study found the seroprevalence of cytomegalovirus infection to be 49.5 in France and 45.6 in the Netherlands.20% in the German market. The potential reasons behind this fluctuation are differences in CMV assay methodologies, environmental influences, immunity of patients, health issues of the population, physical location, and endemicity of the virus. This could be due to the fact that the immune system of older people is not so robust or the response to an infection is not so efficient due to the lack of naïve T cells and lymphocytes. Coronavirus infection is more likely to occur in these elderly people. Age is strongly correlated with reactivation of infections; this is more so in patients who have gone through haemodialysis due to multiple blood transfusions; it is believed that such individuals might have a T cell malfunction due to an intrinsic T cell abnormality. Contrary to these findings, in his study, Hanif found that seroprevalence did not depend on age or sex. This was caused by a high risk of CMV infection associated with patients undergoing therapeutic medicines by some writers. When CMV-IgM antibodies are detected, it usually means that a primary, recent, or active CMV infection is taking place. Our results demonstrate that the virus's seroprevalence increases with age, which is in line with earlier studies [13–15]. This could be attributed to the fact that naive T cell and lymphocyte are less in the aged, which may be a sign of a weakened immune system or a failure to respond to the infection. The highest incidence of CMV is observed in 50-59-year-olds (30.5% of cases) due to the fact that chronic mumps and rubella infections induce the development of CMV-specific T-cells, which reduce immunity against other infections and accelerate the immune response in the elderly. The results of this study with regard to sex in terms of seropositivity were consistent with those of an Iraqi study which identified a distribution of CMV in 57% males and 42% females among patients undergoing hemodialysis. Both the present research and the previous one had established that CMV was greater among older guys than females. It is common knowledge that in response to an illness, the immune system of a woman can respond with more antibodies and with less inflammation than that of a man. Estrogens and androgens hormones in females and males respectively are likely to be the cause of the gender differences in CMV. To make a definitive diagnosis of pneumonia, isolation of CMV in lung tissue and clinical manifestation of pneumonia, including hypoxia and tachypnea on chest radiographs, are essential. Symptoms of clinical pneumonia and the isolation of CMV in the bronchoalveolar lavage fluid suggest the likely occurrence of CMV pneumonia. The shedding of cytomegalovirus (CMV) may make CMV be found in lungs but this does not automatically imply that it is a cause of clinical disease and therefore clinical signs and symptoms should be taken into account in the diagnosis of CMV pneumonia. The gastrointestinal tracts both upper (esophageal) and lower (colon) are susceptible to cytomegalovirus infection. Some of the symptoms that may manifest include nausea, vomiting and diarrhea. In the case of gastrointestinal tissue CMV presence with symptoms but without mucosal lesion observed, suspected CMV GI illness can be diagnosed. An established category for likely disease in cytomegalovirus hepatitis has not been determined. The diagnosis of proven CMV hepatitis is by abnormal liver functional tests and by CMV within the hepatic tissue. Clinicians should exclude other causes of hepatitis. The

diagnosis of proven CMV retinitis requires the results of ophthalmologic examination compatible with symptoms of CMV retinitis [16]. Moreover, in case such examination is not possible, CMV retinitis may be verified by identifying CMV in vitreous fluid of an eye through QNAT. Infection by cytomegalovirus encephalitis or ventriculitis has to be proven by central nervous system symptoms and the detection of CMV in tissues of the central nervous system. Conversely, a deviant CNS imaging/EEG besides CNS symptoms would signify likely illness. The diagnostic criteria of proven CMV nephritis is the presence of CMV in kidney tissue specimens and renal impairment. Renal tissue sample is typically sampled in allograf kidney biopsy specimens [17]. A bladder biopsy sample should also be collected to make a diagnosis of CMV cystitis. To be sure of a diagnosis of cytomegalovirus myocarditis, a cardiac biopsy specimen has to be studied.

Conclusion

CMV has a higher rate of infection among males as compared to women and it is more common among the elderly. In the present study, the seroprevalence of CMV infection was found to be high in the patients of haemodialysis in Babylon City. Among the causes of the increased seroprevalence are the endemicity of the virus, the issues of public health, and immunity of the patient. The rate of infections among men was higher than that among women, and the rate of CMV infection with age. Hemodialysis patients are at higher risk of CMV infection because there is higher seroprevalence rate of CMV-IgG antibodies than the CMVIgM antibodies indicating the virus was previously infected or reactivated.

References

1. Breesam AA, Nooruldeen MY. Evaluation of the immunochromatography assay's diagnostic performance for quickly detecting the presence of COVID-19 antigen in patients with positive PCR results. NTU J Pure Sci 2022; 1:35-43.
2. Zhang J, Kamoi K, Zong Y, Yang M, Ohno-Matsui K. Cytomegalovirus anterior uveitis: Clinical manifestations, diagnosis, treatment, and immunological mechanisms. Viruses 2023; 15:185.
3. Jalil MB, Al Atbee MY. Seroprevalence of cytomegalovirus in haemodialysis patients. J Pure Appl Microbiol 2022;16: 851-7.
4. Mahmood NS, Al-Ghazal AT. Prevalence of cytomegalovirus and its roles in cytokines stimulation in immunocompromised patients in Mosul City, Iraq. Rafidain J Sci 2020; 29:17-27.
5. Salman AD, Alsaadi LA, ALazi IH. Seroprevalence of human cytomegalovirus among hemodialysis patients in Diayala province. Int J Curr Microbiol Appl Sci 2014; 3:160-5.
6. Tofiq WA, Saadoon IH, Hadi AM. Detection of cytomegalovirus in patients with end stage renal disease in Kirkuk City. Biochem Cell Arch 2019; 19:4441-3.
7. Sepehrvand N, Khameneh ZR, Eslamloo HRF. Survey the seroprevalence of CMV among hemodialysis patients in Urmia, Iran. Saudi J Kidney Dis Transpl. 2010; 21(2):363-367.
8. Brooks GF, Carrol KC, Butel JS, Morse SA, Mietziner TA. Virology, Herpes viruses. In: Jawetz, Melnick and Adelbergs Medical Microbiology. USA: McGraw Hill Companies Inc. International Edition.2010: 433-455.
9. Ramanan P, Razonable RR. Cytomegalovirus infections in solid organ transplantation: a review. Infect Chemother. 2013; 45: 260–271.
10. Shen CY, Ho MS, Chang SF, Yen MS, Ng HT, Huang ES, Wu CW. High rate of concurrent genital infections with human cytomegalovirus and human papillomaviruses in cervical cancer patients. J Infect Dis. 1993; 168:449–452.
11. Cobbs CS, Harkins L, Samanta M, Gillespie GY, Bharara S, King PH, Nabors LB, Cobbs CG, Britt WJ. Human

cytomegalovirus infection and expression in human malignant glioma. Cancer Res. 2002; 62:3347–3350.

12. Krajicek, E.; Shivashankar, R.; Hansel, S. Cytomegalovirus and the Seemingly Immunocompetent Host: A Case of a Perforating Gastric Ulcer. ACG Case Rep. J. 2017; 4: e27.

13. Vilibic-Cavlek T, Kolaric B, Ljubin-Sternak S, Kos M, Kaic B, Mlinaric-Galinovic G. Prevalence and dynamics of cytomegalovirus infection among patients undergoing chronic hemodialysis. Indian J Nephrol. 2015; 25(2):95- 98.

14. Malaponte G, Bevelacqua V, Fatuzzo P, et al. IL1beta, TNF-alpha and IL-6 release from monocytes in haemodialysis patients in relation to dialytic age. Nephrol Dial Transplant. 2002; 17(11):1964-1970.

15. Van Riemsdijk IC, Baan CC, Loonen EHM, Zietse R, Weimar W. Patients on chronic hemodialysis have no intrinsic lymphocyte defect upon stimulation with interleukin-2, interleukin-15 or tumor necrosis factor-alpha. Blood Purif. 2003; 21(2):158-162.

16. Ricci Z, Ronco C. New insights in acute kidney failure in the critically ill. Swiss Med Wkly. 2012; 142:w13662.

17. Ross SA, Novak Z, Pati S, Boppana SB. Overview of the diagnosis of cytomegalovirus infection. Infect Disord Drug Targets. 2011;11(5):466-474.