



## Prevalence of HBV and HCV Infections among Blood Donors in Northeast Libya

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### Authors' contributions

*This work was carried out in collaboration between all authors. Authors SRMQ and MSA designed the study and wrote the protocol. Author MSA wrote the first draft of the manuscript, analyzed of the study with help of statisticians and managed the literature searches. Authors SAMM and FAK collected the data. All authors read and approved the final manuscript.*

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### ABSTRACT

**Background:** Blood donation is a very important life-saving intervention in health care services. Post transfusion infections such as hepatitis and human immunodeficiency virus infection continues to be an important public health concern with regard to blood transfusion, and WHO has recommended that these diseases should be screened to get safe blood. Therefore, testing for hepatitis B surface antigen (HBsAg), and antibodies to hepatitis C antigen (anti-HCV) is a very important preventive measure.

**Methods:** The objective of this study was to establish the prevalence of hepatitis B and C virus seromarkers among blood donors as a foundation for safe blood transfusion in North East of Libya

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from 2008 until 2015. The total of 78.987 blood samples obtained from healthy blood donors who attended blood bank, were tested for HBsAg and anti-HCV antibodies by a third generation enzyme linked immunoassay (ELISA).

**Results:** From total samples examined, the frequency of HBsAg positive cases was 0.21%, the number of anti-HBV positive samples were found to be particularly high in the age group 41>50 years. The number of anti-HCV positive samples was found to be particularly high in same age group. The frequency of HCV positive blood donors among this sample was 0.24%.

**Conclusion:** The study revealed a low prevalence of HBV and HCV among our prospective blood donors. It could be that people who know their status do not come for blood donation or as a result of other challenges confronting safe blood practices in Northeast of Libya.

*Keywords: Libya; hepatitis; HBV and HCV.*

## 1. INTRODUCTION

Transfusion of blood and blood product is a life-saving measure and benefits numerous patients worldwide. However, transfusion is an important mode of transmission of infection to the recipients. In 2005, all member states of WHO signed a document that commits them to the provision of safe and adequate blood and blood products to patients [1]. Transfusion-transmitted infectious diseases remain a major topic of interest for those involved in blood safety [1]. To avoid infection by blood transfusion, safety is very important because of blood transfusion is an integral part of medical and surgical therapy. Therefore, the tests for HIV, HBV, HCV syphilis and malaria are mandatory in the blood bank [2]. Hepatitis B virus (HBV), hepatitis C virus (HCV) are a major global public health problem warranting high priority efforts for prevention, control and treatment [3]. Testing for hepatitis B surface antigen (HBsAg) is the commonly used screening test in developing countries [4]. The hepatitis C virus was discovered in 1989. It is transmitted via blood and blood products, both parenterally and through sexual contact [5]. Libya, a developing country of approximately 6 million people, belongs to the intermediate endemicity countries with a wide variance of sero-positivity among different regions and populations [6]. A national serological survey for HBV and HCV infections among the general population was performed in Libya during 2003 and revealed prevalence of 2.2% and 1.2% for HBV and HCV, respectively [7]. A local surveys reported that the rate of HBsAg positivity among blood donors ranged from 1.3% to 4.6% [8], while the rate of HCV antibodies was 1.2% [9,10]. Very recently, the frequency of HBsAg positive blood donors and anti-HCV among this sample was 0.8% and 0.7% respectively in blood donors in western Libya (Tripoli) [11]. There has

been relatively little research on the prevalence of hepatitis in Libya; as well as to estimate the correlation risk factors in blood donor samples. Therefore, the present study was an attempt to screen the HBV and HCV in blood donors in Eastern Libya (area including El-Beyda, Susa, Shahat and Almarj). This would be an important factor for the health authorities to consider in blood donor bank.

## 2. MATERIALS AND METHODS

The study protocol was reviewed and approved by Bioethics Committee at Biotechnology Research Center (BEC-BTRC) with Ref No: BEC-BTRC 05-2016. A cross-sectional survey was done among blood donors at the blood bank in the four different regions of Northeast Libya. A total of 78.987 subjects were included in the study over the period from 2008 to 2015. Subjects were tested for evidence of HBV, HCV infections plus other relevant blood-borne pathogens. A questionnaire sheet for the collection of personal information (such as name, age, and sex), family history of HBV infection, and history of immunization against HBV, was prepared and used for each subject.

The total of 78.987 blood samples were obtained from healthy blood donors. All the donors were medically examined before donation; as per the blood bank's standard operating protocol; any donors who were anaemic, or who had low body weight or low blood pressure at the time of donation, were excluded. Only individuals in good health should be accepted as blood donors. The donors were from different regions of the Northeast of Libya including El-Beyda, Susa, Shahat and Almarj. The total donors blood samples in blood bank were screened for HBV and HCV, their age were ranged from 20 to 50

years old. The majority of the donors were males, from different regions.

Blood sample was collected on site and transported within a few hours (less than 3 hours) to the local laboratory in blood bank in the region for separating serum aliquots and stored in a  $-20^{\circ}\text{C}$  deep freezer until testing. Seropositivity to HBV was defined by detection of hepatitis B surface antigen (HBsAg) and seropositivity to HCV by detection of anti-HCV antibodies by a third generation enzyme linked immunoassay (ELISA). Samples that initially gave a positive HBsAg and anti-HCV antibodies result were repeatedly (3 times) tested for confirmation. The contributing blood donors were presented separate into four regions of study and then divided into age groups. Data is presented and described by using mean, and table presentations.

### 3. RESULTS

The total of 78.987 blood samples were obtained from healthy blood donors who attended to blood bank during the period from 2008 to 2015. Among the studied sample, the prevalence of HBsAg (hepatitis B surface antigen) was found to be 172 (0.21%) and the prevalence of anti-HCV antibody was found to be 197 (0.24%) in four different regions for period time of study (Table 1). The highest prevalence of HBV and HCV infection were reported in El-Beyda (55.8% and 46.7% respectively) comparing with other regions. While the lowest prevalence of HBV and HCV infection were reported in Shahat (4.6% and 5.6% respectively). The age groups and infections were associated with each other (Table 2). In contrast to HBsAg-positive blood donors was found 54.1%, the number of anti-HCV antibody positive samples found 47.2% in the older age group 41-50 years (Table 2).

**Table 1. Distribution of prevalence of HBV and HCV among four regions of study over 8 years**

Region	Sero-positive HBV (%)	Sero-positive HCV (%)
El-Beyda	96 (55.8%)	92 (46.7%)
Susa	30 (17.6%)	49 (24.9%)
Shahat	8 (4.6%)	11 (5.6%)
Almarj	38 (22%)	45 (22.8%)
Total	172 (0.21%)	197 (0.24%)

**Table 2. Seropositive donors by age group (n=78.987)**

Age (years)	Sero-positive HBV (%)	Sero-positive HCV (%)
21-30	32 (18.6%)	35 (17.8%)
31-40	47 (27.3%)	69 (35.1%)
41>50	93 (54.1%)	93 (47.2%)
Total	172 (0.21%)	197 (0.24%)

### 4. DISCUSSION

The prevalence of hepatitis infection in the general population in Northeast of Libya is not available due to the lack of publication for the past decades. Hepatitis markers are important tests in screening blood donors and prevent transfusion-related hepatitis. Total 78.987 donors were screened over an 8-year period from 2008 to 2015. The results of this study indicate that of the apparently healthy voluntary blood donors in four regions (172) 0.21% were positive for HBsAg and (197) 0.24% were positive for anti-HCV (total number 369). This prevalence for HBsAg is lower than that reported in the international finding in Libya during 2003 (2.2% for HBV and 1.2% for HCV) [8]. In Libya, a study conducted between 1991 and 2001 indicated that the prevalence of HCV infection ranged from 1.2% to 1.6% among blood donors, similar to the prevalence among the general population reported in 2014 of 1.2%, though it was much higher (20.5%) among hospital personnel but similar to that reported from the western region 0.8% for HBV and 0.7% for HCV [11]. This could be explained by the fact that families of blood donors search for "physically healthy" blood donors. The prevalence of HBsAg among blood donors has been found to be 9.8% in Yemen [12], 1.2% in Egypt [13] and 1.2–1.7% in India [14].

From the results of the present study, the prevalence rates of HBV and HCV were highest in El-Beyda city and lowest rates were in Shahat, which refer to number of population in four region of study. Moreover, the prevalence rates of hepatitis B and C were lower among young donors than older donors. This confirms the results reported earlier by another study in India [15] and in Libya [11,16]. Additionally, the comparisons of the prevalence of transfusion viruses among different sex blood donors may not be applicable because all donors were male; this is due to the fact that Libyan women are less willing to donate blood practically in East of Libya

which is in consistency with preceding studies [11,17,18].

Testing for HbsAg may not identify donors with occult HBV infection who have isolated anti-HCV anti- bodies. Anti-HCV remains positive lifelong in all the donors with an HBV infection in the past. However, it remains useful to screen for anti-HCV, since for the purpose of blood transfusion it is better to exclude all anti-HCV-positive donors to prevent transfusion-related HBV infection. Since 1997 blood units were routinely examined for anti-HCV in all blood banks in Libya, which should reduce the transmission through blood transfusion. Our data do not necessarily represent the true hepatitis B and C prevalence among the general population and thus are in need of further updating. To the best of our knowledge, this is few large-scale study to examine the prevalence of sero-markers in blood donors in East of Libya. However, there are some limitations to this study, due to the lack of information such as the history of blood transfusion, dental extraction, surgical operation, cupping and tattooing. Future studies will be needed to explore these areas. One possible limitation of the study is that it included only blood donors, and this may not reflect the real prevalence in the whole society. Generally, Libya is experiencing a major challenge regarding its geographical, political and social-ethnic identity. Thus, future planning regarding infectious disease should be prioritized [19]. Hence, further studies are needed to elucidate the different factors associated with the higher prevalence of HCV among Libyan blood donors.

## 5. CONCLUSION AND RECOMMENDATION

In conclusion, the study revealed a low prevalence of HBV and HCV infectious agents among the prospective blood donors in Northeast of Libya were found 0.21% and 0.24% respectively. HCV infection is more prevalent than HBV infection in blood donors at age 41>50 years. A better understanding of the epidemiology of hepatitis B and C infection will allow health authorities to revise and plan new strategies within the health care system. Lastly, strategies should be put in place to take care of infected blood donors. Moreover, it uses enough sample size, thus, the result produced from this study reflect the real situation in the Libyan populations living in the Northeast of Libya but cannot be generalized among the whole general blood donors of Libya.

## CONSENT

It is not applicable.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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