Prevalence of Hepatitis C virus antibodies among health care workers in Damascus, Syria

Basem M. Othman, MSc, Fawza S. Monem, PhD.

ABSTRACT

Objective: Health care workers exposed to accidental inoculation with infected blood represent a high risk group of acquiring hepatitis C virus infection. Hepatitis C virus is considered the most common parenterally transmitted pathogen to which needle-stick recipients are exposed. Therefore, the prevalence of hepatitis C virus antibodies among different health care workers was studied.

Methods: Antibodies of hepatitis C virus were studied by 3rd generation enzyme immunoassay. Hepatitis B surface antigen and antibodies to hepatitis B core were carried out using enzyme immunoassays. Liver enzymes (alanine aminotransferase, aspartate aminotransferase) and total bilirubin were measured using reagents on chemistry autoanalyzer. The studied group (189 members, aged 28.1±6.2 years, 86 males and 103 females) consisted of laboratory workers (65), hemodialysis staff (34), dentistry workers (24), surgery workers (35), and a 5th group contained other medical care workers (31) in Damascus, Syria.

Results: The prevalence of hepatitis C virus antibodies among health care workers was 3%. The positivity of anti-hepatitis C was 0% in the laboratory group, dentistry group, and surgery group. Whereas, it was 6% in the hemodialysis group, and 10% in the other medical workers group. The prevalence of hepatitis B surface antigen was 6% among health care workers in Damascus. Means of biochemical parameters were 23.2+/-15.9 U/L for alanine aminotransferase, 21.8+/-7.8 U/L for aspartate aminotransferase, and 0.58+/-0.35 mg/dl for total bilirubin.

Conclusion: The prevalence of hepatitis C virus antibodies among health care workers was higher than the prevalence among the general population (1%) which was determined during our study. However, the prevalence of anti-hepatitis C virus is lower than the prevalence of hepatitis B surface antigen among health care workers. There was no significant difference between means of biochemical parameters in each health workers and the general population. Factors related to infrastructure and operational system might be responsible for such prevalence of anti-hepatitis C virus among health care workers. An intensive periodic educational program for the medical and paramedical staff is important, in order to minimize the prevalence of anti-hepatitis C virus among this important high risk group.

Keywords: Prevalence, Hepatitis C virus, Hepatitis B surface antigen, Health care workers.

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Health care workers exposed to accidental inoculation with infected blood represent a high risk group of acquiring hepatitis C virus (HCV) infection.[1-5] Hepatitis C virus is considered the most common parenterally transmitted pathogen to which needle-stick recipients are exposed.[6] Serological analyses of health care workers who have had documented percutaneous exposures to anti-HCV positive needle-stick inocula were found to seroconvert at a frequency of 0 to 4%, depending on

From the Clinical Laboratory Department, Al-Assad University Hospital, Damascus, Syria.

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Address correspondence and reprint request to: Dr. Basem M. Othman, PO Box 511, Al-Tal, Damascus, Syria. Tel. +963 (11) 282 0668 or 213 1619. Fax. +963 (11) 611 9809.

the sensitivity of the enzyme immuno assay for anti-HCV.[7-10] The frequency of HCV infection after needle-stick inoculation to an HCV positive source has been measured up to 10%, based on detection of HCV Ribonucleic acid (RNA) in the recipient.[11] This 10% frequency is still lower than the 20-30% frequency of hepatitis B infection after accidental inoculation with a needle contaminated by blood from a person with replicative chronic hepatitis B.[12] The risk of HCV infection in health care workers is substantially below the approximately 15% risk of exposure to hepatitis B virus (HBV) in health workers.[13] Contamination of immunoassay control samples has been cited as a further possible risk factor for HCV infection in hospital laboratories.[14] Contact of samples with broken skin, penetrating injuries when removing metal foil caps from vials of freeze-dried material, and use of syringes and needles for dispensing are all possible routes of transmission.

Methods. The prevalence of anti-HCV in a population of 189 health care workers was studied. This main group included 5 medical subgroups. They were as follow: Laboratory group which included 65 members (specialists, technicians) working in private and national laboratories, mainly in the laboratory of Al-Assad University Hospital. Hemodialysis group included 34 members (physicians, nurses) working in 2 hemodialysis units in Damascus. Surgery group included 35 members (physicians, nurses) working in the surgery divisions in Al-Assad University Hospital. Dentistry group included 24 members (specialists and postgraduate students) working in this field. The 5th group included 31 medical members of other medical sectors, like doctors, postgraduate students, and a number of paramedical workers.

For each member, information on demographic data, post medical history (accidents, surgery operations, blood transfusion, post hepatitis) were collected. A 5 ml blood sample was collected, following the centrifugation, sera taken were divided into 3 separate samples: for viral markers, biochemistry evaluation, and archive purposes. All collected sera were frozen at -20°C. Alanine aminotransferase (ALT), aspartate aminotransferase (AST), and total bilirubin (TB) were measured using Boehringer Mannheim reagents (IFCC recommended) on Hitachi 911 chemistry analyzer. Hepatitis B surface antigen (HBsAg) and antibodies (IgM, IgG) to hepatitis B core (anti-HBc) were measured using enzyme linked immunosorbent assays (ELISA). Testing for anti-HCV was carried out using 3rd generation HCV enzyme linked immunosorbent assay (ELISA-3). Testing for anti-HCV was repeated using microparticle enzyme immuno assay (MEIA). All viral tests were carried out using commercial available assays (Abbott GmbH Diagnostika, Wiesbaden, Germany). All tests were carried out in the laboratory of Al-Assad University Hospital, Damascus.

Results. The laboratory group ranged from 20-49 years, with mean age of 28.8±4.5, 17/65 were male and 48/65 were female. The hemodialysis group ranged from 20-65 years, with mean age of 30.7±9.9, 3/34 were male and 31/34 were female. Surgery group ranged from 20-44 years, with mean age of 27.6±5, 24/35 were male and 11/35 were female. The dentistry group ranged from 22-50 years, with mean age of 26.9±6.7, 18/24 were male and 6/24 were female. Other medical workers group ranged from 21-34 years, with mean age of 25.3±3, 24/31 were male and 7/31 were female. None out of 65 laboratory members, 35 surgery members, and 24 dentistry members, were positive for anti-HCV. Whereas, 2 out of 34 hemodialysis members (6%), and 3 out of 31 in the other medical workers group (10%) were positive for anti-HCV. As a result, 5 out of 189 health care workers (the whole group) were positive for anti-HCV (3%). On the other hand, the positivity of HBsAg was as follows, 5% in the laboratory group, 3% in the hemodialysis group, 6% in the surgery group, 8% in the dentistry group, and 13% in the other medical workers group. The prevalence of different studied viral markers can be seen in Table 1. Means of biochemical parameters

Table 1 - Prevalence of studied viral markers among health care workers.

Study groups	Anti-HCV Number (%)	HBsAg Number (%)	Anti-HBc Number (%)	HBsAg & Anti-HBc Number (%)	Anti-HCV& HBsAg Number (%)
Laboratory group	0 (0)	3 (5)	3 (5)	3 (5)	0 (0)
Hemodialysis group	2 (6)	1 (3)	1 (3)	1 (3)	0 (0)
Dentistry group	0 (0)	2 (8)	2 (8)	2 (8)	0 (0)
Surgery group	0 (0)	2 (6)	3 (8.5)	2 (6)	0 (0)
Other medical workers group	3 (10)	4 (13)	4 (13)	4 (13)	0 (0)

HCV - hepatitis C virus; HBsAg - Hepatitis B surface antigen; HBc - hepatits B core

Table 2 - Results of studied biochemical parameters among health care workers (comparison with blood donors group which represents general population).

Study groups	ALT (U/L) Mean ± SD	AST (U/L) Mean ± SD	Total Bilirubin (mg/dl) Mean ± SD
Health care workers	23.2±15.9	21.8±7.8	0.58±0.35
Blood donors	25.3±14.3	33.8±15.8	0.48±0.23

ALT - alanine aminotransferase; AST - aspartate aminotransferase
SD - standard deviation

results of health care workers were normal as compared to the normal ranges of these parameters, which were determined during our study, Table 2.

Discussion. The prevalence rate of anti-HCV among health care workers in our study (3%), is comparable to that reported in other countries in the Middle East and other parts of the world.[15-17] However, it is higher than that reported in some western countries.[18,19] According to our results, the prevalence of anti-HCV among health care workers was higher than that among the general population, which was determined during our study (1%); this fact was in agreement with other studies.[13] This result is expected, because health care workers are in continuous contact with patients, giving different forms of medical care for them, handling their samples (for example, blood or respiratory secretions). Those patients who are possibly infected with HCV, so the transmission of the virus for medical staff is more common than the other groups of the general population. On the other hand, the prevalence of anti-HCV was lower than the prevalence of HBsAg among health care workers; this result was in accordance with the results of other studies.[13] This fact is expected for many reasons, first; the prevalence of HBV is higher than the prevalence of hepatitis C virus among the general population, and health care workers represent one of the sectors of this population. Second, the viremia of HBV is higher than that of HCV, so the transmission of HBV is easier and more effective than that in the case of HCV transmission from patients to health care workers after accidental needle-stick inoculation and other common accidents in the medical field.

An intensive educational program for the medical staff is important, explaining the important recent information about these pathogens. This program should be periodic, concentrating on the lower educated medical staff (nurses, technicians) and paramedical staff, in order to minimize the prevalence of such pathogens among this important high risk group.

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