

## SEROPOSITIVITY OF HEPATITIS B SURFACE ANTIGEN AND HEPATITIS C ANTIBODIES AMONG BLOOD DONORS AT A TERTIARY HOSPITAL IN EGYPT: A THREE -YEAR RETROSPECTIVE STUDY

By

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### ABSTRACT

**Background:** Chronic hepatitis B (HBV) and chronic Hepatitis C (HCV) are common transmissible infections through unsafe blood transfusion. Egypt has the highest prevalence of chronic HCV infection worldwide and a moderate prevalence of chronic HBV. **Aim of the work:** Assessment of the prevalence of chronic hepatitis B and chronic hepatic C in our blood banks donors. **Material and Methods:** The blood donation records over 3 years (from January 2008 to December 2010) were retrospectively reviewed for seropositivity of HBs Ag and HCV antibody in our blood banks data base. **Results:** Total of 193,000 donations were received in our blood banks within 3 years (from 2008-2010). The annual prevalence rate of HBs Ag seropositivity was almost constant showing linear trend throughout the three years (1.63%, 1.59% and 1.77% respectively). HCV seropositivity was slight different, as the annual prevalence rate was 12.5% in 2008 increased to 16.5% in 2009 and to 18.9% in 2010. Age distribution of both infections showed that; HBs Ag was doubled in age group (35-45 year), while HCV antibodies seropositivity increased up to 3 folds in the same age group. **Conclusion:** Our study confirmed the fact that, HBV prevalence is steadily constant in our governorate although, it cannot be relied upon because the donors were screened only for HBsAg, but HCV prevalence is steadily and rapidly increasing each year and as age increases. More Strict measures in our blood banks are needed including HB core IgM and HCV RNA assay for prevention of any missed undiagnosed cases.

**Key words:** Seropositivity; Hepatitis B surface antigen; Hepatitis C antibodies; Blood donors; Retrospective study; Egypt.

### INTRODUCTION

Chronic hepatitis B and C are, and will remain major health problems worldwide. Both infections can lead to silent course of liver disease progressing from liver impairment to cirrhosis and decompensated liver disease, liver failure and hepatocellular carcinoma in about 20-30 years period<sup>(1)</sup>.

Both HBV and HCV infections can be transmitted by transfusion of infected blood as these viruses are usually present in blood, body secretions, semen and vaginal secretions<sup>(2)</sup>.

In Egypt, national obligatory hepatitis B vaccination that started in 1998 had largely dropped prevalence of chronic hepatitis B to very low constant percentage, although sporadic cases are recorded from time to time. Regarding HCV, the situation is quite worse; Egypt has a population of about 80 millions and contains the highest prevalence of chronic hepatitis C worldwide. The Egyptian prevalence rate of HCV seropositivity has been estimated to be between 10 and 18 percent of general population depending upon the geographic distribution<sup>(3)</sup>. The northern Nile Delta appears to have the highest

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prevalence, while Upper Egypt in the south, seems to have the lowest HCV prevalence<sup>(4)</sup>.

Screening and testing of the blood donation not only alleviates the risk of transmission through infected blood products, but also gives an idea about the prevalence rates of these infections in our governorate.

We try to estimate and compare the annual prevalence rate of chronic hepatitis B and chronic hepatitis C in Zagazig university blood banks retrospectively from 2008 to 2010.

**MATERIAL AND METHODS**

The blood donation records over 3 years (from January 2008 to December 2010) were retrospectively reviewed for seropositivity of HBs Ag and HCV antibody in our blood banks data base.

Pre-donation questionnaire and bedside clinical examination were done for all blood donors aiming to exclude previously well-known hepatitis donors and exclude high risk donors including diabetic, cardiac and hypertensive patients. Exclusion criteria included:

- Younger (less than 18 year) or older ages (more than 45 year).
- Past history of jaundice, hypotension or anemia.
- Sever chronic diseases.

Standardized kits were used for detection of HBV, namely Genscreen ULTRA enzyme-linked immunosorbent assay (ELISA) kit (BioMerieux, ELISA kit, Helsinki, Finland), based on HBs Ag detection. HCV detection was done using the Biokit Bioelisa (Lliça D'amunt, Spain), based on the detection of antibodies against HCV in the human serum. Both HBs Ag and HCV antibodies were measured by DAVINCI (Automated immunoassay analyzer, Biomeriex).

All the donors who turned out to be reactive for HBs Ag and/or HCV antibody were confirmed by repeating test on the

second day. Positive donors were fed back about their status for further consultation.

**Statistical analysis**

Data were analyzed by Microsoft Office 2007 (Excel) and Statistical Package for Social Science (SPSS) version 15 (SPSS, Inc., Chicago, IL). Prevalence rates were calculated, tests of significance used were chi-square tests, one-sample t test, and Fisher exact tests via cross-tabulation. The p value was considered significant at  $p < 0.05$ .

**RESULTS**

A total of 193,000 donations were received in our blood banks within 3 years (from 2008 to 2010). We received 60,425 donations in 2008, 64,374 in 2009 and 68,201 in 2010. Replacement donations (from family, friends, and relatives of the patients) accounted for the majority of the donations (98.2%), while the voluntary donations represented the remaining percentage (1.8%).

Sex-wise distribution of the donors showed that most of donors were males; males account 154,522 (80%) of the total donations while females account only for 28.478(20%).

Total cases with positive HCV antibodies were; 30,762 cases (15.9 %) of the total donation. HCV antibodies seroprevalence rate was (12.5%) in 2008 increased to (16.5%) in 2009 and continue to increase to (18.9%) in 2010 (Fig. 1).

The prevalence of HCV antibodies seropositivity was comparable in age groups (18-24 y) and (25-34 y) but highly increased with significantly high difference ( $p=0.0001$ ) in age group (35-45 y) (Fig. 2).

Total cases with positive HBs Ag were 3,219 cases, which represent 1.66% of the total donation. HBs Ag seroprevalence rate was almost constant throughout the three years; it was (1.63%) in 2008, (1.59%) in 2009 and (1.77%) in 2010 (Fig. 3).

Age study of blood donors showed that HBs Ag seropositivity was almost constant in age groups (18-24 y) and in age group (25-

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34y) but was doubled in age group (35-45y) (Fig. 4).

We did not find combined HBV and HCV cases in our database. Patients who detected to be positive for HBV or HCV were

notified by telephone or by confrontation on return to ask about the blood examination result and they were advised to consult hepatologist.

Table (1): Age-specific HBs Ag and HCV-seropositivity and prevalence rate among the blood donors.

Age groups (ys)	Viral	Positive cases / Total donation numbers			Overall positive cases	Overall age specific prevalence (%)
		2008	2009	2010		
18-24 year	HBsAg	265/18,200	311/20,446	281/19,355	857/58,001	1.47% *
	HCV	1829/18,200	1335/20,446	3279/19,355	6,443/58,001	11.1% *
25-34 year	HBsAg	400/32,500	533/28,554	612/30,645	1,545/120,253	1.28% *
	HCV	1341/32,500	6157/28,554	7225/30,645	14723/120,253	12.24% *
35-45 year	HBsAg	320/9,725	183/8,374	315/8,201	818/26,300	3.10% *
	HCV	4071/9,725	3230/8,374	2385/8,201	9,686/26,300	36.83% **
Total cases/ Total donation	HBsAg	985/60,425 (1.63 %)	1026/64,374 (1.59 %)	1208/68,201 (1.77 %)	3,219/193,000	1.66% *
	HCV	7251/60,425 (12.5 %)	10622/64,374 (16.5 %)	12889/68,201 (18.9%)	30,762/193,000	15.9%**

\* P = (Non significant)

\*\*P = (Highly significant)

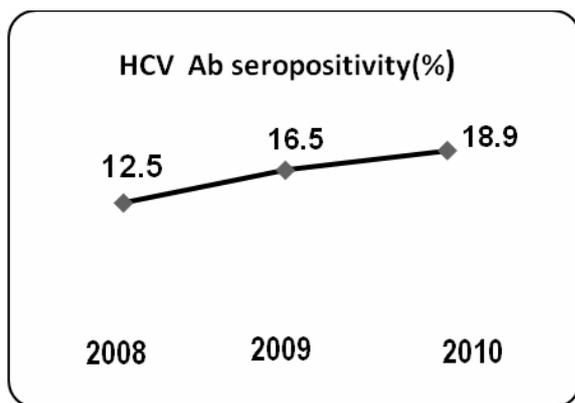


Fig. (1)

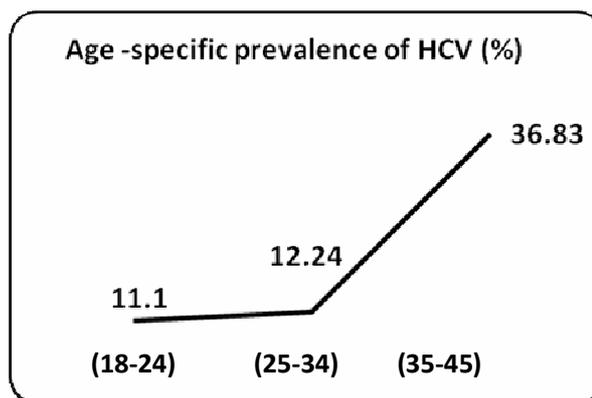


Fig. (2)

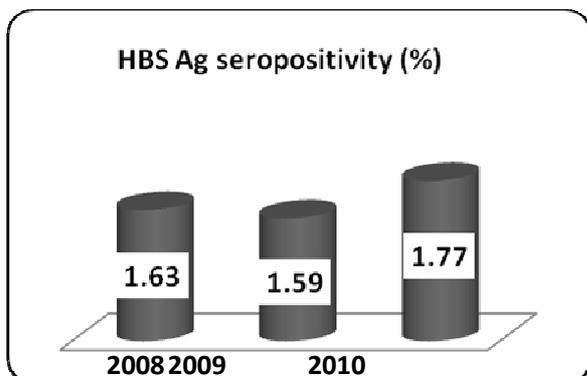


Fig. (3)

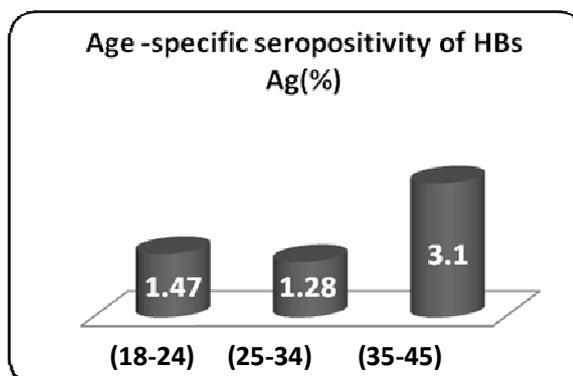


Fig. (4)

### DISCUSSION

Every blood transfusion carries a potential risk for transmissible diseases including viral hepatitis even though, strict and guarantee measures applied for screening and monitoring of the blood products transfusion<sup>(7)</sup>.

HBV and HCV are two major global public health problems; HBV infection is the 10<sup>th</sup> leading cause of death and HBV-related hepatocellular carcinoma (HCC) is the 5<sup>th</sup> most frequent cancer worldwide<sup>(17)</sup>. Worldwide, approximately 200 million have chronic HCV infection and it is the commonest cause of end stage liver disease<sup>(6)</sup>. While global HBV prevalence is decreasing since the availability of HBV vaccine in 1982, global HCV prevalence varies depending upon the geographic distribution<sup>(5)</sup>.

Egypt still carry high risk for transmission of both hepatitis B and C due to multiple risk factors that include; absence of strict rules for blood transfusion especially in rural areas where blood can be direct transmitted to the patient, non sanitary measures and non sterilized surgical procedures. Moreover, close familial contact with hepatitis-positive patients, shaving by public barbers, ear piercing, tattoo acupuncture, in-common nail trimming and sexual

promiscuity share in magnification of the transmission of both HCV and HBV infection in our country<sup>(4,8)</sup>.

Sharkia is the 3<sup>rd</sup> Egyptian governorate in population size next to Cairo and Geza governorates. It lies to the northeast of Cairo and has rural as well as urban population. Sharkia has 12 blood banks; the largest of them is that of Zagazig university hospitals which deals with more than 60.000 donation each year<sup>(12)</sup>.

Regarding HBs Ag seropositivity, we found that the annual prevalence rate of HBs Ag in our blood donors was slight constant throughout the three years; 2008, 2009 and 2010 (1.63%, 1.59% and 1.77 % respectively). Our results are compatible with the seroprevalence of HBV infection in Egypt which is considered to have a moderate prevalence<sup>(15)</sup>. However, our results is much less than that in Nigeria (15.1%) which is considered as an endemic area for hepatitis B<sup>(13)</sup>, and slight near to that of India where a paper published in 2005 reported rapidly decline from 9 % to about only 4 % from 2000 to 2005<sup>(14)</sup>.

The mean annual prevalence of HBs Ag seropositivity recorded in our study was (1.66%). It is much less than that one reported in Egypt in early 1980<sup>(16)</sup> when the

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prevalence rate of HBs Ag was moderately high (10.1%). This HBs Ag prevalence is also nearly similar to the results of Mobile Blood Donation Campaigns study (2.2%) that was done in Sharkia governorate in 2010, although, this study included different type of donor's age and sex<sup>(10)</sup>. Moreover, this result is so near to the results of other governorates blood banks in Egypt which reporting annual prevalence rate of HBs Ag seropositivity ranging from 1.6 to 2.4 %<sup>(11,12)</sup>.

Slight recent Egyptian study published in 2009 reported gradual decline in the prevalence of HBV infection among blood donors in Egypt<sup>(19)</sup>, while another study published in 2011 reported a constant HBV seroprevalence of about 5 % among blood donors in Egypt<sup>(18)</sup>.

HBs Ag seropositivity percentage among age groups of our blood donors was slightly unchanged in age group (18-24y) and in age group (25-34y), while duplication of this percentage was noticed in age group (35-45y) year. These results are accepted and understandable as Egypt had been started obligatory national vaccination for HBV about twelve years ago<sup>(20)</sup>, and this in turn, minimizing HBV acquiring among children and early adulthood but not adult more than 35 who actually did not received HBV vaccination, In addition to, more risk exposure - as the age is increased - from multiple risk factors that come from the daily public exposure<sup>(9, 18)</sup>.

WHO had declared HCV a global health problem with approximately 3% of the world's population (roughly 170-200 million people) infected with HCV, many of whom are still undiagnosed and asymptomatic<sup>(5)</sup>.

Egypt has a population of about 80 million and contains the highest prevalence of chronic HCV in the world. The Egyptian prevalence rate of HCV seropositivity has been estimated to be between 10 and 18 percent of general population depending upon the geographic distribution<sup>(4)</sup>.

In our study, the mean annual prevalence rate of HCV seropositivity among blood donors within 3 years was 15.9 % (12.5 % in 2008, 16.5 % in 2009 and 18.9 % in 2010). This prevalence rate is lower than that was reported in Sharkia governorate (24.9%) among volunteered blood donors in 1988<sup>(20)</sup>. Moreover, this prevalence is about triple of that reported in Sharkia in 2010<sup>(10)</sup> in mobile blood donor campaigns and this partially may explained by slight short time of donations and the unique type of blood donors in these campaigns. Also, our results of HCV seroprevalence is 1.5 times more than that was reported among blood donors in Cairo in 2009 (10.6%)<sup>(19)</sup>.

Our finding disagrees with the findings reported by another Egyptian study that revealed a cumulative seroprevalence of HCV of about (11.95%) with declining annual seroprevalence from (17.7%) to (7.4%) over the period of the study from 2000 to 2007<sup>(19)</sup>. Moreover, our results are higher than that of first representative national sample prevalence (14.7%) that was done in 2008<sup>(21)</sup>. However, our results are near to a cross-section survey that was carried out in rural Egyptian communities in the Nile Delta in 2000 (23.7%)<sup>(4)</sup>.

The similarity of HCV seropositivity in Sharkia and rural Delta Nile may reflect the same demographic and socioeconomic characters of the inhabitants in both areas, while higher HCV seroprevalence in Sharkia more than Cairo can be explained by partially high standard socioeconomic level of Cairo inhabitants and high rural areas in Sharkia more than Cairo.

We recorded high prevalence of HCV seropositivity approaching about 37% of the total donations among age group (35-45y). This high result is comparable with the results reported by a famous national Egyptian survey published in 2007<sup>(22)</sup>, which reported slight near HCV seroprevalence (25%) in this age group. This high HCV seroprevalence

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was not surprise for us as near similar results was published in 2004 and reported identical results and even high HCV seroprevalence (41%) among this age category in Sharkia governorate especially in rural areas<sup>(23)</sup>.

The high prevalence of HCV seropositivity specially in age group (35-45y) in our governorate simply reflect the multiplicity of the predisposing risk factors for HCV transmission that include; absence of tight medical equipment infection control especially endoscopies and dental instruments, unobserved paramedical practices including ear piercing, public barbers public in-share nail trimming. Familial transmission of HCV due to familial clustering and crowding may play a role in interfamilial spread of HCV. Although it is not common like the past, direct patient-to-patient blood transfusion in rural areas still adds to HCV endemicity in these areas.

In conclusion, regarding blood donors in Sharkia governorate, Egypt, annual HBV seroprevalence is constant with very narrow fluctuation while HCV seroprevalence still high and increasing from year to another. More additional measures may be needed for minimizing infectivity of the transfused blood and blood products that may include addition of HBc IgM test and HCV RNA assay for prevention of even small number of infected subclinical cases that may escape laboratory detection. In country like Egypt, where HCV still big national problem, a more advanced notification system for infected asymptomatic blood donors is necessary for early detection of and management of chronic HCV patients.

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**معدل انتشار مستضد التهاب الكبدى (بى) السطحي ومضاد فيروس (سى) الكبدى بين  
دماء المتبرعين فى بنك دم جامعة الزقازيق : دراسة بأثر رجعى لمدة ثلاث سنوات**

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**المقدمة :-** يعتبر الفيروس الكبدى (بى) والفيروس الكبدى (سى) من أكثر الأمراض انتقالاً خلال نقل الدم الملوث، ففي مصر، ينتشر الفيروس الكبدى (بى) بمعدل متوسط بينما ينتشر الفيروس (سى) الكبدى بمعدل عالي.  
**الهدف من الدراسة:-** تقييم انتشار فيروس (بى) و(سى) الكبدى في دماء المتبرعين مرتادي بنك دم مستشفيات جامعة الزقازيق خلال ٣ سنوات بأثر رجعى من (٢٠٠٨-٢٠١٠).  
**المرضى وطرق البحث:** تم استرجاع المعلومات الخاصة بالمتبرعين في بنك الدم بمستشفيات جامعة الزقازيق خلال الفترة من يناير ٢٠٠٨ حتى ديسمبر ٢٠١٠ وقد تم مراجعة الحالة السريرية لهؤلاء المتبرعين وفحص الفيروسات الكبدية لهم خلال تلك الفترة.

وقد تم استبعاد المعلومات الخاصة بالمتبرعين الذين تقل أعمارهم عن ١٨ أو تزيد عن ٤٥ عام، أو الذين لديهم تاريخ مرضى ايجابي للصفراء أو نقص هيموجلوبين الدم أو هؤلاء الذين يعانون من أمراض مزمنة.

**النتائج :-** خلصت الدراسة الحالية للنتائج الآتية:

ارتاد بنك دم مستشفيات الزقازيق خلال هذه الفترة ١٩٣ ألف متبرع شكل الرجال حوالي ٨٥ % منهم وشكل السيدات النسبة الباقية.

المتوسط السنوي لمعدل انتشار مستضد التهاب الكبدى (بى) السطحي كان ١,٦٦ % حيث كان معدل انتشاره في ٢٠٠٨ ١,٦٣ % و ١,٥٩ % في ٢٠٠٩ و ١,٧٧ % في ٢٠١٠.

معدل انتشار مستضد التهاب الكبدى (بى) السطحي في الفئات العمرية كان ١,٤٧ % في الفئة العمرية (١٨-٢٤ عام) و ١,٢٨ % في الفئة العمرية (٢٥-٣٤ عام)، أما في الفئة العمرية (٣٥-٤٥ عام) فكان ٣,١ %.

المتوسط السنوي لمعدل انتشار مضادات فيروس (سى) الكبدى بين دماء المتبرعين في بنك دم جامعة الزقازيق كان ١٥,٩ % حيث كان معدل انتشاره في ٢٠٠٨ ١٢,٥ % و ١٦,٩ % في ٢٠٠٩ و ١٨,٩ % في ٢٠١٠.

معدل انتشار مضادات فيروس (سى) الكبدى في الفئات العمرية كان ١١,١ % في الفئة العمرية (١٨-٢٤ عام) و ١٢,٢٤ % في الفئة العمرية (٢٥-٣٤ عام)، أما في الفئة العمرية (٣٥-٤٥ عام) فكانت ٣٦,٨٣ %.

**الخلاصة والتوصيات :-**

- في محافظة الشرقية، متوسط انتشار الفيروس الكبدى (بى) يعتبر ثابتاً بينما فيروس (سى) في زيادة مطردة وخصوصاً في الفئات العمرية اعلى من ٣٥ عام.
- لابد من استخدام اليه متطوره وحديثه لتشخيص حالات الالتهاب الكبدى الفيروسى (سى) الغير مصحوبه باعراض سريري واضح.
- استخدام فحوص (HBc IgM & HCV RNA) فى بنوك الدم وذلك للمساعدة فى الحد من نقل الدم الملوث ولو بنسبه ضئيله.