

Prevalence of hepatitis B & C virus among blood donors in Taif City, KSA

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Abstract--- The epidemiology of viral hepatitis in Saudi Arabia has undergone major changes, coexisting with major socioeconomic developments over the last two to three decades. However, this disease represents a major public health problem in Saudi Arabia resulting in the need for considerable healthcare resources.

Index Terms— anti-HCV, donors, HBsAg, hepatitis, KSA , Taif

1 Introduction

Worldwide, about 400 million people are infected with the hepatitis B virus (HBV), and the Middle East is the most common infected. Another 170 million people around the world presently infected with chronic hepatitis C virus (HCV) infection [1]. Despite education and availability of effective drugs and vaccines, infection by Hepatitis B virus (HBV) and Hepatitis C virus (HCV) are still a major global health problem [2]. Both HBV and HCV represent a wide-reaching epidemic. However, it showed a significant decline in the last two decades that could be attributed to the vaccination programs and the improved health services [3]. Although significant decline in the occurrence of HBV and HCV infection in Saudi Arabia, these viral diseases cause significant morbidity and mortality, and impose a great problem on the country's healthcare system [4].

The mode of transmission for both types of hepatitis is mainly parenteral. The transfusion recipients of blood and blood-products [5] and intravenous drug abusers are major causes of transfusion-transmitted infection (TTI). The prevalence of HBsAg among blood donors ranges from near zero in some of the western world to as high as 15% in some Asian and African Republics [6]. Among Saudi blood donors, the prevalence of HBsAg and anti HCV were found to be 5% and 1% - 2% respectively [7].

Blood safety still remains an issue of major concern in transfusion medicine in Saudi Arabia. There is high incidence of blood-demanding health conditions in Saudi Arabia resulting from anemia, malnutrition, accidents, surgical and obstetrical emergencies associated with blood loss, etc. The higher possibility of transmitting HBV and other blood-borne pathogens through

contaminated blood present among those higher demand for blood transfusion services [8]. So, Screening blood donors is needed to prevent additional spread of such infection. Thus the objective of this current retrospective study was to determine prevalence of hepatitis B & C virus among blood donors in Taif City based on reviewing available records of the Blood Bank of different Taif Hospitals in the past 2 years, and to detect any change in the trend of prevalence over the study period in attempts to reduce the rates to ensure safer and more reliable blood for transfusion.

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2 Subjects and Methods

This retrospective study samples included all individuals who donated blood from January 2015 to end of December 2016 were screened for Hepatitis B and C viruses at King Abdulaziz specialist Hospital (KASH), King Faisal Hospital (KFH) and Alhada Military hospital.

Retrospective donors (Females & Males) who were passed a history screen and pre-donation screening test for HBsAg and anti HCV were considered fit to donate blood.

The positive donors were classified according to age into 5 groups; <20; 21-30; 31-40; 41-50; and >50. Also, they classified according to their gender and nationality.

The screening of blood donors for HBsAg and anti-HCV is obligatory thus blood donations from positive individuals for any of the above infections were not done.

Archived collected results of blood donors from the hospitals blood banks from January 2015 to end of December 2016 were used for this study with ethical approval from the hospitals authorities. We compared the numbers and % of positive donors for hepatitis in the past two years (2015; January 2015 – December 2015 and 2016; January 2016 – December 2016).

All the blood donors in this study were healthy with no signs and symptoms of jaundice, any illness and no history of drug intake in the recent past. Many of them were first time donors as recorded in their files.

The level of HCV-Ab and the hepatitis B surface antigen (HBsAg) were assessed by commercial DIA.PRO Diagnostic Bioprobes ELISA kit (Italy) following manufacturer's instruction.

Statistical analysis: All variables were categories and represented as numbers and %. Comparing % of positive donors between the last 2 years using chi square. <0.05 is considered significant. The ages of positive donors expressed as mean \pm SD using SPSS version 16[9].

3 Results

The retrospective study of blood bank donors revealed that, total numbers of donors were (9884) in King Abdulaziz specialist Hospital,

(4350) King Faisal Hospital and (16356) in Alhada Military hospital (Fig 1).

The total number of cases found positive for both infections were 106; for HBsAg were 100 (94.34 %) and for anti HCV were 6 (5.66%) (table 1, Fig 2)).

The ages of the positive donors were ranged between 18-65 years (age: mean \pm SD; 38 \pm 12.26). The age group with the highest number of donors was 25-40 years. The number of positive cases in each group of age and their percentage is presented in Table 2 (Fig 3). The highest prevalence of hepatitis (50% of all positive cases) was recorded between the middle ages (31-40 years). Hepatitis B was 49 positive donors and hepatitis C was 4 only. However, the lowest prevalence was recorded in the <20 age group (1.89%). This case was positive to HCV. 27 positive donors were between 21-30 years, while 20 positive donors were between 41-50 years (25.47% and 18.87% respectively). Only 5 HBsAg positive donors was >50 years.

Table 3 reveals that; Most of the positive donors were in male. The number of positive donors for HBsAg were 99 (93.4 %) and for anti HCV were 6 (5.7%). In this study only 1 female donor was found positive for HBsAg (Fig 4).

Regarding nationality of positive cases for HBsAg and anti-HCV as shown in table 4, a very high prevalence of HBsAg (82.08 %) and anti-HCV (2.83 %) were found among Saudis donors (no. 90). Only 16 donors of 106 positive donors were non Saudis. 13 non Saudis positive donors (three Pakistani donors, 5 Syrian, 2 Bangladeshis, 1 Yemenis, 1 Bahraini and 1 Kuwaiti were positive for HBsAg. While other three donors were positive for anti HCV. The nationalities of non-Saudis donors that positive for anti HCV were 1 from Yemen and 2 from Egypt.

Comparison of total numbers and percentages of donors between the last two decades (table 5, Fig 6) shows that, The overall prevalence rate for positive donors was highest in 2015 (total no: 65 ; ~ 61 %) but decreased in 2016 to ~ 39 % (no. 40). This % difference between the two decades was highly significantly lower ($p < 0.001$). However, as shown in table 5, HBsAg Positive donors were decreased in 2016 while Anti HCV Positive donors increased.

Table 1
 Total numbers of donors in the different hospitals

	Total number	HBsAg Positive	Anti HCV Positive
King Abdulaziz specialist Hospital	9884	13	4
King Faisal Hospital	4350	23	2
Alhada Military hospital	16356	64	0
Total no.	30.590	100	6

Total numbers and percentages of donors according to their nationality

	Saudis		Non Saudis	
	HBsAg Positive	Anti HCV Positive	HBsAg Positive	Anti HCV Positive
Total no of donors	87	3	13	3
(%)	82.08 %	2.83 %	12.26%	2.83 %

Table 2
 Total numbers and percentages of HBsAg and Anti HCV positive cases according to age distribution

	No of positive donors	HBsAg Positive	Anti HCV Positive
Total no. & %:	106 (100%)	100 (94.34 %)	6 (5.66%)
Age in year (mean ± SD)	38 ± 12.26	36.42 ± 10.99	40.11± 8.30
Age groups:			
<20 years	1	0	1
21-30	27	26	1
31-40	53	49	4
41-50	20	20	0
>50	5	5	0

Table 5
 Total numbers and percentages of donors from January 2015 to end of December 2016

	2015		2016	
	HBsAg Positive	Anti HCV Positive	HBsAg Positive	Anti HCV Positive
Total no of donors	63	2	37	4
(%)	59.43%	1.89 %	34.91 %	3.77 %
Total %	61.32 % ~ 61 %		38.68 % ~ 39 %	
p-value	< 0.001			

<0.001: is considered highly significant

Table 3
 Total numbers and % of donors according to their genders

	Male		Female	
	HBsAg Positive	Anti HCV Positive	HBsAg Positive	Anti HCV Positive
Total no of donors	99	6	1	-
(%)	93.4 %	5.7 %	0.9 %	0%

Table 4

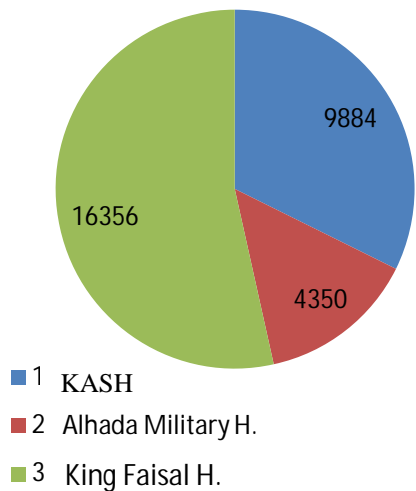


Fig. 1. Total numbers of donors in the different hospitals

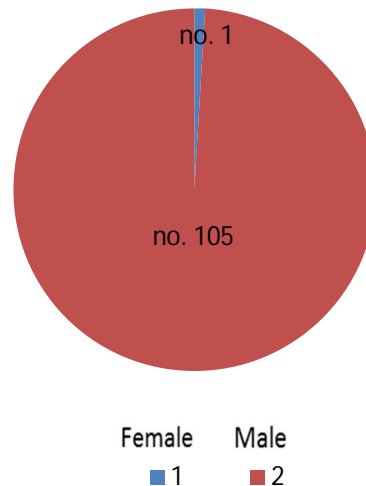


Fig. 4. Total numbers of positive donors according to their genders

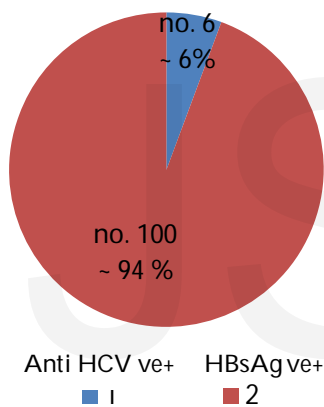


Fig. 2. Total numbers of positive donors in the different hospitals

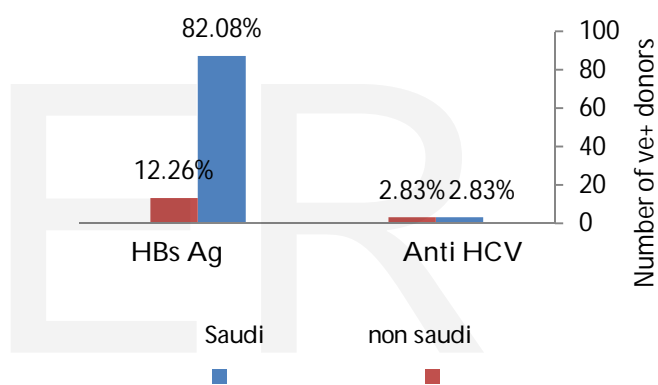


Fig. 5. Numbers and percentages of positive donors according to their nationality

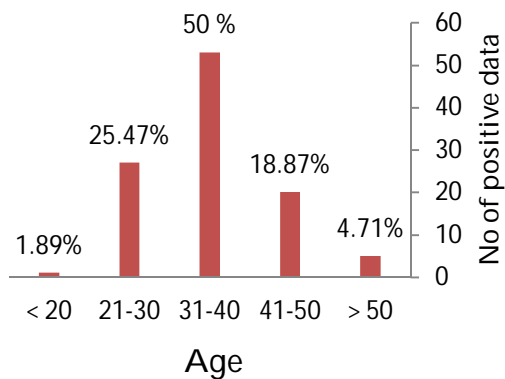


Fig. 3. Positive donors in the different hospitals and its relation to age groups

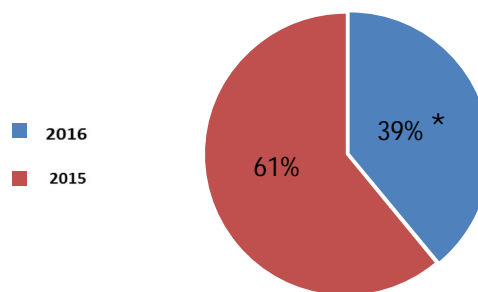


Fig. 6. Comparison of percentages of positive donors between 2015 and 2016
* Highly significantly lower in 2016 than 2015 (p< 0.001)

4 Discussion

Despite significant decline in the prevalence of HBV and HCV infection in Saudi Arabia (discussed later), these viral diseases cause significant morbidity and mortality, and impose a great burden on the country's healthcare system [10].

As observed in the current study, the prevalence of positive donors for hepatitis B and C virus were very low (0.35 %) comparing to all blood donors in Taif City based on reviewing available records of the Blood Bank of different Taif Hospitals in the past 2 years (2015-2016). In our opinion, the decline in % of positive donors in Taif city than other previously result in Saudi Arabia could be due to the greater awareness of hepatitis virus among blood donors.

The prevalence of HBsAg was 100 (94.34 %) of positive donors and 0.33 % of all donors, however, 5.66% of the positive donors were positive for HCV-Ab. and 0.02 of all donors.

As noticed, the prevalence of HBsAg % was more than HCV-Ab %. In our opinion this result was due to decrease the incidence of infection by hepatitis C not to increased incidence of hepatitis B infection as its prevalence regarding all blood donors was very low (0.33 %). Such a decline might be due to improvement in vaccination program, using blood transfusion database and possibly decreasing the prevalence of HBV infection in general population.

It thus prompted a successful cooperation between scientists and government agencies towards establishing universal HBV immunization in the country, which started in 1989 and reinforced in 1990 for children at school entry, healthcare staffs and other high-risk individuals. As a result of these vaccination programs, almost all Saudis aged 24 years or younger as of October 2007 had been vaccinated [11].

The similar results which supporting epidemiological studies, speak of a noticeable reduction in the prevalence of HBV in KSA, averaging approximately 1.5% in general, and 2.6% within the adult residents [12].

Previous studies in Saudi Arabia on the prevalence of HBsAg and HCV-Ab among blood donors show that its rate varied from one region to another [13]. In a study conducted in jazan region of Saudi Arabia, it was found that the

prevalence of HBV-positive was 3.8% among blood donors [14]. However, the current study indicated that 5.66% of the positive donors were positive for HCV-Ab. and 0.02 of all donors. This is less than what was found previously in another study from the jazan region of Saudi Arabia. (0.4 %) [14].

The age group distribution in our study shows a peak for HBsAg and anti HCV prevalence in the 4th decade of life (31-40). However, the lowest prevalence was recorded in the <20 age group (1.89%). This result may be due to that, the age group with the highest number of donors was 25-40 years. These results were in harmony with the result of Abdelaal et al., [15] who reported a peak in the 4th decade of life (30-39). Dongdem et al., [16] reported relatively different results, that the age group with the highest number of donors (53.47%) was 20-29 years which also established the highest number of positive cases (about 70% of all positive cases) among voluntary donors. In contrary, Abdullah, [14] the prevalence of HBsAg generally increased with age, showing the highest rate in those > 46 years of age (7.7%). The increased prevalence rates for HBsAg are statistically significant ($P < 0.001$). However, the difference in the prevalence rate for anti HCV between the age groups is statistically insignificant ($P > 0.05$).

Most of positive donors in our study were male. Only one female from 106 donors was positive for anti-HCV. This may be due to cultural habits of Saudi Arabia which make males donate than females. Gender represents an important risk factor for HBV infection within Saudi Arabia as reported by retrospective analysis of patients in the Saudi Aramco Medical Services Organization (SAMSO) [17]. They identified a 1.8 times greater likelihood of HBV infection in males vs. females. The same study did not report any significant gender biases in the case of HAV or HCV infections. In a report by Memish *et al.*, (2010) [18] incidence of HBV seropositivity stratified by gender in a separate report showed a higher prevalence of HBV infection in males vs. females of 123.0 vs. 85.5; ($P < 0.001$) per 100,000 served but not HCV (76.8 vs. 80.1 per 100,000; $P > 0.05$).

In our study, the number of Saudis positive donors were greater compared to other nationalities. The Madani (2003) report in

collaboration with the Ministry of Health showed a similar finding [19]. However, Shobokshi et al. (2003) reported a lower incidence of hepatitis among Saudi patients compared to non-Saudis [20]. The differences in these data are most likely due to variations in the populations of the different regions of the country that were studied. The present study shows that the prevalence of hepatitis infection among blood donors in Taif city has significantly declined in year 2016 than number in 2015. The overall prevalence rate for positive donors was highest in 2015 (total no: 65 ; ~ 61 %) but decreased in 2016 to ~ 39 % (no. 40). This % difference between the two decades was highly significantly lower ($p < 0.001$). This may be attributed to better living conditions, childhood immunization against HBV, universal blood bank screening, and increased awareness of safe clinical and social practices.

In other studies by Ayoola et al., [21] and Abdullah [14] who tested blood donors from the Jazan region in KSA, reported a significantly decline in prevalence of HBsAg seropositivity between 1995 and 1997 (about 5.4%) and between 2004 and 2009 (about 3.5%) respectively. Their study presumed that the most important factor that is responsible for the decline in HBV infection was the introduction of the HBV vaccination in 1989 and could also be due to the greater awareness of HBV among blood donors [14].

However, declines in HCV prevalence rates from 0.58 to 0.58, between 1996 and 2006 were also noted in the blood bank database of King Khalid University Hospital in Riyadh. Additionally, general declines in prevalence of HCV may be attributed to safer blood transfusional practices, surgical, dental, and procedural practices; overall improvement in sanitation and a better standard of life; and screening of all expatriate populations entering the country [22].

Similarly, among the study population of Aljaraj [19] in KSA, 516 (2.3%) were HBsAg positive and 297 (1.3%) were anti-HCV positive. The prevalence of HBsAg positive cases showed a gradual decrease over time from 4.4% in 1993 to 1.4% in 2008. Similarly, the prevalence of anti-HCV positive cases showed a gradual decrease from 1.8% in 1993 to 0.5% 2008 [24]. Their study showed a major decline in the positivity rate of

both diseases over the study period, which reflects success of the preventive measures and strategies that the Saudi Ministry of Health has taken.

5 Conclusion

It can be concluded that the prevalence of HBV and HCV were significantly decline from 2015 to 2016 among blood donors in Taif City based on reviewing available records of the Blood Bank. It might be due to introduction of childhood immunization programs. Moreover, this may be attributed to better living conditions, universal blood bank screening, and increased awareness of safe clinical and social practices.

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