

Hepatitis B and C seroprevalence in the Lebanese population

R. Baddoura,¹ C. Haddad² and M. Germanos³

الانتشار المصلي لكل من التهاب الكبد ((بي)) و((سي)) لدى اللبنانيين

رفيق بدورة، كريستيان حداد وميرنا جيرمانوس

الخلاصة: لتقييم مدى التعرض لكل من التهاب الكبد ((بي)) و((سي)) وعوامل الاحتطار المحتملة بين اللبنانيين طلبنا من جميع المراجعين لفوححدات المختبرية خلال فترة أسبوعين إعطاء 5 ميلي لتر من عينات الدم مع استكمال الاستبيان حول عوامل الاحتطار، أما المراجعون الذين تقل أعمارهم عن 5 سنوات فقد أجريت مقابلات مع أمهاتهم، ثم حلت العينات المجموعة في نفس المختبر الذي جمعت فيه بالمقاييس المناعية بالإنزيم الدقيق الخريبات. وبلغ مجموع العينات التي حلت 2893 عينة. وقد بلغ معدل رفض الإشراف بالدراسة 2.9%، ومعدل التعرض لمستضدات التهاب الكبد 18.9% وكان الحمل 1.9% ومعدل انتشار التهاب الكبد ((بي)) الحاد 0.1%، أما التعرض لمستضدات التهاب الكبد ((سي)) فقد كان 0.7% فيما كان التعرض لكل من أضداد التهاب الكبد ((سي)) وأضداد التهاب الكبد اللبية معا 0.2% ويزداد معدل انتشار أضداد التهاب الكبد اللبية بتقدم العمر فكانت أعلى ما تكون لدى الرجال. ومن أهم عوامل الاحتطار نقل الدم والديال الدموي وتنظير الجهاز الهضمي.

ABSTRACT We aimed to evaluate exposure to hepatitis B and C viruses (HBV and HCV) and candidate risk factors among the Lebanese population. All individuals presenting to all laboratory units in the country over a 2-week period were asked for a 5-mL whole blood sample and answered a questionnaire addressing risk factors. For individuals under 15 years of age the mother was interviewed. In all, 2893 blood samples were examined. Refusal rate was 2.9%. Exposure to HBV antigen was 18.9%. 1.9% were carriers and acute hepatitis B point prevalence was 0.1%. Exposure to HCV antigen was 0.7%. Exposure to both HbC and HCV antibodies was 0.2%. HbC prevalence increased with age and was higher among men. Significant risk factors included blood transfusion, haemodialysis and gastrointestinal endoscopy.

La séroprévalence des hépatites B et C dans la population libanaise

RESUME Notre objectif était d'évaluer l'exposition aux virus de l'hépatite B et de l'hépatite C (VHB et VHC) et les facteurs de risque potentiels dans la population libanaise. Il a été demandé à tous les individus se présentant dans des services de laboratoire dans le pays sur une période de deux semaines de se prêter à un prélèvement de 5 ml de sang total et de répondre à un questionnaire concernant les facteurs de risque. Pour les individus âgés de moins de 15 ans, c'est la mère qui était interrogée. En tout, 2893 échantillons sanguins ont été examinés. Le taux de refus s'élevait à 2,9 %. L'exposition à l'antigène du virus de l'hépatite B était de 18,9 % ; 1,9 % étaient des porteurs et la prévalence instantanée de l'hépatite B aiguë était de 0,1 %. L'exposition à l'antigène du virus de l'hépatite C était de 0,7 %. L'exposition simultanée aux anticorps anti-HBc et anti-VHC était de 0,2 %. La prévalence des anticorps anti-HBc augmentait avec l'âge et était supérieure chez les hommes. Les facteurs de risque significatifs comprenaient la transfusion sanguine, l'hémodialyse et l'endoscopie gastrointestinale.

¹Epidemiological Unit, Faculty of Medicine, Saint Joseph University, Beirut, Lebanon.

²Haematology Laboratory, Notre Dame des Secours Hospital, Byblos, Lebanon.

³Haematology Laboratory, Hôtel Dieu Hospital, Beirut, Lebanon.

Received: 10/04/01; accepted: 21/06/01

Introduction

Hepatitis B and C are of increasing concern to public health authorities in the developing world where universal vaccination campaigns are being considered [1–5]. In the Middle East there is a need for further public health surveys to assess the situation [6–9].

In Lebanon, following the World Health Organization recommendations, the Ministry of Health is considering implementing a hepatitis B vaccination programme. The country is administratively divided into five districts: Beirut the capital, Mount Lebanon the central part, the North, the South and the Bekaa plateau on the eastern side. Current data on hepatitis B and C in Lebanon are limited to population subgroups, namely blood donors, prisoners, pregnant women and health professionals [10–15].

The aim of our study was to estimate hepatitis B and C seroprevalence in the whole Lebanese population and to evaluate candidate risk factors as reported in the literature.

Methods

This was a cross-sectional population-based national survey run over a 2-week period through medical laboratory facilities. The study included blood-sampling units of both public and private institutions distributed throughout the different administrative departments in the country. After informed consent, all individuals presenting to these blood-sampling units over a 2-week period for whatever medical reason were included. They were asked for a 5-mL whole blood sample for hepatitis B and C assays and were questioned through

direct interview about candidate risk factors for hepatitis B and C. For those under the age of 15 years, the mother was interviewed.

Each participant was asked about exposure to any of the following risk factors: blood transfusion, intramuscular or intravenous injection, minor or major surgery, laparoscopy, local or general anaesthesia, dental or gum care, endoscopy, haemodialysis or peritoneal dialysis, personal or family history of hepatitis. Women were also asked about any previous caesarean section and curettage. Sociodemographic variables included marital and professional status, and nationality. In addition, individuals were asked about previous hepatitis B vaccination.

Sera were stored at -20°C until tested. All samples were analysed in the same laboratory unit using microparticle enzyme immunoassay (AxSYM CORE) (Abbott Laboratories) [16]. Samples were first tested for the presence of antibodies to hepatitis B core antigen (anti-HBc). Whenever positive, hepatitis B surface antigen (HbsAg) and hepatitis B surface antibodies were tested. A confirmatory AxSYM assay was carried out for the confirmation of samples found to be reactive to HBsAg. Antibodies against HCV (anti-HCV) were also assayed by a microparticle enzyme immunoassay; when reactive, additional confirmation was performed using a Western blot assay (Genelabs Diagnostics).

Data entry and analysis were performed using *Epi Info* and *STATA* software. Estimates are given with their 95% confidence interval (CI). Risk factors were evaluated as part of a logistic regression model with exposure to hepatitis virus as the dependent variable.

Results

In the 2-week period, 2982 individuals were recruited, from which 2893 blood samples were examined. Refusal rate was 2.9%. Age and gender characteristics compared to the whole population are summarized in Table 1. Exposure to hepatitis B antigen as indicated by positive HBc antibody seroprevalence was 18.9% (95% CI:

17.4–20.2); 1.9% were carriers and acute hepatitis B point prevalence was 0.1%. Exposure to hepatitis C antigen as indicated by positive HCV antibody seroprevalence was 0.7% (95% CI: 0.4–1.0) (Table 2). Exposure to both HBV and HCV was 0.2% (95% CI: 0.1–0.3). Anti-HBc prevalence increased with age and was higher among males (21.4%) than females (16.9%) while anti-HCV prevalence showed no significant age or sex differences.

The total number of immigrants was 103 (3.5%). When we excluded these individuals to adjust for the population demographic structure, the actual seroprevalence figures for anti-HBc, anti-HBs and HBsAg were not significantly changed (Table 2).

As regards hepatitis B vaccination, 222 (7.7%) individuals had been vaccinated. When we excluded these individuals, seroprevalence figures for anti-HBc, anti-HBs and HBsAg were not significantly changed (Table 2).

Taking into account the differences in age distribution of our sample and that of the general population, we calculated the expected seroprevalence for hepatitis B and C adjusted for age. In this case, hepatitis B exposure would be expected to be 14.0% versus the observed 18.2%, while hepatitis C exposure would remain almost the same

Table 1 Distribution of the sample and population by age, sex and district

Characteristic	Sample %	Population %
<i>Age group (years)</i>		
< 15	4.2	34.0
15–24	18.2	15.8
25–44	43.8	28.3
≥ 45	33.8	21.9
<i>Sex</i>		
Male	42.5	49.5
Female	57.5	50.5
<i>District</i>		
Beirut and Mount Lebanon	54.4	50.7
Bekaa	13.5	13.2
North	19.6	22.2
South	12.5	15.4

Table 2 Seroprevalence of hepatitis B and C markers

Marker	Total (n = 2982) %	No immigrants (n = 2879) %	No HB vaccination (n = 2657) %
HBsAg	1.9 (1.4–2.4)	2.0	1.8
Anti HBs	12.0 (11.7–13.1)	12.0	12.9
Anti-HBc	18.9 (17.4–20.2)	18.5	18.9
Anti-HCV	0.7 (0.4–1.0)	0.6	0.6

Figures in brackets show 95% confidence interval.

Table 3 Observed versus expected seroprevalence of anti-HBc and anti-HCV after adjusting for age

Observed seroprevalence (%)	Distribution of sample by age group (%)	Distribution of population by age group (%)	Expected seroprevalence (%)
<i>Anti-HBc</i>			
6.3	4.2	34.0	2.1
6.4	18.2	15.8	1.0
15.2	43.8	28.3	4.3
29.9	33.8	21.9	6.5
18.2	Overall	Overall	14.0
<i>Anti-HCV</i>			
0.85	4.2	34.0	0.3
0	18.2	15.8	0.0
0.81	43.8	28.3	0.2
0.73	33.8	21.9	0.2
0.6	Overall	Overall	0.7

with 0.7% expected versus 0.6% as observed (Table 3).

Exposure to hepatitis B antigen was higher among the inhabitants from the South, married people and immigrants (Table 4). There were no significant differences for hepatitis C exposure with respect to any of these characteristics, but in general the figures were low.

Risk factors that were significantly associated with hepatitis B antigen exposure, adjusted for age and sex, included blood transfusion (OR = 1.38, 95% CI: 1.05–1.80), haemodialysis (OR = 3.09, 95% CI: 1.29–7.36) and gastrointestinal endoscopy (OR = 1.44, 95% CI: 1.09–1.90). After adjusting for each risk factor using a logistic regression model, all three factors remained significantly associated with exposure to hepatitis B antigen (Table 5). Risk factors for HCV exposure adjusting for age and sex were limited to haemodialysis (OR = 25.91, 95% CI: 6.62–101.5)

and blood transfusion. Adjusting for each risk factor using a logistic regression model, only haemodialysis remained a risk factor (Table 6).

Discussion

The estimated population-based anti-HBc prevalence was 18.9% (CI: 17.4–20.2). The figure is close to what has been reported in other developing and Mediterranean countries [2,3,6,16]. A 1.9% point prevalence of positive HBsAg is similar to previously reported data on blood donors in Lebanon [15]. Our figure is also close to that reported in France in 1995 [17]. Similarly, the 0.7% anti-HCV prevalence we observe in our population falls within the range of 0.5%–1.7% reported in Mediterranean countries [6,8,9,17]. Therefore, hepatitis B and C in Lebanon are as much public health issues as in neighbouring countries.

Table 4 Anti-HBc positivity by sociodemographic characteristic (n = 2982)

Variable	Anti-HBc positivity %
<i>Age group (years)</i>	
< 15	6.1
15–24	6.6
25–44	15.6
> 45	30.5
<i>Sex</i>	
Male	21.4
Female	16.9
<i>Marital status</i>	
Married	23.6
Single	8.6
Divorced	29.4
Widowed	38.8
<i>Citizenship</i>	
Lebanese	18.4
Immigrant	29.6
<i>District of residence</i>	
Beirut	18.5
Mount Lebanon	16.4
Bekaa	18.5
North	17.4
South	26.2

Table 5 Age- and sex-adjusted odds ratios of risk factors for presence of hepatitis B virus core antigen antibodies

Risk factors	Odds ratio	95% confidence intervals	P-value
Blood transfusion	1.38	1.05–1.80	0.020
Haemodialysis	3.09	1.29–7.36	0.011
Gastrointestinal endoscopy	1.44	1.09–1.90	0.010
Sex	1.24	1.02–1.50	0.030
Age	1.03	1.02–1.04	0.000

Table 6 Age- and sex-adjusted odds ratios of risk factors for presence of hepatitis C virus antibodies

Risk factors	Odds ratio	95% confidence intervals	P-value
Blood transfusion	2.34	0.79–06.84	0.121
Haemodialysis	25.91	6.61–101.5	< 0.001
Sex	1.26	0.49–03.21	0.626
Age	1.01	0.99–01.04	0.278

Our sample can be considered quite representative of the Lebanese population regarding sex and district distributions (Table 1). The geographical distribution of our sample matched that of the general population taking into consideration the differences in administrative frames used by the Order of Medical Laboratories and the Public Administration respectively. However, people over 25 years of age were overrepresented while children under 15 years were underrepresented in our sample. Immigrants were also under-represented, but they are not included in the population census estimates [18]. Nevertheless, for extrapolation of the data from our sample to the whole population we used the standardization method.

Self-reported reasons for blood sampling included medical prescription (50.1%), screening (44.7%), pregnancy examination (3.7%), premarital check-up (1.4%) and hepatitis B vaccine assessment (0.1%). The number of individuals reporting past history of hepatitis or jaundice was 236 (8.2%). Self-reported reasons for blood sampling reflect the pattern of use of health care facilities and we have no reason to believe they are related to hepatitis antigen status. Actually, there was no statistically significant association between self-repor-

ted past history of hepatitis and hepatitis antigen status.

At the national level, our sample selection technique was feasible and acceptable. Obtaining blood samples from a random sample of the general population is a difficult task and would probably result in a significant refusal rate and biased estimates. Because of cost and logistic constraints, most "population-based" surveys are limited to small geographical areas or population subgroups within specific settings.

Our study is the first population-based survey on hepatitis in Lebanon and it follows a method easy to repeat if we were to assess the impact of any future public health intervention on hepatitis B and C.

As for risk factors, our results are in agreement with the medical literature [19-21]. Blood transfusion [22] and haemodialysis [23] were the major risk factors for both hepatitis B and C antigen transmission. Blood transfusion or haemodialysis

expose individuals to hepatitis C more than hepatitis B. A 25.8% prevalence of antiHCV among individuals who have undergone haemodialysis has been reported by Naaman and al. [15]. Gastrointestinal endoscopy is a serious nosocomial risk factor for hepatitis B infection since it is a commonly prescribed procedure, and awareness about hospital hygiene control is needed among health professionals.

Whether a universal vaccination programme against hepatitis B is a must remains debatable. However, a vaccination policy is required for at-risk population subgroups. Blood transfusion quality control must be implemented [24].

Acknowledgements

The authors thank the Ministry of Health, Abbots Laboratories and the Lebanese Epidemiological Association.

References

1. McCloy E. Evolution of the Viral Hepatitis Prevention Board. *Vaccine*, 1995, 13 (suppl. 1):S7-8.
2. Sulaiman HA et al. Prevalence of hepatitis B and C viruses in healthy Indonesian blood donors. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1995, 89(2):167-70.
3. Ponce JG et al. High prevalence of hepatitis B and C markers in an indigent community in Caracas Venezuela. *Invesigaci n cl nica*, 1994, 35(3):123-9.
4. McCarthy MC et al. Hepatitis B and C in Juba, southern Sudan: results of a serosurvey. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1994, 88(5):534-6.
5. Nanda SK et al. The epidemiological significance and clinical pattern of HCV induced chronic hepatitis in India. *Tropical gastroenterology*, 1994, 15(3):145-51.
6. Saleh MG et al. High prevalence of hepatitis C virus in the normal Libyan population. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1994, 88(3):292-4.
7. Huraib S et al. High prevalence of and risk factors for hepatitis C in haemodialysis patients in Saudi Arabia: a need

- for new dialysis strategies. *Nephrology, dialysis, transplantation: official publication of the European Dialysis and Transplant Association – European Renal Association*, 1995, 10(4):470–4.
8. Abdel Wahab MF et al. High seroprevalence of hepatitis C infection among risk groups in Egypt. *American journal of tropical medicine and hygiene*, 1994, 51(5):563–7.
 9. Jemni S et al. Seropositivity to hepatitis C virus in Tunisian haemodialysis patients. *Nouvelle revue française d'hématologie*, 1994, 36(5):349–51.
 10. Bitar J, Andonian K. Viral hepatitis in Lebanon. *Lebanese medical journal*, 1971, 24:4.
 11. Abdelnour GE et al. Detection of anti-hepatitis virus antibodies and hepatitis C virus RNA in Lebanese haemodialysis patients. *European journal of epidemiology*, 1992, 13:863–7.
 12. Araj G et al. Hepatitis C virus: prevalence in Lebanese blood donors and brief overview of the disease. *Lebanese medical journal*, 1995, 43(1):11–6.
 13. Arnaout Z. Viral hepatitis in Lebanon an overview for the year 1994. *Epi news*, 1995, March issue, No. 1:6.
 14. Nabulsi M et al. *Prevalence of hepatitis B surface antigen in Lebanese pregnant women*. Paper presented at the Second Annual Meeting of the Lebanese Epidemiological Association, Beirut, Lebanon, October, 1996.
 15. Naman RE et al. Le virus de l'hépatite C chez les hémodialysés et les donneurs de sang au Liban. [Hepatitis C virus in hemodialysis patients and blood donors in Lebanon.] *Le Journal médical libanais. Lebanese medical journal*, 1996, 44(1):4–9.
 16. Barrera JM et al. Improved detection of anti-HCV in pot transfusion hepatitis by a third generation ELISA. *Vox sanguinis*, 1995, 68(1):15–8.
 17. Goudeau A, Dubois F. Incidence and prevalence of hepatitis B in France. *Vaccine*, 1995, 13(suppl. 1):S22–5.
 18. Lebanese population statistics. Documents of the Ministry of Social Affairs 1996.
 19. Mosley JW et al. Donor screening for antibody to hepatitis B core antigen and hepatitis B virus infection in transfusion recipients. *Transfusion*, 1995, 35(1):5–12.
 20. Van der Poel CL. Epidemiology, transmission and prevention. In: Reesink HW ed., *Hepatitis C virus (Current studies in hematology and blood transfusion*, No. 6.1). Basel, Karger, 1994:137–76.
 21. Strasser SI et al. Risk factors and predictors of outcome in an Australian cohort with hepatitis C virus infection. *Medical journal of Australia*, 1995, 162(7):355–8.
 22. Dodd RY. Transfusion-transmitted hepatitis virus infection. *Hematology/oncology clinics of North America*, 1995, 9(1):137–54.
 23. Sampietro M et al. High prevalence of a rare hepatitis C virus in patients treated in the same hemodialysis unit: evidence for nosocomial transmission of HCV. *Kidney internationale*. 1995. 47(3):91–7.
 24. Salmi LR. Les supports épidémiologiques de l'hémovigilance. [Epidemiological support in blood surveillance.] *Transfusion clinique et biologique: journal de la Société française de transfusion sanguine*, 1994, 1(6):421–4.