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Abstract

Background/Aim. Hepatitis C virus (HCV) infection is an important sociomedical problem worldwide because the chronification of the disease is frequent and the occurrence of liver cirrhosis and hepatocellular carcinoma can be expected. The aim of this study was to determine the way of infection, pathohistological changes of the liver, virus genotype presence and sustained virological response after pegylated interferon and ribavirin therapy in prison inmates. Methods. The study included 52 patients with chronic HCV infection classified in two groups managed during 2008–2010. The first group consisted of prisoners (n = 22) and the second one of “non-prisoners” (n = 30). The patients from both groups underwent diagnostic preparation (biochemical analyses, liver biopsy, hepatitis virus detection and genotyping using polymerase chain reaction issue). The treatment lasted for 24 weeks for virus genotypes 2 and 3, and 48 weeks for genotypes 1 and 4. Results. All the patients were males, approximately the same age (35 ± 4.1 and 31 ± 7.6 years). Virus genotype 1 was significantly more frequent in the prisoners (p < 0.05), that demanded longer treatment (48 weeks). At the same time, statistically significant higher number of patients, “non-prisoners”, achieved a statistically significant higher number of patients, “non-prisoners”, achieved a sustained virological response (p < 0.01). Conclusion. Intravenous drug abuse and tattoos, separately or together, are the most frequent way of infection in prisoners. The dominant presence of virus genotype 1 resulted in lower number of patients with sustained virological response, probably regardless prison environment and regime.

Key words: hepatitis C; prisoners; genotype; infection; risk factors; treatment outcome.

Introduction

Hepatitis C virus (HCV) infection is an important sociomedical problem worldwide. The importance of acute HCV is reflected in a high percentage of the disease chronification (65–80%), or the occurrence of liver cirrhosis (10–20%) and a possible development of hepatocellular carcinoma in 1–5% of people with liver cirrhosis. There are approximately 200 million people with HCV infection today, which is somewhere around 3% of the world population. HCV infection is widespread worldwide, with some specificity in genotypic localization observed. Particularly, North America is characterized by the presence of virus genotype 1a, which predominates, followed by genotypes 2a,
The dominant genotype in Europe is 1b, followed by 2a, 2b, and 3a. In Africa dominate genotypes are 4 and 5.\(^1\)\(^,\)\(^2\)\(^,\)\(^3\)\(^,\)\(^4\) The prevalence of HCV infection among general population is uneven, with higher prevalence in southern Europe.\(^4\) High prevalence of HCV infection was observed in Egypt (20%) and it is explained by the treatment of schistosomiasis.\(^5\) Ways of getting a HCV infection are various. However, studies show that the infection is mostly transmitted by intravenous heroin use, exposure to blood and blood derivatives, nasal drug use, from sexually active persons (promiscuous persons), tattoos, piercing, etc.\(^1\)\(^,\)\(^6\) Intravenous drug users are at higher risk for blood transmissible diseases (human immunodeficiency virus (HIV), HCV, hepatitis B virus and other). This problem is being significantly potentiated in persons who are housed in prisons. Specifically, among the general population in the United States the prevalence of HCV infection ranges from 1% to 2% and the proportion is significantly higher, up to 80%, in imprisoned adults who are intravenous drug addicts. Studies show that among prisoners 17.6% are intravenous drug users, 56.1% use drugs intranasally, 56% have various tattoos and 39.6% have a history of variety injection equipment use.\(^7\) All of these activities contribute to the significant number of blood transmitted diseases among this population. HCV infection incidence is different in prisons around the world, ranging from 25% to 40%.\(^8\)\^-\(^11\) In a certain number of inmates HBV and HIV coinfection can be seen.\(^12\)

A relatively small percentage of persons with chronic HCV, in the Correctional Prison (KPZ) in Niš, are submitted to disease examination or treatment by modern standards. A modern therapeutic approach to these patients is identical to general population. The persons with virus genotypes 1 and 4 are treated during 48 weeks with pegylated interferon alpha-2a at a dose of 180 mg once weekly and daily intake of ribavirin at a dose of 1,000–1,200 mg.\(^13\) The patients with HCV genotypes 2 and 3 have shorter treatment, 16 or 24 weeks with the same dose of pegylated interferon alfa-2a and ribavirin in a dose of 800 mg daily.\(^14\)\^-\(^15\) This treatment provides a different percentage of sustained virological response (SVR), in genotypes 2 and 3 the percentage is about 80%, while in the patients with genotypes 1 and 4, SVR achievement is around 50%.\(^16\)

The aim of this study was to examine treatment possibilities in this marginalized group of people, to find the most common way of infection in the group, genotypic representation and also to assess therapeutic effects of pegylated interferon alpha-2a combined with ribavirin.

**Methods**

The study involved 52 patients with chronic HCV infection, during 2008–2010. All the subjects were males, born between 1966 and 1985, and divided into two groups. The first group consisted of imprisoned patients, thus that received their treatment in prisons (n = 22), the second (control) group comprised “non-prisoners” (n = 30), randomly included patients from the Clinic for Infectious Diseases in Niš. The prisoners were mostly from the KPZ in Niš (n = 15), some were from the KPZ in Leskovac (n = 6), and one (n = 1) was serving his turn in Vranje. A number of imprisoned patients started their treatment in prisons (n = 17), while others had already received their treatment before coming to prison (n = 5). In forming the second group, the approach was discriminant, female patients were eliminated since all the prisoners were male. Also, intentionally both patients groups were approximately the same age.

Using epidemiological analysis we found that some subjects, from both groups, had a history of intravenous drug abuse, so they had to gain psychiatric comformation of being abstinent for more than 6 months. Examining the imprisoned patients we saw extensive tattoos that were made during stay in KPZ. The prisoners had in their files different crimes committed, ranging from theft, robbery and murders. During examination all the prisoners were escorted by the police officers.

All the patients were tested for HIV infection (n = 0) and hepatitis B infection (n = 0). Shortly before starting the antiviral therapy, prisoners underwent hospital preparation: biochemical analyses, upper abdomen ultrasound, liver biopsy, and detection of the virus and its genotype, by the polymerase chain reaction (PCR) assay (Amplicor Monitor Assay; Roche Molecular Systems, Branchburg, NJ 08876, USA). Pathohistological examination of liver biopsy specimens was done at the Pathology Institute, Clinical Center in Niš. PCR and genotypisation were done at the Institute for Infectious and Tropical Diseases in Belgrade. The patients with virus genotypes 1 and 4 received pegylated interferon at a dose of 180 mg subcutaneously, once a week for 48 weeks, plus ribavirin at a daily dose of 1,000–1,200 mg per os; while patients with virus genotypes 2 and 3 received the same dose of pegylated interferon but ribavirin in a dose of 800 mg daily for 24 weeks. The prisoners’ therapy was carried out almost without interruption, except in one period of 7 days, when there was a riot in the KPZ Niš. During the therapy the patients were tested for products of heroin degradation, which were found in only one patient (KPZ Leskovac), and so his treatment had to be discontinued after seven months. We should also point out a correct laboratory monitoring of the patients during the therapy, by both prisons’ physicians. Namely, regular monitoring of blood work values was performed, that provided a possibility for medications doses correction. Both groups were followed up on the basis of selected parameters in order to detect some possible features that would be specific for the group.

Data were analyzed by the standard descriptive methods: arithmetic mean and standard deviation (X ± SD). To determine a statistical significance the Student’s t-test was used; the level of probability (p) < 0.05 was considered statistically significant. Analysis was done using Microsoft Office Excel 2003 software package in Windows XP Professional environment.

**Results**

The average age of prisoners was 35 ± 4.1 (X ± SD) years, while the average age of the patients in the group II was 31 ± 7.6 years. Tables 1–4 show their characteristics.

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Comparison of the viral ribonucleic acid (RNA) copies number in blood showed that the number of patients with less than one million copies of HCV-RNA was significantly higher among prisoners \((p < 0.05)\). There were no other significant differences in the number of HCV-RNA copies (Figure 1). Also, we did not find any significant difference in the way of infection between the groups of patients, as well as any significant difference in histopathologic findings of the liver. A significantly higher number of patients in the prisoners’ group had HCV genotype 1 \((p < 0.05)\), while the greater number of patients in the control group was infected with virus genotype 3 \((p < 0.01)\).

We also found a significant difference between the two groups of patients in the treatment duration (48 or 24 weeks). That is, a significantly higher number of prisoners were treated 48 weeks, while in the control group a significantly higher number of patients were treated for 24 weeks \((p < 0.01)\).

Also, a significantly higher number of patients in the control group achieved SVR \((p < 0.01)\).
Discussion

Comparison of the subjects in the groups I and II, based on the obtained statistical data, allowed us to determine some characteristics in the treatment of this marginalized population. The patients of the group I noted in their histories intravenous drug use, alone or associated with tattoos, as the transmission route of HCV infection, but this was encountered even in the patients of the group II in few cases. This observation is consistent with findings obtained by other authors. In the control group a significant number of patients was not able to recall any event that could be the source of infection, and this was labeled as an unknown way of transmission, which is also seen frequently. We also noted significant differences in the distribution of HCV genotypes between the groups. HCV genotype 1 was the most common genotype in the group I subjects, whereas genotype 3 was the most frequent in the control group. Such distribution of genetic background influences the implementation (duration) of the treatment, and there was a significant difference in the treatment duration among the examined groups (p < 0.01). At the same time differences in the level of SVR was noted. Namely, it is well-known that patients with chronic HCV genotype 1 achieve SVR in a significantly lower percentage (50%) than patients with other genotypes, whereas patients infected with HCV genotype 2 or 3 have a significantly higher percentage of SVR (80%). This distribution of genotypes explains the difference in treatment length between the groups. Among the subjects of the group I there was not a single registered case of HBV nor HIV co-infection, which can be found in the allegations made by other authors. This may be explained to some extent by a small number of participants in the study. Although, the available knowledge suggests that HBV and HIV co-infection can be encountered among the prisoners sent to the Clinic for Infectious Diseases in Niš, these patients were not present in our study. The treatment was discontinued in one patient because of the presence of heroin traces, after seven months of treatment, during a routine screening of all inmates undergoing antiviral treatment. This method of monitoring for the drug traces in urine allows us, among other things, the elimination of heroin-returnees from the treatment. However, a question remains how this inmate got heroin while being in prison?

Conclusion

Intravenous drug abuse, alone or associated with tattoos, is the most common way of infection in the prisoners. HCV genotype 1 is predominant in the prisoners while HCV genotype 3 is the most frequent in the non-prisoners. There were no significant differences among the patients groups in terms of viral load (HCV-RNA copies number), but more patients with viral load below million copies were in the prisoners group (p < 0.05). Significantly greater number of the control group patients achieved SVR due to the viral genotype differences.

References


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