

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

**Comparison of the prevalence and trends of Hepatitis B
among blood donors in Tripoli, Misurata and Zleetin cities:
Two years before and after Libyan incidences**

Mohamed Ben-Hasan, Mohamed Moafa and Mohamed Alghazal

College of Medical Technology – Misurata

Abstract

Hepatitis B virus is considered as a serious public health problem. Infection of this virus might lead to more serious clinical consequences. This study was conducted to estimate and compare the prevalence and trend of HBV infection among blood donors of three cities in Libya, Tripoli, Misurata and Zleetin and to explore the effect of Libyan incidences on the trend of the infection. A retrospective study was carried out on 72146 nationwide voluntary blood donors in four blood banks, covering the three cities over a period of four years (2009–2013), where serologic screening assay for HBsAg was performed. Findings showed statistically significant differences ($P < 0.05$) in the prevalence of the virus among the cities over the period mentioned. Results also indicated an increasing trend in the overall prevalence of the virus in Tripoli and decreasing trend in Misurata and Zleetin ($P > 0.05$) after Libyan incidences with no statistically significant difference. Sensitive tests

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

such as nucleic acid amplification are recommended for more accurate results.

Introduction

Hepatitis B is known as blood-borne infection caused by hepatitis B virus and considered as a common serious public health problem especially in developing countries (1). The genome of hepatitis B virus (HBV) is a circular double stranded DNA of < 3,200 nucleotides (2). The transmission of the infection of this virus is mainly by blood to blood contact such as, re-use of contaminated needles, sexual contact, dental procedures and vertical transmission from mother to child (3,4). Infection of this virus might finally lead to more serious disease such as a hepatocellular carcinoma (5). Routine tests for blood donors to screen HBV and HCV is done worldwide for a safe blood transfusion and preventing serious clinical consequences (6,7,8). Hepatitis B has been known as one of the most deadly infections. The age of infection with HBV inversely affect the progression of the infection from acute to chronic (9). It was reported that up to 90% of infants who infected from their mothers at birth develop chronic infection whereas only 5% become chronically infected in adults with acute infection from HBV (10). Despite the immunity developed by patients (87–90%) infected with HBV to eliminate infection (11), about 370 million chronic infections were

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

estimated worldwide (12). The fatality of HBV-related diseases was estimated to be 600,000 annually (13). A high prevalence of HBV was reported in regions such as south East Asia, sub-Saharan Africa and china (14). The aims of the present study are to estimate and compare the prevalence of HBV infection among blood donors in three western cities of Libya, Tripoli, Misurata and Zleetin and to explore the effect of Libyan incidences on the trend of the infection. In addition, this study analyzes the risk factors which could associate with higher prevalence. Results of the study may also display a good indication to the overall prevalence of HBV in Libya, since the cities where this study was conducted represent nearly half of the population.

Material and Methods

This retrospective study was carried out in three Libyan western cities, Tripoli, Misurata and Zleetin, over a period of 4 years between January 2009 and December 2013. The year 2011 was not included because of inaccurate records due to the Libyan incidences. These cities were chosen as they comprise more than two third of western cities and nearly half of Libya in population. A total of 72146 voluntary blood donors who were declared physically fit for transfusion were screened for HBV using enzyme linked

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

immunosorbent assay (ELISA). The assay was done using HBsAg ELISA version1 kit (BioTek, USA), which based on the one-step sandwich method. In Tripoli, 32098 blood volunteers were screened at the blood bank of Tripoli Medical Centre (TMC), and in Zleetin 13467 screened at the Central Hospital of Zleetin, while in Misurata, 19836 at the National Cancer Institute (NCI) and Misurata Medical Centre (MMC).

Statistical Analysis

Data were entered into Microsoft Excel spreadsheets and analyzed by means of the statistical package for social sciences (SPSS-PC version17.0, computer software). The overall prevalence of HBV among the three cities was compared using ANOVA test. Post Hoc LSD test was performed to address cities with significantly different prevalence. The difference in the prevalence before and after Libyan incidences was analysed using paired t-test. Statistical significance was defined as $P < 0.05$.

Results

The number of blood donors with positive HBsAg in the whole area of the study was 496 showing a prevalence of 0.69%. In Tripoli, the number of blood donors found to be positive for HBsAg was 287 from total blood donors of 32098, giving an overall prevalence of 0.89% (Fig. 1). The number

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

of infected donors in the year 2009 was found 77 from a total of 8754 blood donors, showing a prevalence of 0.87%.

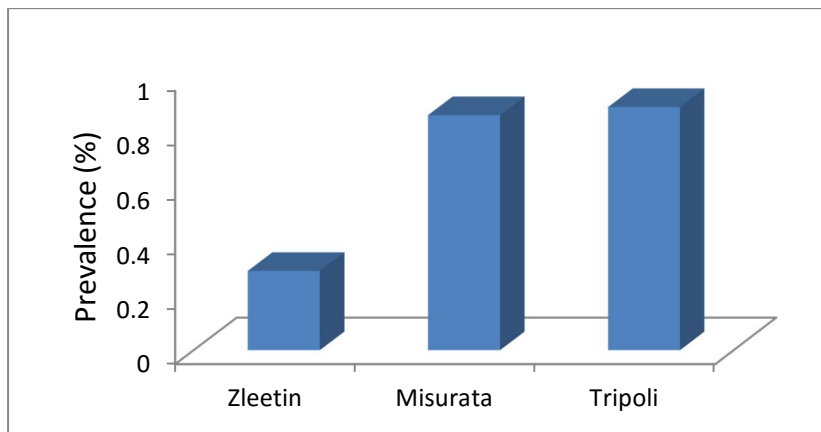


Fig.1- The overall prevalence of HBV over four years of the study.

The x-axis represents the percentage of overall prevalence while y-axis represents cities of the study

The prevalence in the year 2010 was 0.74% but subsequently increased to 0.78% in 2012 and reached 1.18% in 2013 (Fig. 2).

In Misurata, the number of positive HBsAg donors was 170 from a total number of 19836, representing an overall prevalence of 0.86% (Fig. 1). The prevalence of HBV through were 1% in 2009, 1.14% in 2010 and dropped to 0.71% and 0.66% in 2012 and 2013, respectively (Fig. 2).

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

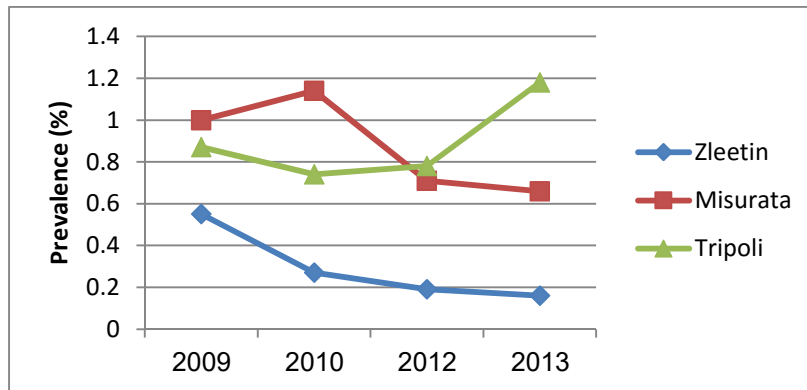


Fig.2- Trend of the prevalence of HBV in the three cities over four years of the study

The x-axis represents the percentage of overall prevalence while y-axis represents years of the study

In Zleetin, the overall prevalence of HBV was 0.29% corresponding to 39 Positive HBsAg blood donors (Fig. 1). The prevalence of HBV was 0.55% in 2009 and gradually decreased to 0.16% in 2013 (Fig. 2).

The difference in the overall prevalence of HBV between Zleetin and Tripoli, and between Zleetin and Misurata was statistically significant ($P < 0.05$), while between Tripoli and Misurata was not significant ($P > 0.05$).

The prevalence of the infection when compared two years after Libyan incidences in 2011 with two years before was found to be increased in Tripoli, while decreased in Misurata and Zleetin. The difference in the

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

overall prevalence after and before Libya incidences in 2011 was found to be not significant ($P>0.05$).

Discussion

The availability of safe blood transfusion is needed in all countries to prevent common serious complications, such as HBV infection. In developed countries, reduction of unnecessary transfusions, recruitment of regular blood volunteers and screening for blood transmissible infections has prevented transfusion-transmitted infections (15). However, such interventions are not applied uniformly in many developing countries and, therefore, the risk of blood-transmissible infections remains high (16). Statistics released by World Health Organization (WHO) have revealed that 80% of world population can have access to only 20% of the world's safe blood supply (17). Studying the prevalence of HBV in blood banks gives a good indication to its prevalence in the whole city due to the big number of volunteer blood donors. In the cities of the current study, the blood donors were all volunteers or from the relatives and friends of the blood recipient. The study showed an overall prevalence of 0.89%, 0.86% and 0.29% in Tripoli, Misurata and Zleetin, respectively, with an overall prevalence of 0.68% in the total area of the study. It was reported that areas of low endemicity, where the prevalence of HBsAg is less than 1%, account for

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

about 12% of the world's population (18). The low prevalence of HBsAg obtained in the three cities qualifies the cities and all area of the study as a low prevalence area (less than 2%), according to the WHO classification (19). Moreover, these results might, to some extent, reflect the overall prevalence of this infectious disease in Libya, since the area of the study comprises nearly more than half of the Libyan population..

Higher prevalences of the disease compared to area of the study were reported worldwide. For instances, 1.18% in New Delhi (20), 1.4% in North Region of Jordan (15), 6.25% in Nyala- Sudan (21), 10.9 % in Jijiga -Eastern Ethiopia (22) and 13.3% in Nairobi- Kenya (12).

The low prevalence of this infectious disease in the three cities might be considered as a reflection to people awareness, availability of vaccination, religion, social cohesion and literacy in the country.

The prevalence of HBsAg in Tripoli city was the highest among the three cities of the study. Moreover, an increasing trend of the prevalence in the city was noticed over the four-year period of the study. The least overall prevalence was found in Zleetin city with a decreasing trend noticed over four-year period of the study. Misurata was observed to be with slightly lower prevalence than Tripoli and higher prevalence compared to Zleetin.

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

However, the city showed a decreasing trend of the prevalence in the last three year-period of the study.

The least overall prevalence in Zleetin can be attributed to the small size and low population of the city which led to limiting drug trafficking and reducing the number of illegal immigrant infected by HBV.

Most infections of HBV low endemic areas are acquired by using of intravenous drug or unprotected sexual activities (23). The instability, and absence of law after Libyan incidences in 2011, which motivated sexual violence and rape might contributed to the increasing trend in Tripoli. Moreover, illegal immigrants, who might be infected with the virus and involved in drug dealing, may also contributed to the increasing trend. In contrast, the decreasing trend of the infection in Misurata and Zleetin may be due to being relatively stable cities after the Libyan incidences.

Limitation of the current study was the use of only HBsAg detection to determine the prevalence of the infection. During the period between disappearance of HBsAg and appearance of HBs antibodies “window phase”, hepatitis B core antibodies (anti-HBc) are the only serum marker of acute hepatitis B infection (24). It was reported that HBV can be transmitted from positive anti-HBc and negative HBsAg person when transfused (25, 26) and therefore, the prevalence of the virus will be increased. Moreover,

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

earlier detection of the virus using sensitive tests such as nucleic acid amplification (15) should have been done for more realistic results.

Conclusion

The prevalence of HBV infections among blood donor in the area of the study is low which could give an impression to a low prevalence of the infection in Libya. Zleetin has the lowest prevalence of the virus among the three cities. Although the prevalence of the virus was increased in Tripoli and decreased in Misurata and Zleetin after Libyan incidences, the differences are statistically not significant.

Acknowledgment

Special thanks go to Mr. Morad Sahal, BSc in Medical Laboratory, from Misurata central hospital for helping us with the data collection from Zleetin and Tripoli blood banks, and Dr. Deyadeen Alshibani for helping us with the statistical analysis.

References

- 1- Kalepoto GN, Bhally HS, Khaliq G, et al. Epidemiology of blood-borne viruses. A study of health blood donors in southern Pakistan. *J. Pak. Med. Assoc.* 1996; 27: 703-6.
- 2- Rehermann B and Nascimbeni M. Immunology of Hepatitis B virus and Hepatitis C virus infection. *Nature Publishing Group.* 2005; 5: 215-229.

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

- 3- Ishak KG. Pathologic features of Chronic Hepatitis. *Am. J. Clin. Path.* 2000; 11: 40-55.
- 4- Kumar et al. Robbin and Cotran pathologic basis of disease, *Elsevier 7th ed.* 2005: 891-898.
- 5- Nazar H, Nadia N, Shazia N, et al. Prevalence of hepatitis B and hepatitis C in blood donors in Karachi. *Biomedica.* 2008; 24: 116-117.
- 6- Kaur P and Basu S. Transfusion-transmitted infections: existing and emerging pathogens. *J Postgrad Med.* 2005; 51 (2):146-51.
- 7- Bihl F, Castelli D, Marincola F, et al. Transfusion transmitted infections. *J Transl Med.* 2007; 5:25.
- 8- Salawu L, Bolarinwa RA, Adegunloye AB, et al. HBsAg, anti-HCV, anti-HIV and VDRL in blood donors: Prevalence and trends in the last three and a half years in a tertiary health care facility in Ile-Ife, Nigeria. *International Journal of Medicine and*

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

Medical Sciences. 2010; 2 (11): 335–34.

9- Hwang EW and Cheung R. Global Epidemiology of Hepatitis B Virus
(HBV)

Infection. NAJ Med Sci. 2011; 4 (1): 7–13.

10- McMahon BJ, Alward WL, Hall DB, et al. Acute hepatitis B virus
infection: relation

of age to the clinical expression of disease and subsequent development
of the carrier

state. *J Infect Dis*. 1985; 151(4): 599–603.

11- Ott JJ, Stevens GA, Groeger J, et al. Global epidemiology of hepatitis B
virus

infection: New estimates of age-specific HBsAg seroprevalence and
endemicity.

Vaccine. 2012; 30: 2212– 2219.

12- Kerubo G, Khamadi S, Okoth V, et al. Hepatitis B, Hepatitis C and
HIV-1

Coinfection in Two Informal Urban Settlements in Nairobi, Kenya.
PLoS ONE. 2015;

10 (6): e0129247.

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

13- Goldstein S T, Zhou F, Hadler S C, et al. A mathematical model to estimate global

hepatitis B disease burden and vaccination impact. *International Journal of*

Epidemiology. 2005; 34: 1329–1339.

14- Sheriff HA. Prevalence of Hepatitis B and C Among Normal Individuals in

Tripoli/Libya. *AJPS*. 2010; 8 (2): 104–109.

15- Abed Al-Gani F. Prevalence of HBV, HCV and HIV-1, 2 infections among blood

donors in Prince Rashed Ben Al-Hassan Hospital in North Region of Jordan. *Int J*

Biol Med Res. 2011; 2 (4): 912–916.

16- Gurol E, Saban C, Oral O, et al. Trends in hepatitis B and hepatitis C virus among

blood donors over 16 years in Turkey. *Eur J Epidemiol*. 2006; 21 (4): 299–305.

17- Lee HH and Allain JP. Improving blood safety in resource-poor settings. *Vox*

Sanguinis. 2004; 87 (2):176–179.

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

18- Hwang EW and Cheung R. Global Epidemiology of Hepatitis B Virus (HBV)

Infection. *NAJ Med Sci.* 2011; 4 (1): 7-13.

19- Singh K, Bhat S and Shastry S. Trend in seroprevalence of Hepatitis B virus infection

among blood donors of coastal Karnataka, India. *J Infect Dev Ctries.* 2009; 3(5): 376-

79.

20- Makroo RN, Hegde V, Chowdhry M, et al. seroprevalence of infectious markers &

their trends in blood donors in a hospital based blood bank in north india.

Indian J

Med Res. 2015; 142: 317-322.

21- Abou MA, Eltahir YM and Ali AS. Seroprevalence of Hepatitis B virus and Hepatitis

C virus among blood donors in Nyala, South Dar Fur, Sudan. *Virology Journal.* 2009;

6:146.

22- Mohammed Y and Bekele A. Seroprevalence of transfusion transmitted infection

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

among blood donors at Jijiga blood bank, Eastern Ethiopia: retrospective
4 years

study. *BMC Res Notes*. 2016; 9:129.

23- Gust ID. Epidemiology of hepatitis B infection in the Western Pacific
and South East

Asia. *Gut*. 1996; 38(2):18–23.

24- Al-Mekhaizeem KA, Miriello M and Sherker AH. The frequency and
significance of

isolated hepatitis B core antibody and the suggested management of
patients. *CMAJ*.

2001; 165(8): 1063–1064.

25- Hoofnagle JH, Seefe LB, Bales ZB, et al. Type B hepatitis after
transfusion with

blood containing antibody to hepatitis B core antigen. *N Engl J Med*.
1978; 298:

1379– 1383.

26- Tegtmeir G, Henderson S, McNamara A, et al. Contribution of anti-
HBc screening to

blood safety at a regional blood center in the United States. *Transfusion*.
1997; 37

**Comparison of the prevalence and trends of Hepatitis B among blood donors
in Tripoli, Misurata and Zleetin cities: Two years before and after Libyan
incidences**

(9S): 110s [abstract439].