Hepatitis C Infection in Risk Groups

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Abstract

Hepatitis C infection is important global health problem with wide spectrum of health, social and economic consequences. The goal of this research was to estimate prevalence of hepatitis C virus infection in risk groups, and to determine association hepatitis C virus (HCV) infection and risk factors. Research included 4627 subjects divided in two groups. Test group included 2627 subjects divided in 4 subgroups with risk for HCV infection: those who received blood transfusion without screening on HCV (it was introduced in 1995) (700); intravenous drug users (60); patients on hemodialysis (168) and health care workers (1699). Control group included 2000 healthy volunteer blood donors. In all subjects anti-HCV antibodies were tested with third generation ELISA test. Positive serum samples were tested for presence of HCVRNA, using reaction of reverse transcription and polymerase chain reaction. In all anti-HCV positive subjects further epidemiological and clinical workup was performed. Prevalence of HCV infection in risk groups was: 4,6% in subjects who have received blood transfusions without HCV blood screening, 35% in intravenous drug users, 58,9% in patients on chronic dialysis, and 0.4% in health care workers. In control group prevalence was low (0,2%). In the group of 158 anti-HCV positive subjects, 73,4% had HCVRNA. The largest number of subjects with HCV infection was in the age group of 30-49 years (45,8%). This study showed that multiple blood transfusions before introducing the blood screening for HCV, longer duration of intravenous drug abuse, longer duration of hemodialysis treatment, larger number of accidental injuries in health care workers are independent and statistically significant risk factors for those groups examined. Results of this study confirm that general screening for HCV infection is recommended in risk groups for HCV infection in order to identify to prevent and to treat it.

KEY WORDS: Hepatitis C viral infection, risk groups, prevalence.

Introduction

Hepatitis C viral infection is significant global health problem with a wide-ranging personal, social and economic impact. Globally, an estimated 170 million people, approximately 3% of the world's population, are infected with the hepatitis C (1). Prevalence of hepatitis C viral infection ranges from 0,1% to more than 12% depending on the country (1,2,3). According to the data from B&H conference for consensus about hepatitis C, it is estimated that HCV prevalence infection is 1.8% and it is one of the most common blood transferred infection in B&H (4). This estimation does not include the data about HCV infection in high-risk groups. Also, there is no valid data about the influence of war on high-risk groups HCV infection. In the area where this research was conducted, the war lasted from 1992 to 1995. During this period a large number of persons were wounded, and received blood and blood derivates in the course the treatment. In that period, up to the end of the year 1995, testing of blood donors for HCV was not performed. Therefore, it can be reasonably assumed that certain percentage of wounded who received blood at that time, were infected with HCV. The hepatitis C virus is primarily spread by direct contact by human blood. Routes of transmission vary between countries, and sources of infection include intravenous drug use, needle-stick accidents, and transfusions of blood or blood products (5,6). Just about 20% of infected persons are actually diagnosed having HCV infection, so that majority of patients are still to be identified. In the next ten years we expect the number of chronically infected HCV patients to triple, which obliges us to introduce proper means of diagnosis, prevention (including high-risk groups screening) and treatment (7). The aim of this research was to determine prevalence of HCV infection in the risk groups (recipients of the possibly infected transfusions, intravenous drug users, hemodyalised patients and health – care workers) as well as the association of HCV infection with risk-factors.

Subjects and Methods

From 2003 to 2005 we did prospective study at the Clinic for infectious diseases, Policlinic for diagnostics; Psychiatry Clinic and Internal Clinic of the University Clinical Center Tuzla. Research was approved by the ethics committee of the University Clinical Center Tuzla. In this research we examined 4627 subjects and they were divided into 2 groups: a) subjects with risk factors (2627), they subdivided into 4 high-risk subgroups for HCV infection: recipients of the transfusions or blood products before the donor screening program started in 1995 (700 subjects); intravenous drug users (60), dialysis patients (168) and health-care workers (1699), and b) control group consisiting (2000) volunteer blood donors who were randomly chosen. All participants of this study were examined clinically, they were tested on anti-HCV antibody with ELISA test third generation . Positive serum samples were tested on presence of HCV RNA by reverse transcription reaction and polymerase chain reaction made by Amplicor-Roche. All anti-HCV antibody positive patients were evaluated according to their epidemiological, clinical and biochemical tests. We have also collected general information from all examined as well as data about their risk factors. Statistical analysis was performed using descriptive statistical parameters (mean value-x, standard deviation-SD) and comparative methods . Statistical differences between two means were determined by Student's t-test. $P<0,05$ was considered statistically significant.

Results

Prevalence of anti-HCV antibodies in subjects who have received blood transfusions before the HCV blood screening was introduced as routine method in Tuzla (at the end of 1995) was 4,6% (32/700); in intravenous drug users 35% (21/60); in the patients on long-term dialysis 58,9% (99/168), and in health care workers 0,4% (6/1699). In Table 1 it is shown that 158 out of 2627 patients (6,0%) were anti-HCV positive. Prevalence of anti-HCV in the volunteer blood donors was 0,2% (4/2000). There was statistically significant difference between frequency of anti-HCV antibodies found in test group (high risk subgroups) compared with its frequency in control group ($P<0,0001$). In anti-HCV positive subjects, the largest part of infected was found in the risk group of hemodialysis patients (62,7%) followed by blood transfusion recipients who received blood before screening for HCV was introduced (20,2%), intravenous drug users (13,3%), while it was the smallest in the health – care workers subgroup (3,8%), as is summarized in Table 2. In the group of 158 anti-HCV positive subjects 73,4% (116/158) were identified having HCV RNA, i.e., 73,4% of anti-HCV positive subjects had active HCV infection, while 26,6% (42/158) to had earlier HCV infection (Table 2). Compared between risk groups, highest percentage of HCV viremia was found in the group of hemodialysis patients - 75,8% (75/99), while the smallest percentage of HCV RNA was detected in the group of health care workers - 50% (3/6), as it is shown in Table 2. Largest number of subjects with positive anti-HCV

RISK FACTORS	anti-HCV +		anti-HCV –		All	
	n	%	n	%	n	%
BLOOD TRANSFUSION	32	4,6	668	95,4	700	100,0
INTRAVENOUS DRUG USERS	21	35,0	39	65,0	60	100,0
CHRONIC HEMODIALYSIS	99	58,9	69	41,1	168	100,0
HEALTH CARE WORKERS	6	0,4	1693	99,6	1699	100,0
ALL	158	6,0	2469	94,0	2627	100,0

TABLE 1. Prevalence of anti - HCV in risk groups

RESEARCHED GROUP	anti-HCV+		anti-HCV –		HCV RNA+/ anti HCV+
	N	%	N	%	N
BLOOD TRANSFUSION RECIPIENTS	32	20,2	24	20,7	75
INTRAVENOUS DRUG USERS	21	13,3	14	12,1	66,7
HEMODIALYSIS PATIENTS	99	62,7	75	64,6	75,8
HEALTH CARE WORKERS	6	3,8	3	2,6	50,0
ALL	158	6,0	116	4,4	73,4

TABLE 2. Results of HCV RNA detection in anti-HCV positive subjects

antibodies live in Tuzla municipality (48,9%). Mean age of anti-HCV positive subjects was 45,6±9,9 years, while mean age of anti-HCV negative examinees was 43,8±10,3 years. This difference is statistically significant (P=0,0329). Largest number of subjects (954, or 36,6%) was in the age group of 40-49 years, while 1718 subjects (65,4%) was in the age group of 30-49 years (Table 3). Out of overall 158 anti-HCV positive examinees, 45,8% was in the age group of 30-49 years, while the smallest number (14,5%) was in the age group of <30 years (Table 3). There is statistically significant difference in the presence of anti-HCV antibodies between subjects of various age groups (P=0,0004). There was no statistically significant difference in distribution of anti-HCV antibodies related to the sex. More anti-HCV positive cases were registered among men (91/67) (p=0,084).

Screening of blood donors for HCV infection was introduced at Transfusiology institute UKC Tuzla at the end of 1995 (second generation Elisa test). All 700 of examinees who received blood transfusion did it for therapeutic reasons. 459 of them (65,5%) received 3 or more blood products. In the group of intravenous drug users, duration of intravenous drug abuse in HCV positive subjects was 6,2±3,0 years, while in anti-HCV negative examinees 3,6±1,6 years. This difference is statistically significant and shows that duration of intravenous drug abuse is possible risk for HCV infection. Duration of hemodialysis, as possible risk factor for HCV infection, shows statistically significant difference in the group of anti-HCV positive subjects (p <0,0001), compared with duration of hemodialysis in the group of anti-HCV negative ones. Blood transfusion before 1995, the other risk factor, was

Age (years)	n	%	Male antiHCV+		n	%	Female antiHCV+		n	%	All antiHCV+	
			n	%			n	%			n	%
14	58	2,2	1	1,2	51	1,9	0	0	109	4,1	1	0,6
5-19	11	0,4	2	2,3	8	0,3	2	3,1	19	0,7	4	2,5
20-29	109	4,1	14	15,4	216	8,2	4	6,1	325	12,4	18	11,4
30-39	291	11,0	23	25,3	473	18,0	10	15,0	764	29,1	33	20,9
40-49	313	11,9	24	26,4	641	24,4	15	22,5	954	36,3	39	24,7
50-59	102	3,9	15	16,5	237	9,0	20	30,0	339	12,9	35	22,2
60-69	55	2,1	0	0	50	1,9	13	19,5	105	4,0	23	14,6
≥70	6	0,2	2	2,3	6	0,2	3	4,6	12	0,5	5	3,2
All	945	36,0	91	57,6	1682	64,0	67	42,4	2627	100,0	158	100,0

TABLE 3. Distribution of test-group subjects related to the age, sex and prevalence

present in both risk groups. Largest number of subjects received more than two blood transfusions. Mean number of blood products given per patient was 2,8±1,1 in the group of anti-HCV positive subjects, and 2,4±0,9 in the group of anti-HCV negative ones (P=0,0134). Duration of working life, as possible risk factor for HCV infection, was 18,2±4,9 years in the group of anti-HCV positive subjects, compared with 15,9±9,4 years in the group of anti-HCV negative ones. This difference is no statistically significant (p=0,4515). Mean number of accidental injuries, as possible risk factor for HCV infection, was 6,2 in the group of anti-HCV positive subjects, compared with 0,41 in the group of anti-HCV negative ones. This difference is statistically significant (p< 0,0001).

Discussion

Studies of HCV infections that detect anti-HCV antibodies in different risk groups are finding different level of prevalence, higher than the prevalence in general-population samples, depending on: risk for infection, use of different tests for detection of HCV infection, existing prevalence in general population, screening activities aimed at early detection of HCV infection, HCV infection prevention, etc. In our study, out of total number of 2627 subject from various risk groups, 158 (6,0%) were found to have anti-HCV antibodies. Statistically significant difference between numbers of anti-HCV antibodies-positive subjects in risk groups and control one was found (p<0,0001). In the volunteer blood donors low prevalence of anti-HCV antibodies was found (0,2%), because they are usually healthy young persons. Global data show that the prevalence of anti-HCV positive volunteer blood donors is probably higher in Japan and other Asian countries than in Europe and USA (8). Obvious difference in presence of HCV infection between risk group and control group can be attributed to various risk factors for HCV infection transmission present in risk group. In risk group, HCV RNA was found in 73,4% of subjects. That confirms that in risk groups, as well as in general population, in large percentage of cases chronic infection develops (9). All HCV RNA positive patients are direct source of HCV infection, that fact should be kept in mind when working on HCV infection prevention. The fact that this study found that 2,2 times more infected persons in age group of 30-49 years than in other age groups corresponds with the data from other published studies, and it clearly shows that HCV infection is global health, social and economic problem that we will have to deal with in coming years (10,11). Results of this research with registered prevalence of 4,6% (32/700) in the group of blood transfusion recipients who received blood for therapeutic purpose before HCV screening was introduced, are similar to the registered mean prevalence in comparable population in the USA. This similarity can be explained by the fact that the prevalence of positive tests for HCV infection is higher in Japan and the rest of Asia, than in Europe and USA (8,11). In this research, high prevalence of anti-HCV antibodies was found in the group of hemodialysis patients, 58,9% (99/168), with 65,4% (72/110) patients in Hemodialysis center Tuzla and 46,5% (27/58) in Hemodialysis center Gračanica. Different levels of prevalence of HCV infection in hemodialysis patients are the consequence of different prevalence in general population of different countries, but also by the dialysis process itself, as well as poor prevention of HCV infection spreading in some countries, or different hemodialysis centers within same country. Detection, in this study, of HCV infection in 16,1% (16/99) of hemodialysis patients who did not receive blood transfusion, or received it after it was tested for HCV, suggests nosocomial spreading of HCV infection within hemodialysis department. This mechanism of spreading of HCV infection was proven many times (12,13). Multiple blood transfusions before the blood screening for HCV was introduced, longer duration of intravenous drug abuse, longer duration of hemodialysis treatment, larger number of accidental injuries in health care workers are independent, statistically significant risk factors in risk groups examined in this study. In all anti-HCV positive subjects, found in this study, further epidemiological and clinical workup are needed.

Conclusion

Results of this study confirm that general screening for HCV infection is recommended in risk groups in order to detect HCV infection as early as possible, to prevent its occurrence and to treat it optimally. Screening should identify large number of infected patients who are without symptoms, but need long-term follow up in order to detect progression of disease and to recommend changes of lifestyle (i.e. avoidance of alcohol intake). Especially important is the fact that it is possible, using potentially effective drugs, to prevent occurrence of potentially grave consequences for life and health of infected person.

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