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The seroprevalence of both hepatitis B and hepatitis C at the first-step health organizations and the difference between the urban and rural areas

Fatma Kalem · Şerife Yüksekkaya · Metin Başaranoğlu

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Summary
Background Hepatitis B virus (HBV) and hepatitis C virus (HCV) are very important infectious agents for public health. The aim of this retrospective study was to assess the seroprevalence of hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (anti-HBs) and anti-HCV test results of patients who admitted to first-step health organizations in central and peripheral districts of Konya, the central region of Turkey during the period 2005–2010.

Methods In this study, HBsAg, anti-HBs and anti-HCV screening test results of patients who admitted to first-step health organizations in Konya during the period 2005–2010 were retrospectively investigated from the laboratory records. This study was approved by the Konya Health Directorate. All screening tests were performed on the automatic third-generation enzyme-linked immunosorbent assay (MEIA). This immunoassay method was carried out according to the instructions of the manufacturer. Borderline and positive results were retested.

Results Konya is the largest city of Turkey in terms of surface area and one of the economically developed cities. For HBsAg, anti-HBs and anti-HCV screening, whole test results of 5 years are given in Table 1 and Figure 1. The differences between the urban and rural for HBsAg ($p = 0.062 > 0.05$) and anti-HCV($p = 0.874 > 0.05$) were not statistically significant. Among the markers only for anti-HBs, the difference between the urban and rural was statistically significant ($P = 0.042 < 0.05$). Of them, 4.15 % were positive for HBsAg, 36.46 % were positive for anti-HBs and 1.16 % were positive for anti-HCV.

Conclusion In this study, Konya has been evaluated as two regions: central and peripheral. Our study showed us that distribution of the diseases vary from one region to another. We consider that difference in social diversity is one of the factors. These infections are major health problems. So the results of immunodiagnostic tests for HBsAg, anti-HBs and anti-HCV will be useful for guiding control actions and for new preventive strategies.

Keywords Seroprevalence · Hepatitis B · Hepatitis C · First step · Health organizations · Urban areas · Rural areas

Introduction

Hepatitis B is a potentially life-threatening viral infection that attacks the liver and can cause both acute and chronic disease by hepatitis B virus (HBV) [1–5]. The virus is transmitted through contact with the blood or other body fluids of an infected person. World Health Organization (WHO) reported that an estimated 600,000 persons die each year due to the acute or chronic consequences of hepatitis B. Hepatitis B, for which there is no specific treatment, is 95 % preventable with a vaccine which is the first vaccine against a major human cancer since 1982. It can take several months to a year to recover or can be chronic and can cause cirrhosis or liver cancer. In developing countries transmission is mostly by the perinatal route (from mother to baby at birth), blood transfusions and sexual contact. In developed countries the majority of infections are

Dr. F. Kalem (✉)
Konya Numune Hastanesi, Infectious Diseases,
Konya, Turkey
e-mail: metin_basaranoglu@yahoo.com

Ş. Yüksekkaya
Konya Training and Research Hospital,
Konya, Turkey

M. Başaranoğlu, MD, PhD
Ankara Yüksek Ihtisas Hospital,
Ankara, Turkey

transmitted during young adulthood by sexual activity and injectable drug use. Young children who become infected with HBV are the most likely to develop chronic infections. So vaccination is most essential in childhood [3–7]. In Turkey HBV vaccine has been applied to newborns, children and young adults up to 19 years of age and risk groups since 1998.

Hepatitis C can be a mild illness lasting a few weeks or can cause lifelong liver cirrhosis and cancer. Hepatitis C virus (HCV) infection is curable using increasingly effective antivirals. There is no vaccine against this virus. HCV is transmitted through exposure to infectious blood. Being born to an HCV-infected mother and unprotected sex with HCV-infected persons are also risk factors for transmission. The presence of anti-HCV antibodies may indicate that an individual has been infected with HCV, it may show a false positive result or may be indicative of previous resolved acute hepatitis and antibody detection methods cannot distinguish between active and resolved infections. To demonstrate active infection; nucleic acid testing and HCV antigen detection methods are required. Hepatitis C virus infection causes serious mortality and morbidity, and so is a great financial burden like the hepatitis B virus. Therefore, hepatitis C is also a major health problem [8]. About 20 % of primer infection leads to chronic infection such as chronic liver disease, cirrhosis or liver cancer. So knowing infection status of family members, close contacts etc. can prevent health problems.

Nowadays, due to the advances in screening techniques the risk of transmission has decreased, but due to variations in the window period of infectious agents, silent carriage and limitations in screening may cause infection transmission [5].

The aim of this retrospective study was to assess the prevalence of hepatitis B surface antigen (HBsAg), hepatitis B surface antibody (anti-HBs) and anti-HCV test results of patients who admitted to first-step health organizations in central and peripheral districts of Konya in the central region of Turkey during the period 2005–2010.

Patients and methods

In this study, during the period 2005–2010 HBsAg, anti-HBs and anti-HCV screening test results of patients who admitted to first-step health organizations in Konya were retrospectively obtained from laboratory records. All screening tests were performed on the automatic third-generation enzyme-linked immunosorbent assay (MEIA). This immunoassay method was carried out according to the instructions of the manufacturer. Borderline and positive results were retested. This study was approved by the Konya Health Directorate. Ethical approval was not required for this study because the data involved in this project were retrospectively collected from the patients' records.

Table 1 HBsAg, anti-HBs, anti-HCV screening whole test results

Tests	Positivity (%)
HBsAg	4.15
Anti-HBs	36.46
Anti HCV	1.16

Table 2 HBsAg test results accoding to years and region. For HBsAg the population was 177,282

Year	Urban(%)	Rural(%)
2005	3.9	5.6
2006	4.6	3.0
2007	5.7	3.8
2008	5.5	3.7
2009	4.7	3.1
2010	4.6	3.9

Results

Konya is the largest city of Turkey in terms of surface area. Konya is one of the economically developed cities with natural and historical richness. The Mevlâna museum is located in Konya.

For HBsAg, anti-HBs and anti-HCV screening, whole test results of 5 years are given in Table 1 and Figure 1; Table 2 and Figure 2; Table 4 and Figure 4.

Statistical analyses were performed using SPSS 15. The associations between the year and geographic variables were evaluated using the t test. A p value < 0.05 was considered to be statistically significant. Among the markers only for anti-HBs, the difference between the urban and rural was statistically significant ($p = 0.042 < 0.05$). The difference between the urban and rural for HBsAg ($p = 0.062 > 0.05$) and anti-HCV ($p = 0.874 > 0.05$) were not statistically significant.

Discussion

In this study Konya has been evaluated as two regions: central and peripheral. Our study showed us that distribution of the diseases varies from one region to another. We thought that difference in social diversity is one of the factors. Our results have been obtained from a larger population than the other studies planned in Turkey. All ages and groups of patients have been included in this study. Patients with chronic hepatitis B and asymptomatic viral carriers are the sources for infections [9]. The modes of transmission of HBV vary between different regional, gender and age groups [10]. Other important modes of transmission include horizontal transmission of infections such as within families [11]. Infection carriers need to be treated. There is no ideal and specific cure for HBV infection. The economic burden of HBV infection is substantial because of high morbidity and mortality associated with end-stage liver disease, cirrhosis and hepatocellular carcinoma. After the vaccina-

Table 3 Anti-HBs test results according to years and region. For anti-HBs the population was 105,546

Year	Urban (%)	Rural (%)
2005	29	34
2006	37	32
2007	37.3	30
2008	40.7	29.4
2009	49	31.5
2010	57	35
The increase is seen after 2007		

Table 4 Anti-HCV test results accoding to years and region. For anti-HCV the population was 102,680

Year	Urban(%)	Rural(%)
2005	1.5	2
2006	1.1	1.2
2007	1.4	0.9
2008	1.1	0.6
2009	1.1	0.5
2010	0.9	2.2

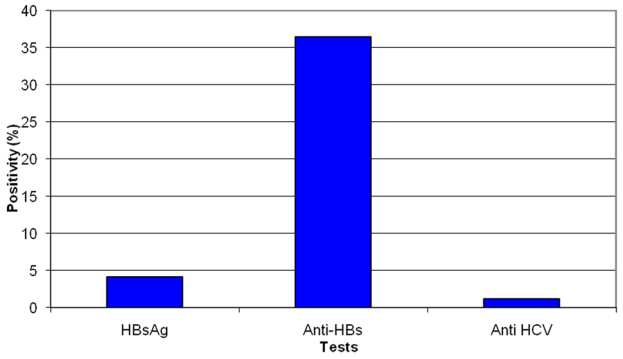

Fig. 1 Whole screening test results of hepatitis B surface antigen (*HBsAg*), anti-hepatitis B surface antibody (*anti-HBs*) and anti-hepatitis C virus (*anti-HCV*)

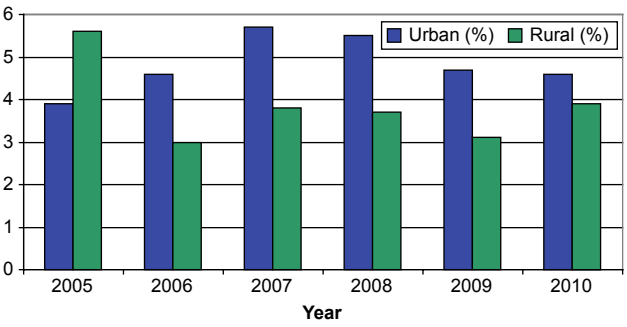

Fig. 2 Hepatitis B surface antigen (*HBsAg*) test results according to years and region

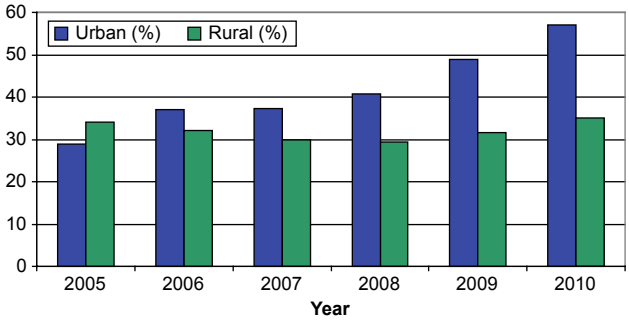

Fig. 3 Anti-hepatitis B surface antibody (*Anti-HBs*) test results according to years and region

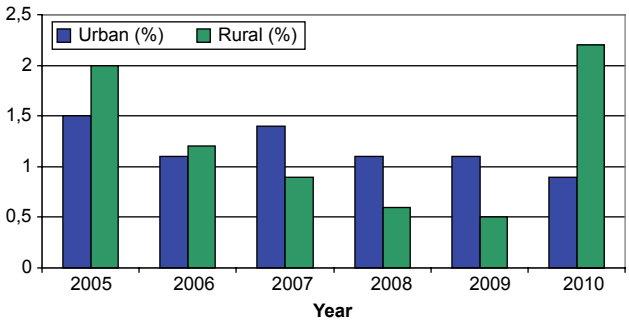

Fig. 4 Anti-hepatitis C virus (*Anti-HCV*) test results according to years and region

tion programme, transmission between adults has become the most expected mode of HBV spread. So families at risk need to be closely monitored. Perhaps hepatitis B is the most important infection as it is preventable with vaccine. So all risk groups must be vaccinated [4]. The epidemiological patterns of these infectious agents in Turkey generally have been evaluated according to data from blood donors or special groups and restricted areas. According to these studies, seropositivity rate of HBsAg was 3.8% [12] in our region, was 3.79 and 1.85% in southwestern Turkey [13, 14], was 2.55 and 1.8% in eastern Turkey [15, 16], was 2.6% in southern Turkey [17] and was 2.75 and 3.3% in southeastern Turkey [18, 19]. In our region Turan et al. reported the seropositivity of HBsAg and anti-HCV as 1.53 and 0.5% in donors, respectively [20]. Zhang et al. reported the prevalence of HBsAg and anti-HBs as 4.38 and 35.66%, respectively, from China [3]. In India, Bhattacharya et al. reported the seropositivity of HBsAg as 1.66% [21]. The prevalence of HBV was reported as 4.4% in Romanian adult population (18–69 years). Sociodemographic characteristics of the participants affect the rate. Blood product transfusion, surgery, tattooing and alcohol consumption are reported as risk factors in Romania [22]. In our country tattooing and alcohol consumption are not common. We found the seropositivity of HBsAg and anti-HBs was 4.15 and 36.46%, retrospectively. The seroprotection marker anti-HBs had increased year by year, which showed that National Immunization Program Protocol for hepatitis B has been effective, especially since 2007 as it is seen in Table 3 and Figure 3. In our region most studies regarding HBV prevalence are performed in blood donors. This is the first study that shows

the prevalence of HBV in the general population. The rate as shown is higher than in blood donors.

The studies about the seroprevalence of anti-HCV are generally have been planned in blood donors like HBsAg. According to these studies, seropositivity rate of anti-HCV was 0.21 % [12] in our region, was 0.63 and 0.16 % in southwestern Turkey [13, 14], was 0.17 and 0.2 % in eastern Turkey [15, 16], was 0.6 % in southern Turkey [17] and was 0.55 % and 0.3 in southeastern Turkey [18, 19]. From India the seropositivity of anti-HCV was reported as 0.28 and 0.35 according to years in blood donors [21]. In our study the seropositivity of anti-HCV was 1.16 % in general population as the first-step health organizations serve all citizens and do not require referrals. Of course these results belong to screening tests, and confirmation is required.

Today, because of the advances in screening techniques, the risk of transmission has decreased but due to variations in the window period of infectious agents, silent carriage and limitations in screening may cause infection transmission [5]. Identifying risk groups can also be useful in the development of national strategies [2, 3]. For transmission, dental treatment has a great risk [23]. In Turkey ear and/or skin piercing is not common. As it is known, donor screening is an important factor for the donation as well as for decreasing the infection rate. And the studies about seropositivity rates of anti-HCV and HBsAg are generally planned in blood donors, we couldn't compare our results. It is important that according to population the serological status can change. For instance, in the studies reported from Italy among refugees, HBsAg positives were 9.3 % and anti-HCV positives were 2.7 % [24]. In another study performed on refugees in Greece, HBsAg positives were 27.3 % and anti-HCV positives of 12.5 % [25]. In Saudi Arabia the prevalence of HBsAg among male Saudi blood donors was reported as 3.0 % [26]. According to the Viral Hepatitis Surveillance of Centers for Disease Control and Prevention (CDC), the percentage of people ever infected with HBV is 4.3–5.6 %, and the percentage of ever infected with HCV is 1.3 –1.9 % in the USA. In the general population, assessing the prevalence of these infection parameters is necessary for the planning of health control measures in primary and secondary prevention. In viral diseases; it is certain that prevention is of great importance for public health [10]. Our study covers all age groups and also all geographic regions of Konya; the results reflect the general population. Determining serological profile of blood and/or sexually transmitted diseases regionally can be helpful in identifying new strategies for community health. Making people aware of these infectious diseases and protective measures can be helpful to decrease the infection rate. Knowing the seropositivity is important as it can be used for monitoring the epidemiological perspective of public. This study showed that the incidence of the serological parameters of infections had decreased among the general population in years. In this result, the national vaccination programme has a primarily important role. As treatment carries a lot of cost and sometimes inefficiency, prevention is more important. So all children, adolescents younger than 18 years old and people in high-risk groups should be vaccinated for HBV. To inform household contacts of infected persons about the infections is another prevention method. The incidence of all infections has dropped over the years. This decrease can be related to donor screening [5] through improved history questioning and risk factor assessments, and also in the public there is a higher awareness about health compared to previous years.

In conclusion, this study shows the current epidemiological situation for HBsAg, anti-HBs and anti-HCV in our region. It is important to have awareness about how these infections can be prevented and screening and control of viral hepatitis and its related diseases. Knowing the serological status of community will be useful for planning public health policies.

Conflict of interest

The authors declare that there are no actual or potential conflicts of interest in relation to this article.

References

1. Alencar Ximenes RA, Pereira LMB, Martelli CMT, Merchán-Hamann E, et al. Methodology of a nationwide cross-sectional survey of prevalence and epidemiological patterns of hepatitis A, B and C infection in Brazil. Cad Saúde Pública, Rio de Janeiro. 2010;26(9):1693–704.
2. Wang YB, Chen EQ, Cui YL, et al. Seroprevalence of hepatitis B virus markers in individuals for physical examination in West China Hospital, China. Eur Rev Med Pharmacol Sci. 2011;15(6):592–6.
3. Zhang H, Li Q, Sun J, Wang C, Gu Q. Seroprevalence and risk factors for hepatitis B infection in an adult population in Northeast China. Int J Med Sci. 2011;8:321–31.
4. Hepatitis B. http://www.who.int/mediacentre/factsheets/fs204/en/. Accessed Nov 2013.
5. Acar A, Kemahli S, Altunay H, et al. HBV, HCV and HIV seroprevalence among blood donors in Istanbul, Turkey: how effective are the changes in the national blood transfusion policies?. Braz J Infect Dis. 2010;14(1):41–4.
6. Tonial GC, Passos AM, Livramento L, et al. Hepatitis B marker seroprevalence and vaccination coverage in adolescents in the City of Itajaí, State of Santa Catarina, Southern Brazil, in 2008. Rev Soc Bras Med Trop. 2011:44(4):416–9.
7. Voigt AR, Neto MS, Spada C, Treitinger A. Seroprevalence of hepatitis B and hepatitis C markers among children and adolescents in the south Brazilian region—metropolitan area of Florianópolis, Santa Catarina. Braz J Infect Dis. 2010;14(1):60–5.
8. Hepatitis C. http://www.who.int/mediacentre/factsheets/fs164/en/. Accessed Nov 2013.
9. Weinbaum CM, Mast EE, Ward JW. Recommendations for identification and public health management of persons with chronic hepatitis B virus infection. Hepatology. 2009;49:35–44.
10. Liaw YF. Management of patients with chronic hepatitis B. J Gastroenterol Hepatol. 2002;17:406–8.
11. Chang MH. Hepatitis B virus infection. Semin Fetal Neonatal Med. 2007;12:160–7. 2002;3:382–8.

12. Özdemir M, Baykan M. Kan merkezimize başvuran gönüllü donörlerde hepatit B, hepatit C ve HIV seroprevalansı. Selçuk Tıp Derg. 2005;21(1):1–4.
13. Kaya S, Arıdoğan BC, Adiloğlu AK, Demirci M. Isparta bölgesi kan donörlerinde HBsAg ve anti-HCV seroprevalansı. S.D.Ü. Tıp Fak Derg. 2005;12:36–8.
14. Sakarya S, Tuncer G, Yaşa H, Çiçek C, Kadıköylü G, Yükselen V. Aydın bölgesindeki kan donörlerinde HBsAg ve anti-HCV seroprevalansı ve yaş ve cinsiyetle ilişkisi. *KLİMİK* Derg 2001;1:22–4. (8)
15. Dilek İ, Demir C, Bay A, Akdeniz H, Öner AF. Seropositivity rates of HBsAg, anti-HCV, anti-HIV and VDRL in blood donors in Eastern Turkey. Turk J Hematol. 2007;24:4–7.
16. Keskinler DÜ. Erzurum Kızılay Kan Merkezi'ne başvuran kan donörlerinin HBV ve HCV yönünden serolojik değerlendirilmesi. İnönü Üniversitesi Tıp Fakültesi Dergisi. 2003;10:195–8.
17. Otağ F, Köksel T. Mersin Tıp Fakültesi Araştırma ve Uygulama Hastanesi Kan Merkezi donörlerinin infeksiyon etkenleri tarama sonuçlarının değerlendirilmesi. MEÜ Tıp Fak Derg. 2002;3:382–8.
18. Temiz H, Gül K. Kan vericilerinin HBsAg, anti-HCV, anti-HIV ve VDRLtest sonuçlarının değerlendirilmesi. Turk J Infect. 2008;22(2):79–82.
19. Demiraslan H, Aksöz S. Adıyaman İli Kan Vericilerindeki HBsAg ve Anti- HCV Sıklığının Değerlendirilmesi. Viral Hepatit Dergisi. 2008;13(1):23–6.
20. Turan H, Şerefhanoğlu K, Kanat-Unler G, Arslan H. Konya İlinde Kan Donorlerinde HBsAg ve Anti-HCV Seroprevalansı ve Yaş ve Cinsiyetle İlişkisİ. Klimik Dergisi. 2011;24(1):36–9.
21. Bhattacharya P, Chandra PC, Datta S, et al. Significant increase in HBV, HCV, HIV and syphilis infections among blood donors in West Bengal, Eastern India 2004–2005: exploratory screening reveals high frequency of occult HBV infection. World J Gastroenterol. 2007;13(27):3730–3.
22. Gheorghe L, Csiki I, Iacob S, Gheorghe C. The prevalence and risk factors of hepatitis B virus infection in an adult population in Romania: a nationwide survey. Eur J Gastroenterol Hepatol. 2012;10. [Epub ahead of print]
23. Guzelant A, Kurtoğlu MG, Kaya M, Keşli R, Baysal B. Kan vericilerinde ve bir ağız-diş sağlığı merkezi calışanlarında hepatit B, hepatit C ve HIV seroprevalansı ile vericilerde risk faktorlerinin araştırılması. İnfeks Derg. 2008;22(4):189–95.
24. Majori S, Baldo V, Tommasi I, Malizia M, Floreani A, Monteiro G, et al. Hepatitis A, B, and C infection in a community of sub Saharan Immigrants Living in Verona (Italy). J Travel Med. 2008;15(5):323–7.
25. Vasilopoulou VA, Hadjichristodoulou C. Migration and viral hepatitis. Viral Hepat. 2008;16:18–9.
26. El Beltagy KE, Al Balawi IA, Almuneef M, Memish ZA. Prevalence of hepatitis B virus markers among blood donors in a tertiary hospital in Tabuk, northwestern Saudi Arabia. Int J Infect Dis. 2008;12(5):495–9.