



Hepatitis C virus antibodies are absent among high risk group of health care workers in Damascus Hospital

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ABSTRACT

Background and study aims

Liver disease caused by hepatitis C virus (HCV) is one of the most serious health issues worldwide. The prevalence of HCV among health care workers (HCWs) is higher than normal population. Our aim is to determine the seroprevalence of HCV among this high-risk group in Damascus Hospital, Syria in 2016.

Subjects and methods

During March 2016, anonymous testing for HCV was offered to 150 residents and physicians from different departments (Surgery, otolaryngology, gastroenterology, anaesthesiology and laboratory) in Damascus Hospital using fourth-generation enzyme-linked immunosorbent assay (ELISA). In addition, each participant was interviewed and answered a comprehensive questionnaire which includes questions on potential hazards, risk factors and the level of awareness about the disease and its ways of transmission.

Results

Surprisingly, all samples were tested negative for anti-HCV antibodies, though many participants were already exposed to many risk factors especially as HCWs.

Conclusion

HCV is not a main issue regarding its prevalence among HCWs in Damascus Hospital. Nevertheless, it is still necessary to develop a mandatory well-organized program to increase the awareness among HCWs and develop stricter prevention policies especially about bloodborne diseases transmitted occupationally.

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Introduction

Liver disease caused by hepatitis C virus (HCV) is one of the most serious health issues worldwide. It causes death for more than 350,000 people annually [1]. World health organization (WHO) studies detect 21.3 million carriers in the Middle East and more than 185 million patients worldwide, 80% of them are chronically infected and 20% of HCV chronic carriers will develop cirrhosis and hepatocellular carcinoma. Eighty percent (80%) of the chronically infected HCV carriers are asymptomatic which means high numbers of silent carriers and a very high transmission rate [2]. HCV is an enveloped RNA virus with a high degree of genomic variability [3]. A Recent study shows that 75% of transmission routes are parenteral [4], while Intravenous drug misuses, needle stick injury and sharing toothbrushes/razors are other important ways of transmission.

The prevalence of HCV among health care workers (HCWs) vary from country to another. Different studies shows numbers of 0.3% in Saudi Arabia [5], 0.4% in Turkey [6], 1.7% in Brazil [1], 2.6% in Lebanon [7], 4% in New Delhi [8] and 8% in Egypt [9]. One study conducted in Syria in 2001, detected HCV antibodies in 3% [10] of HCWs, which are higher than normal population, measured at 0.4% [11].

Because of continuous contact with blood, HCWs are considered as an intermediate risk group [11,12]. The Study aims to determine the prevalence of HCV among a group of HCWs in Damascus hospital in 2016.

Subjects and Methods

The study is a cross-sectional study conducted in Damascus Hospital, Damascus, Syria. The hospital is one of two main public hospitals that are administrated by the Ministry of Health in Damascus City. It is located near the city center surrounded by very crowded residential area.

During March 2016, 150 residents and physicians in Damascus Hospital were offered anonymous testing for HCV antibodies with the use of test codes to ensure confidentiality (total number of residents and physicians in the screened departments with ongoing practice at study month was 310 (C.I. for the given sample=95%, Margin of Error=5.76%).

After agreeing and signing a consent form by each participant, approximately 5 ml of venous whole blood was obtained. Each participant was interviewed and answered a comprehensive questionnaire. It includes questions on gender, age, place of birth, marital status, working department, current position; having intravenous drug antecedents, weather needle stick injured, surgical intervened or underwent blood transfusion or haemodialysis. It also included lifestyle

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habits such as sharing toothbrushes or razors, piercing, circumcision status, household of family member with HCV, history of dealing of HCV infected patients, history of occupational injury from HCV infected patient.

Blood drawing team of the Faculty of Medicine of Syrian Private University underwent a special training course provided by the university on first aid and phlebotomy before the initiation of this study.

Blood sampled from each participant was placed in a plain tube and allowed to clot at room temperature (range 20°C–25°C), then centrifuged to its components at 3000–3500 rpm for 5 min. The separated sera then were moved to Eppendorf® tubes, stored in ice bags and transported to the Central Laboratory of the Ministry of Health in Damascus. The sera were directly tested for anti-HCV antibodies presence by fourth-generation enzyme-linked immunosorbent assay (ELISA) [DIA.PRO Diagnostic BioProbes s.r.l, Via G. Carducci, 27 – 20099, Sesto San Giovanni]. The assay was performed according to the manufacturer's instructions (positive result: S/C.O. ≥ 1; S=the individual absorbance of each specimen, C.O.=Cut-off). Statistical analysis was carried out using Microsoft Office Excel 2016.

The study was reviewed and approved by the ethical committee of Syrian Private University and Damascus Hospital.

Results

A total of 127 residents and 23 physicians in Damascus Hospital were tested through this study. The mean ages for the participants were 30.34 ± 7.6 years (30.64 ± 7.72 years for males and 28.79 ± 6.92 years for females). Men to women ratio was 126:24. Complete results from questionnaires and serology of all participants were available for analysis. The study covered participants from surgery departments (general, pediatric, vascular, genitourinary, plastic, thoracic, neurological, orthopedic and maxillofacial) as well as otolaryngology, gastroenterology, anaesthesiology and laboratory departments. Participants' ages and occupations are summarized in Table 1.

Surprisingly, all samples of our study group were tested negative for anti-HCV antibodies.

As for the study participants' characteristics, Table 2 shows that 36.7% of the participants reported previous intravenous drug use, 34% reported a history of having at least one surgical intervention, 75.3% had an invasive dental procedure (dental extraction, gum

Table 1
Participants' ages and occupation.

Variable	Residents	%	Specialists	%	Total	%
Gender						
Male	105.0	70.0	21.0	14.0	126.0	84.0
Female	22.0	14.7	2.0	1.3	24.0	16.0
Occupation	Residents	%	Specialists	%	Total	%
Surgery	91.0	60.7	13.0	8.7	104.0	69.3
General	30.0	20.0	1.0	0.7	31.0	20.7
Pediatric	3.0	2.0	1.0	0.7	4.0	2.7
Vascular	3.0	2.0	3.0	2.0	6.0	4.0
Genitourinary	6.0	4.0	1.0	0.7	7.0	4.7
Plastic	7.0	4.7	2.0	1.3	9.0	6.0
Thoracic	0.0	0.0	1.0	0.7	1.0	0.7
Neurological	6.0	4.0	0.0	0.0	6.0	4.0
Orthopedic	19.0	12.7	3.0	2.0	22.0	14.7
Maxillofacial	17.0	11.3	1.0	0.7	18.0	12.0
Otolaryngology	14.0	9.3	1.0	0.7	15.0	10.0
Gastroenterology	8.0	5.3	3.0	2.0	11.0	7.3
Anaesthesiology	3.0	2.0	5.0	3.3	8.0	5.3
Laboratory	11.0	7.3	1.0	0.7	12.0	8.0
Total	127.0	84.7	23.0	15.3	150.0	100.0

Table 2
Participants' characteristics.

Variable	No.	%	Notes
Currently married	51.0	34.0	
Antecedents			
Intravenous drugs use	55.0	36.7	
Surgical intervention	51.0	34.0	
Dental procedures	113.0	75.3	
Blood transfusion or haemodialysis	0.0	0.0	
Needle stick injury	122.0	81.3	
Dealing with HCV patients	119.0	79.3	
Injury while dealing with HCV patients	28.0	23.5	18.7 out of total
Sharing toothbrushes or Razors	0.0	0.0	
Piercing	24.0	16.0	(all the females)
Circumcision (males/126)	117.0	92.9	
Household member with HCV	0.0	0.0	
Previous HCV antibodies test	28.0	18.7	All negative

surgery, root canal procedures, etc.) and none (0%) had been exposed to blood transfusion or haemodialysis.

Regarding occupational related exposure, the majority of participants (81.3%) reported an incident of needle stick injury, 79.3% had dealt with HCV infected patients and 23.5% of them reported an injury while dealing with those patients (18.7% of total participants). In respect to lifestyle habits 34% of participants were currently married, none had a habit of sharing razors or toothbrushes, 16% had piercing, most males were circumcised (92.9%), also, none of the participant lived with household members infected with HCV and 18.7% had previous HCV test (negative result).

Discussion

Despite the high rate of contact with HCV infected patients and considerable rate of accidents while dealing with them, none of our study participants tested positive for anti-HCV antibodies. Therefore, by publishing this study we aim to reduce what is called "publication bias" especially regarding blood contagious diseases in Syrian Hospitals. Health care personnel were directly tested for anti-HCV antibodies with fourth-generation enzyme-linked immunosorbent assay (ELISA).

A systematic review by Westermann et al. [13] indicates in most of its reviewed studies an increased risk of HCV exposure among HCWs compared to general population, especially in areas with high exposure to blood contact (e.g. dialysis, blood banks, etc.). This increased risk was statistically significant in Europe, USA, Africa, Middle East and South Asia, with no difference in the risk of HCV between HCWs and general population in Japan.

In comparison with the previous study conducted in Damascus, Syria in 2001 among similar population and group size, the prevalence was similar in surgery and laboratory workers (0%) [10], our study did not include a haemodialysis group. To the best of our knowledge, this is just the 2nd study that addressed the seroprevalence of HCV among HCWs in Syria, which came after 15 years of the last one conducted in 2001 [10] and marked by a massive change in healthcare policies and a considerable demographics changes in Syria caused by the ongoing crises. In comparison to the general population, the prevalence of positive HCV blood donors fluctuated the between 0.3% and 0.46%, through the time span from 2003 to 2014 as reported by the Syrian Ministry of health [14]. Other systematic review confirms similar numbers [11].

Only 14 persons approached declined to participate in the study, this reflects high compliance for our study, but we cannot rule out the possibility of the presence of HCV-positive HCWs not included in

our study. We have re-stratified the data of our sample to include more participants after their refuse.

Our results include physicians and surgeons whom are at direct contact with blood and blood products, thereby suggesting that occupational risk exposure to HCV is an unlikely event, which agrees with some previous reports [15–17]. This in turn reflects the increased awareness among the medical staff and the population as a whole (the potential source of infection) about blood contagious diseases, which may be due to the repeated health awareness WHO-supported programs launched by the Syrian Ministries of Health; and Higher Education and announced through all media and local means.

The present study documented a moderate level of adherence to safety measures among HCWs in Damascus Hospital regarding safe injection practices and standard precautions to prevent occupationally transmitted bloodborne infections. This may be attributed to the high workplace stress and work overload of Damascus Hospital physicians and residents beyond the hospital maximum capacity due to the crises in Syria. Similar low to moderate levels of awareness and adherence to safety measures have been reported in other studies [18–20].

Our encouraging results show that there is no significant occupational transmission of HCV among our medical staff. However, this finding should not lead to complacency, since the risk of HCV transmission remains a potential occupational risk [11,12,21,22]. In addition, we consider the fact that incomplete health care provider adherence to blood transmission instructions and safety measures may threaten the effectiveness of HCV prevention and control programs [23–25].

Our study limitations included the need for detection of HCV RNA as confirmatory assay and correlate the results with liver function tests and complete blood count data, in addition to the detection for HCV in other hospital hospitals in Syria. The study of HCV is important in the Arab world especially in Syria, as there is still lack of documented literature about HCV burden in such country, which should implicate for further research.

In spite of our results, we see that it is still necessary to develop a mandatory well-organized program to increase the awareness among all HCWs including physicians, dentists, pharmacists, medical technicians, nurses and medical students regarding adherence safety measures in blood transition, needles injections... etc. Preparing a brochure for medical education and pre-employment awareness program for HCWs is recommended to address the following topics: bloodborne diseases transmitted occupationally, standard precautions to prevent occupationally transmitted bloodborne infections and safe injection practices.

Conflict of interest

None.

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References

- [1] Ciorlia LA, Zanetta DM. [Hepatitis C in health care professionals: prevalence and association with risk factors]. *Revista de saude publica*. 2007 Apr;41(2):229–35. PubMed PMID: 17384798. Epub 2007/03/27. Hepatite C em profissionais da saude: prevalencia e associacao com fatores de risco. por.
- [2] Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* (London, England). 2012 Dec 15;380(9859):2095–128. PubMed PMID: 23245604. Epub 2012/12/19. eng.
- [3] Choo QL, Kuo G, Weiner AJ, Overby LR, Bradley DW, Houghton M. Isolation of a cDNA clone derived from a blood-borne non-A, non-B viral hepatitis genome. *Science* (New York, NY). 1989 Apr 21;244(4902):359–62. PubMed PMID: 2523562. Epub 1989/04/21. Eng.
- [4] Conry-Cantilena C, VanRaden M, Gible J, Melpolder J, Shakil AO, Viladomiu L, et al. Routes of infection, viremia, and liver disease in blood donors found to have hepatitis C virus infection. *The New England J. Med.* 1996 Jun 27;334(26):1691–6. PubMed PMID: 8637513. Epub 1996/06/27. eng.
- [5] Alqahtani JM, Abu-Eshy SA, Mahfouz AA, El-Mekki AA, Asaad AM. Sero-prevalence of hepatitis B and C virus infections among health students and health care workers in the Najran region, southwestern Saudi Arabia: the need for national guidelines for health students. *BMC Public Health*. 2014;14:577. PubMed PMID: 24912684. PMCID: Pmc4059075. Epub 2014/06/11. eng.
- [6] Ozsoy MF, Oncul O, Cavuslu S, Erdemoglu A, Emekdas G, Pahsa A. Seroprevalences of hepatitis B and C among health care workers in Turkey. *J. Viral Hepatitis*. 2003 Mar; 10(2):150–6. PubMed PMID: 12614472. Epub 2003/03/05. eng.
- [7] Irani-Hakime N, Aoun J, Khoury S, Samaha HR, Tamim H, Almawi WY. Sero-prevalence of hepatitis C infection among health care personnel in Beirut, Lebanon. *American journal of infection control*. 2001 Feb; 29(1):20–3. PubMed PMID: 11172314. Epub 2001/02/15. eng.
- [8] Jindal N, Jindal M, Jilani N, Kar P. Seroprevalence of hepatitis C virus (HCV) in health care workers of a tertiary care centre in New Delhi. *The Indian J. Med. Res.* 2006 Feb; 123(2):179–80. PubMed PMID: 16575118. Epub 2006/04/01. eng.
- [9] Okasha O, Munier A, Delarocque-Astagneau E, El Houssinie M, Rafik M, Bassim H, et al. Hepatitis C virus infection and risk factors in health-care workers at Ain Shams University Hospitals, Cairo, Egypt. *Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit*. 2015 Mar; 21(3):199–212. PubMed PMID: 26074220. Epub 2015/06/16. eng.
- [10] Othman BM, Monem FS. Prevalence of hepatitis C virus antibodies among health care workers in Damascus, Syria. *Saudi Med. J.* 2001 Jul; 22(7):603–5. PubMed PMID: 11479642. Epub 2001/08/02. eng.
- [11] Chemaitelly H, Chaabna K, Abu-Raddad LJ. The Epidemiology of Hepatitis C Virus in the Fertile Crescent: Systematic Review and Meta-Analysis. *PLoS one*. 2015;10(8):e0135281. PubMed PMID: 26296200. PMCID: Pmc4546629. Epub 2015/08/22. eng.
- [12] Fadlalla FA, Mohamoud YA, Mumtaz GR, Abu-Raddad LJ. The epidemiology of hepatitis C virus in the Maghreb region: systematic review and meta-analyses. *PLoS one*. 2015;10(3):e0121873. PubMed PMID: 25803848. PMCID: Pmc4372394. Epub 2015/03/25. Eng.
- [13] Westermann C, Peters C, Lisiak B, Lamberti M, Nienhaus A. The prevalence of hepatitis C among healthcare workers: a systematic review and meta-analysis. *Occupational Environ. Med.* 2015 Dec; 72(12):880–8. PubMed PMID: 26438666. PMCID: Pmc4680146. eng.
- [14] Bashour H, Muhjazi G. Hepatitis B and C in the Syrian Arab Republic: a review. *Eastern Mediterranean health journal = La revue de sante de la Mediterranee orientale = al-Majallah al-sihhiyah li-sharq al-mutawassit*. 2016 Jul 10;22(4):267–73. PubMed PMID: 27432409. Epub 2016/07/20. Eng.
- [15] Thorburn D, Dundas D, McCrudden E, Cameron S, Goldberg D, Symington I, et al. A study of hepatitis C prevalence in healthcare workers in the West of Scotland. *Gut*. 2001 Jan; 48(1):116–20. PubMed PMID: 11115832. PMCID: Pmc1728181. eng.
- [16] Nakashima K, Kashiwagi S, Hayashi J, Noguchi A, Hirata M, Ikeda S, et al. Low prevalence of hepatitis C virus infection among hospital staff and acupuncturists in Kyushu, Japan. *J. Infect.* 1993 Jan; 26(1):17–25. PubMed PMID: 7681088. Epub 1993/01/01. Eng.
- [17] Struve J, Aronsson B, Frenning B, Forsgren M, Weiland O. Prevalence of antibodies against hepatitis C virus infection among health care workers in Stockholm. *Scandinavian J. Gastroenterol.* 1994 Apr; 29(4):360–2. PubMed PMID: 8047813. Epub 1994/04/01. Eng.
- [18] Alam M. Knowledge, attitude and practices among health care workers on needle-stick injuries. *Ann. Saudi Med.* 2002 Sep-Nov;22(5–6):396–9. PubMed PMID: 17146275. Epub 2006/12/06. Eng.
- [19] Askarian M, McLaws ML, Meylan M. Knowledge, attitude, and practices related to standard precautions of surgeons and physicians in university-affiliated hospitals of Shiraz, Iran. *International journal of infectious diseases : IJID: official publication of the International Society for Infectious Diseases*. 2007 May; 11(3):213–9. PubMed PMID: 16837226. Epub 2006/07/14. Eng.

[1] Ciorlia LA, Zanetta DM. [Hepatitis C in health care professionals: prevalence and association with risk factors]. *Revista de saude publica*. 2007

- [20] Moghimi M, Marashi SA, Kabir A, Taghipour HR, Faghihi-Kashani AH, Ghoddoosi I, et al. Knowledge, attitude, and practice of Iranian surgeons about blood-borne diseases. *J. Surg. Res.* 2009 Jan; 151(1):80–4. PubMed PMID: 18599085. Epub 2008/07/05. Eng.
- [21] Yazdanpanah Y, Boelle PY, Carrat F, Guiguet M, Abiteboul D, Valleron AJ. Risk of hepatitis C virus transmission to surgeons and nurses from infected patients: model-based estimates in France. *J. Hepatol.* 1999 May; 30(5):765–9. PubMed PMID: 10365799. Epub 1999/06/12. Eng.
- [22] Mizuno Y, Suzuki K, Mori M, Hayashi K, Owaki T, Hayashi H, et al. Study of needlestick accidents and hepatitis C virus infection in healthcare workers by molecular evolutionary analysis. *J. Hospital Infect.* 1997 Feb; 35(2):149–54. PubMed PMID: 9049819. Epub 1997/02/01. Eng.
- [23] Lavanchy D. Public health measures in the control of viral hepatitis: a World Health Organization perspective for the next millennium. *J. Gastroenterol. Hepatol.* 2002 Dec; 17 Suppl:S452–9. PubMed PMID: 12534777. Epub 2003/01/22. Eng.
- [24] Gaze R, Carvalho DM, Tura LF. [Health providers' knowledge on transfusion-transmitted viral hepatitis]. *Revista de saude publica.* 2006 Oct; 40(5):859–64. PubMed PMID: 17301908. Epub 2007/02/16. Informacao de profissionais de saude sobre transmissao transfusional de hepatites virais. Por.
- [25] Harris SA, Nicolai LA. Occupational exposures in emergency medical service providers and knowledge of and compliance with universal precautions. *Am. J. Infect. Control.* 2010 Mar; 38(2):86–94. PubMed PMID: 19815310. Epub 2009/10/10. Eng.