

# The Prevalence of *Cytomegalovirus*, Hepatitis B, Hepatitis C, and HIV Infections among Hemophilic Patients in Sanandaj in 2017

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## Abstract

**Background and Objective:** As *Cytomegalovirus* (CMV) has been distributed widely and great number of people are affected by it, such as hemophilic patients, and given the prevalence and complications of CMV, hepatitis B, hepatitis C, and HIV and lack of study in Kurdistan province in this regard, this study was conducted to evaluate the prevalence of CMV infection and other viruses among the hemophilic patients. This study can be used to reduce and solve the problem of hemophilic patients and health system plans. The objective of this study was to evaluate the prevalence of mentioned infections among hemophilic patients in Besat Hospital in Sanandaj in 2017. **Materials and Methods:** This is a descriptive study in which its population included all 121 hemophilic patients, diagnosed in Besat Hospital of Kurdistan province. They were examined in terms of infection of four viruses, including hepatitis C, hepatitis B, CMV, and HIV. It should be noted that the definition of infection was based on global criteria. **Results:** Of 121 patients, 95 cases were tested for hepatitis C, which 22 of them (23.1%) were positive in terms of HCV-Ab, and 13 people (13.6%) were suspected. In addition, 88 of them were tested for CMV, which 70 of them (79.5%) were positive in terms of CMV-Ab. In terms of HIV and HBV, all tested patients were seronegative. Among these patients, 48 patients had severe hemophilia, who recurrently received coagulation factor. Among them, 14 people (29.1%) were seronegative in terms of HCV-Ab, and 43 people (89.5%) were seronegative in terms of CMV-Ab. In addition, nine of them (18.7%) were suspected in terms of HCV-Ab. **Conclusion:** The recent study showed that the prevalence of hepatitis C among hemophilic patients is higher than that in other people of the community. In addition, among hemophilic patients, the prevalence of hepatitis C is higher in patients who received coagulation factor recurrently than that in other patients. The prevalence of CMV is also more in patients receiving factor recurrently than that in rest of the patients. Therefore, patients receiving blood and blood products should be periodically evaluated for virology.

**Key words:** *Cytomegalovirus*, hemophilia, hepatitis B, hepatitis C, HIV

## INTRODUCTION

owing to impaired coagulation factors (depending on the level of factors in the blood), hemophilic patients should receive blood product exogenously to maintain their homeostasis. Hemophilia is a chromosome X-dependent disorder, making the person prone to bleeding due

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to coagulation factor 8 or factor 9 deficiencies. Type A hemophilia prevalence is 1 per 10,000 people, and type B hemophilia prevalence is 1 per 60,000 people. Almost 80% of hemophilic patients suffer from type A hemophilia. This disease is mainly seen in males and females are generally asymptomatic. Clinically, hemophilia A and B are not distinguishable, and the severity and phenotype of the disease are influenced by the level of remaining factors 8 and 9. Patients need to receive the required factors during their lifetime based on the severity of the disease and the level of factors.<sup>[1,2]</sup> Hemophilia patients are exposed to the blood of thousands of donors and are prone to blood-borne diseases during their lives due to the frequent need to receive the blood products. Blood-borne diseases are the leading cause of mortality in hemophilic patients. Approximately 7–10% of hemophilic patients have a severe disease, that is, their coagulation factor is <1% (1 and 3). Therefore, there is always a concern that the patient to be infected with blood-borne infections. As these infections, which the most important of them is viral infections, are followed by bad consequences and increase morbidity and mortality in patients<sup>[3,4]</sup> and preventing the transmission of these viruses is vital. Hence, medical science is always looking for a solution for this problem.<sup>[5]</sup>

The risk of transmission of hepatitis and human retroviruses, such as HIV, has been reduced through screening of antibodies before transfusion. However, *Cytomegalovirus* (CMV) can be transmitted through blood transfusion<sup>[6-8]</sup> due to the lack of routine screening of all blood donors. The CMV is a member of the herpesviruses family and betaherpesvirus subfamily, causing various syndromes in children and adults. It is also the most common cause of congenital and neonatal viral infections in the world. The prevalence of this infection in human communities varies from 40% to 99%. Recent studies on neonatal CMV infection followed by transfusion have proved that donors with antibody are the source of CMV infection after transfusion in recipient patients without antibodies against the CMV.<sup>[9]</sup> Das *et al.* published an article entitled “CMV prevalence in blood donors and recipients.” In this prospective study, 2100 blood donors and 200 blood recipients were studied, and serum level of the patients was examined in terms of antibodies against CMV using ELISA method. Based on the results obtained from 2100 blood donors, 98.6% of the people had IgG, and only one person had IgM. Among 200 blood recipients, 100% of the people had IgG, and only one person had IgM.<sup>[10]</sup>

In this regard, other studies conducted in different countries on the prevalence of these infections among people who received blood or blood products for any cause showed different results.<sup>[6,11,12]</sup> A part of these differences is due to the social and cultural conditions, lifestyle and literacy level of people, and the prevalence of these infections in the target community, so the results of a single study cannot be generalized to all communities. Based on what was stated, the prevalence of the mentioned infections needs to be examined at the national and even at the smaller scale of the province level. Given that what was stated, conducting research in this regard seems to be an essential, since based on the role of early prevention in modern medicine, it is necessary to identify all risk factors of various diseases to prevent the disease and its complications. This study examined the prevalence of hepatitis B, hepatitis C, and HIV and CMV viral infections among the hemophilic patients in the Sanandaj in 2017. As an epidemiological study, its results can be used for health promotion planning and as a base for future studies.

## METHODOLOGY

### The study type

This research was a descriptive, cross-sectional study.

### Population of the study

All hemophilic patients admitted to Sanandaj Besat Hospital in 2017, whose files were reviewed by written consent of the patients or first-degree relatives of the patients and according to the Ethical Code of Kermanshah Medical Science University. Personal information and the name of patients remained confidential. Patients with intravenous drug users (IDU), patients with high-risk sexual behaviors, diseases cases transmitted from mother to embryo, and suspicious needling were excluded from the study.

### Data collection

In this study, 121 hemophilic patients who had a medical file in Besat Hospital of Sanandaj and had no exclusion criteria were selected and examined. To obtain information required for this study, a checklist was prepared. It included general information and virology of hemophilic patients. In this study, the results of the

individual tests conducted within the last 6 months were recorded, and these tests were performed for those test date was older than 6 months. Serologic tests were performed using the ELISA method and diagnostic kits (eBioscience Inc, United States).

### Data analysis

This study data entered into the STATA-11 software. Quantitative descriptive goals were calculated by calculating the mean and standard deviations and, if needed, other quantitative indicators such as the mode and median. Qualitative descriptive goals were calculated by calculating the ratios along with the confidence interval.

## RESULTS

### Demographic characteristics

In our study, 121 patients with coagulation disorder, which majority of them were hemophilic patients, were evaluated. Their demographic characteristics are presented in Table 1a. The place of birth and living place of the studied patients are also presented in Table 1b.

### Family history

Family history information of coagulation disorders was reported in medical files of 113 patients. In this regard, 58 (51.3%) patients had no family history of coagulation disorders. About 25 (22.2%) patients had at least one brother affected this disorder, and 10 (8.8%) patients had at least one sister affected this disorder. Five (4.5%) patients had mother with this disorder, and one patient had father with coagulation disorder. The results of the family history of patients in terms of coagulation disorders are presented in Table 2.

### Frequency of blood groups

The frequency of different types of blood groups of patients was also examined, and the results of this examination are shown in Table 3.

### Frequency of coagulation disorders

With regard to the frequency of coagulation disorders in patients, the investigations revealed that among the

patients, hemophilia A with 67 people (55.3%) ranked first in terms of prevalence and it accounts for 85.9% of the total hemophilia cases. The results of this study are presented in Table 4.

**Table 1a:** Frequency of gender in patients studied

Variable (gender)	n (%)	Confidence interval	Mean of age (SD)
Male	85 (70.2)	(61.9–78.2)	24.9 (14.8)
Female	36 (29.8)	(21.4–38)	27.4 (13.3)
Total	121 (100)		

**Table 1b:** Living place of the participants

Variable	n (%)	Confidence interval
City	103 (88.6)	(81.4–95.7)
Village	18 (11.4)	(4.2–18.5)
Total	121 (100)	

**Table 2:** Family history of patients in terms of coagulation disorders

Positive family history	n (%)	Confidence interval
No	58 (51.3)	(43.1–59.5)
Father	1 (0.8)	(–0.2–4.2)
Mother	5 (4.5)	(0.8–11.8)
Brother	25 (22.2)	(12.4–32.1)
Sister	10 (8.8)	(3.7–14.1)
Others (uncle ...)	14 (12.4)	(4.4–17.6)
Total	113 (100)	

**Table 3:** Frequency of blood group types among hemophilic patients studied

Blood group type	n (%)	Confidence interval
A+	30 (24.7)	(13.4–31.5)
B+	17 (13.9)	(6–21.7)
O+	55 (45.5)	(34–56.7)
AB+	7 (5.7)	(1.7–8)
Other	12 (10.2)	(4.3–15.4)
Total	121 (100)	

## Virologic findings

Out of a total of 121 patients, whose medical files were records at Besat Hospital in Sanandaj, 90–95 of them participated in the study to perform the test. The patients, who did not admit to this center, were mostly those patients whose medical files could not be examined or those who had not received factor. Finally, the virology tests were taken from the patients, and following results were obtained.

### Prevalence of Hepatitis B (HBs-Ag)

Out of 95 HBs-Ag patients underwent HBs-Ag test, no patient had positive HBs-Ag.

### Status of HBs-Ab

Out of the 92 patients underwent HBs-Ab, 65 (70.6%) patients were positive, and 27 (29.3%) were negative [Table 5].

### Prevalence of hepatitis C (HCV-Ab)

With regard to HCV-Abs, out of 95 patients tested, 22 (23.1%) people were positive, and 60 (63.1%)

**Table 4:** Frequency of types of hemophilia among patients studied

Coagulation disorder	n (%)	Confidence interval
A	67 (55.3)	(43.2–69.9)
B	11 (9)	(6.2–17.8)
7a	11 (9)	(6.2–17.8)
VWF	15 (12.4)	(4.6–18.9)
Others	17 (14)	(6.8–21.8)

**Table 5:** Immunity status against hepatitis B (HBs-Ab) among patients studied

Variable	Prevalence	
	n (%)	Confidence interval
Positive	65 (70.6)	(62.3–77.1)
Negative	27 (29.3)	(21.9–37.5)
All people tested	92 (100)	-
Unknown (without test)	29 (24 out of patients)	(13.2–31)

patients were negative, and 13 (13.6%) people had suspected result [Table 6].

### Prevalence of HIV-AIDS

In the case of HIV-Ab, all of 93 tested patients were negative.

### Prevalence of CMV

In terms of CMV-Ab, out of 88 patients tested, 70 (79.5%) were positive and 18 (20.5%) were negative [Table 7].

### Virology tests in patients with severe hemophilia

Due to the non-admitting to the center by a number of patients for performing virology tests, a number of tests did not complete. Hence, we decided to prepare a table

**Table 6:** The prevalence of hepatitis C among patients studied

Variable	Prevalence	
	n (%)	Confidence interval
Positive	22 (23.1)	15.9–31.6
Negative	60 (63.1)	54.2–71.8
Suspected	13 (13.6)	4.2–22.4
All people tested	95 (100)	-
Unknown (without test)	26 (21.4 out of patients)	11.8–25.9

**Table 7:** The prevalence of CMV among patients studied

Variable	Prevalence	
	n (%)	Confidence interval
Positive	70 (79.5)	71.7–95
Negative	18 (20.5)	12.3–28.8
All people tested	88 (100)	-
Unknown	33 (37.5 out of patients)	30.1–42.3

CMV: *Cytomegalovirus*

using the information of those patients who admitted to the center to receive the factor as well as those who received the factor with other coagulation disorders patterns for more precise examination of the virology status of the patients.

This group of patients is, in fact, the group who had severe coagulation disorders. Their approximate number was 55 in the province of Kurdistan. Based on the medical files of them in Besat Hospital in Sanandaj, 50 people were available at first, which after contacting and following up them, 48 of them were tested for virology and their results are presented below.

### Frequency and prevalence of hepatitis B

Out of 48 patients, no patient had hepatitis B.

**Table 8:** Status of HBS-Ab among severe hemophilic patients

HBS-Ab	n (%)	Confidence interval
Positive	34 (70.8)	62.4–81
Negative	14 (29.1)	22.3–38.5
Total	48 (100)	-

**Table 9:** Frequency and prevalence of hepatitis C among severe hemophilic patients

HCV-Ab	n (%)	Confidence interval
Positive	14 (29.1)	22.8–35.5
Negative	25 (52)	44.4–60.1
Suspected	9 (18.7)	10.3–23.2
Total	48 (100)	-

**Table 10:** Frequency and prevalence of CMV-Ab among severe hemophilic patients

CMV-Ab	n (%)	Confidence interval
Positive	43 (89.5)	83.5–97.2
Negative	5 (10.4)	2.9–17.2
Total	48 (100)	-

CMV: Cytomegalovirus

### Status of HBs-Ab

Out of 48 patients, 14 (70.8%) patients do not have adequate immunity against hepatitis B [Table 8].

### Frequency and prevalence of hepatitis C

About 14 patients (29.1%) are seropositive in terms of hepatitis C, indicating a high prevalence of hepatitis C among patients with severe hemophilia. Moreover, 9 (18.7%) of patients had suspected serology [Table 9].

### Frequency and prevalence of HIV

No patient was seropositive in terms of HIV-Ab.

### Frequency and prevalence of CMV-Ab

About 43 (89.5%) patients have positive CMV-Ab, indicating that the prevalence of CMV infection is more among these patients than that in other patients [Table 10].

## DISCUSSION AND CONCLUSION

This research was a descriptive study in which 121 patients with coagulation disorders in Kurdistan province, which most of them were hemophilic, were examined in terms of infection with several viruses. It was found that 23.1% of total patients and 29.1% of patients with the factor level <1% had positive HCV-Ab. With regard to CMV antibody, these values were 79.5% and 89.5%, respectively. HBs-Ab was also positive in 70.6% and 70.8% of patients in both groups, respectively. In addition, no patient was positive in terms of HBs-Ag and HIV-Ab. Blood and blood products, long-term chronic hemodialysis, and IDU have been reported as important risk factors for the transmission of many infectious diseases in hemodialysis and hemophilia patients.<sup>[13]</sup> Moreover, viral hepatitis in developing countries is considered as a problem in hemophilic patients.<sup>[14]</sup> The clinical importance of the infection with hepatitis B and C and HIV in humans is well known; however, the clinical importance of the infection with the CMV virus and its association with acute or chronic hepatitis and liver enzymes have not yet been well studied.

One of the epidemiological issues discussed in this regard is the question of whether blood donors should be screened for viruses, which have been discovered

in human blood but have not been yet recognized as the cause of the disease. To answer this question, many factors are involved, including knowing the prevalence of the virus in blood donors and recipients of that community, the probability of the virus transmission by blood transfusion, the virus's role in the development of acute and chronic hepatitis, and the ability to produce long-term viremia. This requires examining the prevalence of the above-mentioned viruses among blood recipients and donors at first step and then comparing them with other people in the community especially the donors of these products. Thus, the results of this study can be helpful in achieving the final answer for the asked questions by gaining a better understanding of the prevalence of these viruses among high-risk individuals. In a study conducted by Rabkin *et al.* in 1993 on more than 390 hemophilic patients, it was found that 49% of the patients had IgG antibodies for CMV in their serum (1983). They were older than the rest of the participants. In addition, it was revealed that people with seropositive CMV are more suspected to AIDS compared to other people. Older people were suspected to liver cancer according to the latest serum samples. The results of this study indicated that to prevent more deaths among hemophilic patients with HIV viral infection and seronegative CMV, these patients should not be exposed to blood products or liquids of the body of donors with seropositive CMV.<sup>[15]</sup>

In another study conducted by Jacson *et al.* in 1988, the prevalence of antibody against CMV was examined in the serum of non-homosexual hemophilic patients and homosexual hemophilic male patients with HIV-1. The results showed that 57% of hemophilic patients with HIV-1 had positive antibody. In addition, 65% of hemophilic patients with HIV-1 infection had symptomatic-HIV-1 and CMV-positive antibody.<sup>[16]</sup> However, in our study, 79.5% of patients were seropositive, and among patients who received factor recurrently, 89.5% ( $n = 43$ ) were seropositive. Based on the current research, the prevalence of hepatitis C and CMV in a group of patients received factor recurrently is higher than that in total number of patients. Moreover, the prevalence of hepatitis C among hemophilic patients is higher than that in other people of the community. If confirmed by other studies, appropriate and practical plans should be developed in this regard to reduce its transfusion rate and to treat patients. The prevalence of anti-CMV antibody in this study (most parts of Iran and worldwide) shows high level, so complementary studies and planning are required for patients and those people who are at risk

for this virus. In addition, the prevalence of hepatitis B and HIV in patients of our study was zero, indicating the proper screening of blood and blood products.

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