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**Seroprevalence of transfusion-transmissible infections HIV,
HBV, and HCV among blood donors in Derna, Libya**

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Abstract

Blood transfusion is the process of receiving blood products in a variety of medical conditions. To ensure the safety and efficacy of the blood supply and that any adverse outcome are dealt with on time and efficiently, strict procedures must be followed. Transfusion transmitted infections (TTIs) are a major problem associated with blood transfusion. Although the risk of TTIs is lower than ever, the supply of blood products remains subject to contamination with known and yet to be identified pathogens. The aim of this study is to investigate the seroprevalence of TTIs (HIV, HBV and HCV) among the healthy blood donors in Derna hospital. This study may help in a way to establish a good strategy for the blood donation system in Derna city/Libya. A retrospective analysis of blood donor's records covering the period between 2015 and 2016 was conducted to analyse for seroprevalence of HBV, HCV and HIV among blood donors. The number of donors among two years was 5941. Males formed the majority of the donor population accounting for 5923 (99.7 %). The prevalence of hepatitis B surface antigen (HBsAg) was the majority of infection and found to be (0.4 %), followed by anti-HCV(0.3%) while the prevalence of HIV was found to be (0.0001%) over period time of study. The present study clearly documents low seroprevalence 43/5941 (0.7%) of TTIs, highest prevalence of TTIs was within age group <30 years which found to be the most common age group of donors. Our study showed high prevalence of HBV compared to the other viral markers and also showed low female participation. This study, which is the first to measure the risks of TTIs in Derna city, Libya, discloses the need to implemented more precaution measures, stringent donors selection criteria and screening strategies to improve transfusion safety in the region.

Key-words: Derna, Libya, TTIs, HBV, HCV, HIV

Introduction

Transfusion transmitted infections (TTIs) are a major problem associated with blood transfusion. The mandatory testing of all blood donations for HIV-1 and 2, Human T cell Lymphotropic virus (HTLV) I and II, Hepatitis C virus (HCV), Hepatitis B virus (HBV) followed by the NAT testing which reduces the window period by detecting early stages of infection, greatly reduce the risk of TTIs (Dodd et al. 2002).

Different studies were undertaken in many countries to evaluate the prevalence of HIV, HBV and HCV among blood donors. Some reports in Europe and in the US recorded a reduction in the risk of HCV, while The prevalence of HCV antibodies in blood donors in developed countries ranges from 0.4-2% (Bihl et al. 2007). A study in Libya has found that the prevalence of HCV infection among Libyans is 1.2% (Daw et al. 2014).

Transmission of HIV by blood transfusion is a major health problem worldwide, World Health Organization(WHO) reported in 2005 that 38 million people were living with HIV worldwide, 4.1 million were newly infected and 2.8 million had died of AIDS. A study in Libya by Daw et al. 2013 showed that the prevalence of HIV was 0.015% in 2012. WHO recommends universal routine infant HBV vaccination and that plays an affective role in the prevention and control of HBV infection. World wide, HBV remains a substantial risk for TTI infection as more than 300 million individuals infected (Bihl et al. 2007). A study was carried out on the healthydonors in west of Libya and it found that the frequency of anti-HBc was 10% which is high compared with other studies (Mohamed et al. 2015). This study was carried out to investigate the seroprevalence of transfusion transmitted infectious diseases (HIV, HBV and HCV) among the blood donors in Derna City. It may help to set up a good national strategy for the blood donation system, at least it can help to knowledge about the current

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situation of TTIs among the blood donors in Derna city.

Material and Methods

A retrospective analysis of blood donor’s records, the data was collected from the blood bank Lab at Derna hospital. A total of 5941 blood donors attended the blood bank were included in the study over the period from January 2015 to December 2016. The age distribution of all the donors ranged from 18 to 59 years and the number of male donors were more than the females.

Prior to blood collection, the donors were requested to answer some general questions included weight being more than 45 kilograms, Hemoglobin being more than 12.5 g/dl, temperature, pulse, blood pressure. All the donors were medically examined by consultant before donation. However, the blood bank lab at Derna’s hospital doesn’t have proper questionnaire that would determine the eligibility of the donor as per the criteria set by WHO.

Before the donation, each potential donor was required to fill their details like their name, age, sex, date of birth, profession, marital status and contact numbers, also some data regarding their general health. All donors details were recorded from the donor consent forms kept in the blood bank records. Blood donors were given a unique identification number so all sampled involved were anonymous. Sample was collected from each participant using venipuncture technique (Aseptic and antiseptic presenter) by disposable syringe. All donated blood was screened (mandatory screening tests) for the presence of hepatitis B surface antigen (HBsAg), Hepatitis C virus antibodies (anti-HCV), and HIV antibody (anti-HIV), using commercially available ELISA kits and also a rapid chromatographic immunoassay test for the qualitative detection of anti-HCV, HIV type 1 and HBsAg. Samples were recorded as a positive according to the manufacturer’s instructions.

Statistical analysis

The data was collected, entered and analyzed using SPSS version 19 and Excel. Infections among reactive and nonreactive blood donors were analyzed. Data were presented and described by using valid percentages from Frequency Table, graphical presentations and cross tabulations.

Results and Discussion

Home Starting from January 2015 to December 2016, the total numbers of blood donors were 5941. Among the donors visited the blood bank at Derna’s hospital over the past 2years, male constitutes the

majority 5923 (99.7%) of the donors, while females make up 18 (0.3 %). The most common age group of donors was found to be <30 years (45.1 %) followed by age group of 30≥ 40 years (40.9 %), followed by age group of 40≥ 50 years (10.9 %), while the least age group was 50≥ years (3.0 %). The blood donation rate have gradually increased in the middle of 2015 due to the conflict in the city as the total donations number was 3021 compare to 2016 was 2920 as showing in Figure 1.

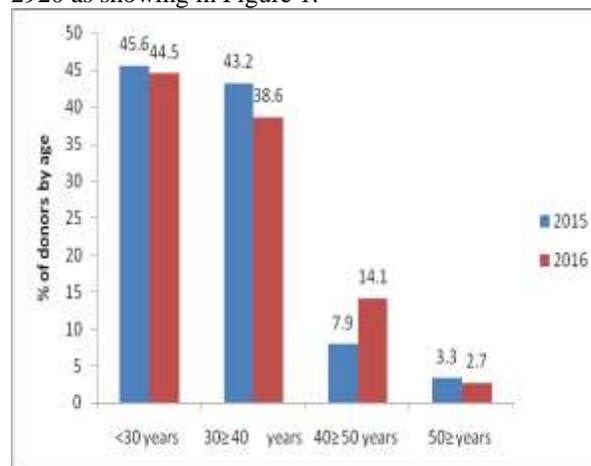


Fig. 1: The percentage of donor included in the study by age Derna, Libya, 2015-2016

The total (5941) donors blood samples were studied and screened for the prevalence of HBV, HCV and HIV infectious disease. The prevalence of HBsAg was the majority of infection and found to be (0.4%), followed by anti-HCV(0.3%), while the prevalence of HIV was found to be (0.0001%) over period time of study. Comparing the two years we found that the high percentage of TTI was seen in 2016, change in sero-positivity from year 2015 to 2016 (Figure 2).

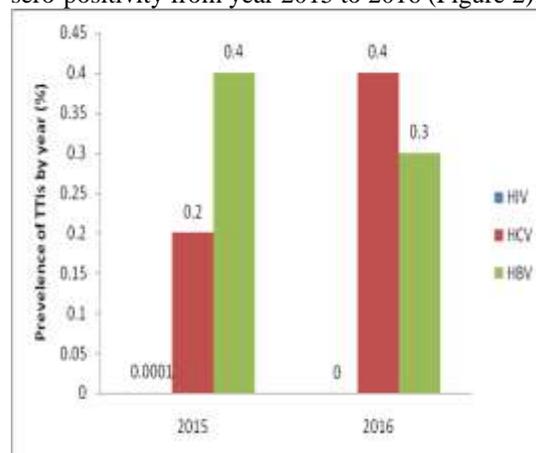


Fig. 2: The percentage of infected cases of HIV, HBV and HCV among donors over two years

The present study clearly documents low seroprevalence 43/5941 (0.7%) of TTIs. Highest prevalence of TTIs was within age group <30 years as was (0.4 %), followed by age group 30 ≥40 as found to be (0.3%), While age groups 40≥50 and 50≥ years were the least affected age group (0.02 %). HBsAg and HCV was reported from all age group of donors, while HIV was only seen in age group <30 years (figure 3).

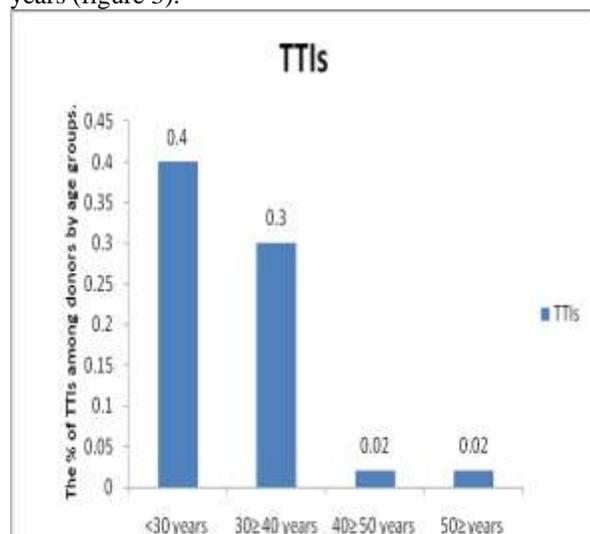


Fig. 3: The percentage of infected cases of TTIs among donors by age groups over two years

All types of TTIs were reported from males and only one HBV infected case was female donor. However, as the majority of the donors were male, the comparisons of the TTIs percentage between both gender may not be valid.

Though Blood transfusion is a life saving procedures, it is associated with risk of post-TTIs. TTIs are potential risk and major issue for the recipients of blood products (Matee et al. 2006).

The mandatory testing of all blood donations not only gives us an idea about the prevalence of TTIs in healthy donors but also ensures the safety of blood products. Despite donor screening, availability of totally safe blood free from TTIs is still enormous challenge.

The results of this study showed the seroprevalence of major TTIs (HBV, HCV and HIV antibodies) among blood units donated at the blood bank Lab at Derna's hospital from 2015 till 2016. In this study over the 2 year period, the blood donations tested with a cumulative total of 5941.

HBV is major source of TTIs and in our study the incidence of HBsAg in the blood donors was around 0.4 %, seroprevalence of HBsAg in a different

Libyan studies was shown to range between (0.21 - 2.2)(Elzouki et al. 2103&Doro et al. 2015). Moreover, a study in northeast of Libya observed similar results (Doro et al. 2015).

Furthermore, our finding had very low prevalence of HbsAg compared with studies done in neighbour countries as about 7% in Tunisia, Algeria (Ezzikouri et al 2013) and about 1.2% in Egypt (Darwish et al. 1993).

In our study the percentage of seroprevalence of anti-HCV was around 0.3% so our finding was lower when compared to study in west of Libya (1.2% for HCV)(Elzouki et al. 2103). Moreover, Our data agreed with the study in northeast of Libya (0.24% for HCV)(Marfoua et al 2014).

A study carried out between 1991 and 2001 in Libya, shown 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% (Doro et al. 2015).

In the present study, the frequency of HIV is shown to be (0.0001%), which is lower than that reported in the capital of Libya of (0.15%)(Daw et al. 2014).). Also it is lower than in study in northeast of Libya as frequency of HIV was 0.014%(Gupta et al 2004). Our finding is similar to study from Egypt in which it was no cases reported (Nada et al. 2013).

In this study the overall prevalence of TTI among blood donors in Derna blood bank over past 2 years was (0.7%), This was lower than findings from neighboring, TTIs among blood donors in Kassala, eastern Sudan 3%(Abdallah et al. 2012), and 1.2% in Egypt(Darwish et al. 1993).

In the present study, the majority of the donors (97%) were males which is similar to study done in different regions of Libya (Marfoua et al. 2014&Ismail et al. 2013). This is due to the different reasons like culture and lack of motivation and education of blood donation among them. This finding made the compare of the prevalence of TTIs among different genders non applicable. Furthermore, efforts should be made to encourage and improve the number of female donors, as our study shows limited number.

In current study risk factors among the blood donors were not analyzed for each blood donor's category individually. This is the first local study in Derna city. Since healthy citizens from different areas, ages, jobs, giving blood donation(s), it could provide an updated image about prevalence of viral infections rate in Derna population. The Blood bank at Derna's hospital should take protection measure to reduce the risk of the TTIs.

However, there are some limitations to our study, due to the lack of information as the blood bank lab at Derna's hospital doesn't have proper questionnaires to include all the necessary data.

Conclusion

Despite the tremendous benefits of blood transfusion, the risks associated with transfusion continue to increase. Although the known risks are controlled and extremely low, new emerging risks emphasise the need to avoid unnecessary transfusion where possible. Special attention should be given to targeted blood donor's population and the population at risk. These measures will improve public health and would increase blood safety and quality. Automation and computerization will develop further, thus reducing the risk of human error. Enhanced transfusion safety in the future will depend on the professionals involved and extremely, on how they utilise new technologies, also on the coordinated optimization of each step in the transfusion chain.

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