

## Seroprevalence of hepatitis C virus among blood donors attending Omdurman teaching hospital

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### Abstract:

*Hepatitis C Virus has remained a major cause of chronic liver disease worldwide and the main reason for liver transplantation in the western world, HCV infections are known to occur in the general population, a total of 90 blood donors males who attending Omdurman Teaching Hospital blood bank during the period from November to December 2014, were enrolled in this study their age range from 18 to 60 years with mean (27), the aim of this study was to detect seroprevalence of hepatitis C virus antibodies, serum specimens were collected from blood donors and analyzed by Enzyme linked Immune Sorbent Assay (ELISA) technique.*

*Hepatitis C virus antibodies were detected among 1 (1.1%) of blood donors, all the study populations had neither previous blood transfusion nor history of jaundice.*

*Large-scale studies in different settings and studies are required.*

**Key words:** seroprevalence, HCV, blood donors, ELISA technique, Khartoum, Sudan.

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## **Introduction:**

Hepatitis C virus (HCV) is a single-stranded RNA virus of the flavivirus family, about 9.5 kb in length, HCV does not integrate into the host genome and the means by which it establishes chronic infection are unknown, the association of chronic HCV infection with development of hepato-cellular carcinoma (HCC) is well-established, this nearly always occurs in the presence of cirrhosis, it is estimated that approximately 80% of persons infected with HCV will develop a chronic infection and 15-20% will develop serious liver disease, often many decades later <sup>(1)</sup>.

Among those who develop cirrhosis, 1-4% per year will develop HCC, several important cofactors, such as alcohol consumption and older age at infection, are known to affect the probability of developing HCC among persons chronically infected with HCV <sup>(2)</sup>.

Hepatitis C virus has been considered to be one of the most potential pathogens that have hindered the medical community all over the world, indeed, since its discovery in 1989, HCV has been recognized as a major cause of chronic liver disease worldwide and due to the surpassing hepatitis B virus <sup>(3)</sup>.

The data reported by World Health Organization (WHO) estimated that the prevalence of HCV infection is 2.2%, and more than one million new cases were reported annually, furthermore, an estimated 27% of cirrhosis and 25% of HCC worldwide occur in HCV-infected people, such infection increases tremendously among the developing countries particularly at those categories that were considered to be at a potential risk of acquiring hepatitis C virus infection <sup>(4)</sup>.

The status of HCV among Sudanese is also obvious as it is reported to be (2.2–3%) among the general population <sup>(5, 6)</sup> high-risk population showed a higher prevalence of HCV and it was found to be 23.7% in haemodialysis patients <sup>(7)</sup>, the major

genotype isolated was genotype 4 with subtypes 4e, 4c and 4d, this was found to be similar to those genotypes isolated from Egypt <sup>(8)</sup>.

HCV is a blood borne virus that is most efficiently transmitted through exposures to blood, such as transfusions or transplants from infected donors, inadvertent contamination of supplies shared among patients undergoing chronic hemodialysis or sharing of equipment among injection drug users, transmission of HCV may also occur through high-risk sex or through prenatal exposure and percutaneous exposures in the health care setting or exposure to an infected household contact <sup>(9)</sup>.

HCV is a major cause of end stage liver disease in many parts of the world; one hundred and seventy million people are estimated to be infected worldwide <sup>(10)</sup>.

Studies on the epidemiology of HCV have suggested that the Nile delta region of Egypt has one of the highest prevalence rates of HCV infection in the world with seroprevalence rates approaching 20% in villagers over the age of 30 years <sup>(11)</sup>; this was largely attributed to infection with schistosomiasis, and to mass treatment with parenteral antischistosomal therapy <sup>(12)</sup>.

The few studies on HCV infection in Sudan demonstrated a low seroprevalence ranging from 2.2% in the Gezira state <sup>(13)</sup>, an area endemic with schistosomiasis to 4.8% in patients with schistosomal periportal fibroses, genotype 4 was the commonest isolated genotype, no association was found between HCV infection and schistosomiasis or with parenteral antischistosomal therapy <sup>(14)</sup>.

Similar HCV seroprevalence was noted in other African countries such Ethiopia (2%) <sup>(15)</sup>, Central African Republic (5%) <sup>(16)</sup> and Libya (7.9%) <sup>(17)</sup>.

Genotype 4 was also the commonest genotype isolated in Cameron <sup>(18)</sup>, Nigeria <sup>(19)</sup>, Egypt <sup>(20)</sup>, and the Central African Republic <sup>(21)</sup>.

Currently screening of blood and blood products for HCV infection is carried out in most blood banks round the country, the difference between the low seroprevalence of HCV infection between Sudan and neighboring Egypt which has one of the highest HCV seroprevalence worldwide, may be due to the fact that parenteral antishistosomal therapy was only offered to those over the age of 12 years in Sudan whereas in Egypt, it was offered to those over the age of 6 years, equipment sterilization was more strictly observed in Sudan due to low volume of patients treated per session when compared to Egypt, other factors thought to contribute to the high seroprevalence in Egypt include intravenous drug abuse <sup>(22)</sup>, and interfamilial transmission between parents and children <sup>(23)</sup>.

The highest prevalence of HCV infection in Sudan was noted in patients with end stage renal disease on regular hemodialysis with a seroprevalence of 23.7%, major risk factors for infection were longer duration of dialysis, dialysis in multiple centers and an age over 30 years <sup>(24)</sup>.

The aim of this study was to detect seroprevalence of hepatitis C virus among blood donors at Omdurman Teaching Hospital blood bank.

### **Materials and methods:**

This was a descriptive cross-sectional study which had been conducted in Khartoum state during period from November to December 2014, 90 blood donors males were enrolled in this study, data was collected by using direct interviewing questionnaire, ethical clearance was obtained from research ethical committee of faculty of graduate studies Al-Neelain University and ministry of health Khartoum state, written consent also was obtained from blood donors.

### **Experimental work and Samples collection:**

Blood samples were collected from 90 blood donors males, under direct medical supervision by medical vein puncture using 5 ml syringe into plain tube to obtain serum by centrifugation at 5000 rpm for 10 min, serums was kept in -20°C till serological study was performed.

Specimens were processed by ELISA (4th generation ELISA) (fortress-diagnostic limited, United Kingdom) for detection anti hepatitis C virus antibodies.

All reagents and samples were allowed to reach room temperature for 15 minutes before use, washing buffer was prepared 1:20 from buffer concentrate with distilled water, 100µl of sample diluents was added into appropriate wells except the blank well and negative well, 10µl from each sample was added to the appropriate wells and mixed by tapping the plate gently, 10µl from negative and positive control was dispensed and added to the negative and positive wells separately without dispensing liquid into the blank control well, then plate was covered and incubated for 30 minutes at 37°C, plate cover was removed and discarded each well washed 5 times with diluted wash buffer each time (washing 1), 50µl of Horseradish Peroxidase (HRP)-Conjugate Reagent was added in to each well except the blank, the plate was mixed well and covered with the plate cover and incubated for 30 minutes at 37°C.

The plate cover was removed and discarded, the liquid was aspirated and each well was rinsed in wash buffer (Washing 2), this step was repeated for 5 times until each well become dry, 50µl of chromogen A and 50µl of chromogen B solution were added in to each well including the Blank and mixed by tapping the plate gently, the plate was incubated at 37°C for 15 minutes, 50 µl of Stop solution was added into each well and mixed gently, intensive yellow color developed in a positive control and anti hepatitis C virus positive samples wells.

### **Measuring the absorbance:**

The plate reader was calibrated with blank well and the absorbance was read with micro well reader at 450 nm.

The results were calculated by relating each sample optical density (OD) value to the Cut off value of plate.

Calculation of Cut off (C.O) value:  $C.O = *NC *2.1$

\*Nc = the mean absorbance value for the three negative controls.

### **Interpretation of Results:**

**Negative results:** samples giving absorbance less than Cut-off value are negative for this assay.

**Positive results:** samples giving absorbance equal to or greater than Cut-off considered initially reactive.

**Borderline:** samples with absorbance O.D.  $\leq$  Cut-off \*2 are considered borderline and retesting of these samples in duplicates is recommended.

### **Data analysis:**

Data was analyzed by SPSS (Statistical Package of Social Science) software program version 13.

### **Results:**

A total of 90 blood donor male who attending Omdurman Teaching Hospital blood bank during the period from November to December 2014, were enrolled in this study, their age ranges from 18-60 years with mean (27) , all of them had neither previous blood transfusion nor history of jaundice.

Among the total studied blood donors seropositivity of hepatitis C virus was (1/90, 1.1%) as showed in fig (1).

Most of the donors aged from 20 to 29 years (**52/90, 57.8%**), the one who is the seropositive was belong to 20 -29 age group had done of previous mentioned risk factors (Table -1).

(10/90, 11%) had previous surgical operation, (18/90, 20%) had previous dental operation and (1/90, 1.1%) with tattoo / scarification on examination, (Table -2).

## **Discussion:**

Blood transfusion is a branch of medicine in the healthcare sector, an incorporated strategy for blood safety is required for elimination of transfusion transmitted infections, and for provision of safe and adequate blood, the infectious agents such as HCV, HBV, HIV and syphilis are important blood born and transfusion transmitted infections throughout the world, the previous research statistical data has been established that prevalence rate of HCV among blood donors on the general population varied from country to another <sup>(25)</sup>.

All subjects examined in this study were males, because usually females do not donate blood in Sudan, this is because socially and culturally women are not favored to donate blood either to men or women, usually men of young or middle age are those who can willingly donate their blood.

The present study result revealed that the seropositivity of hepatitis C virus among blood donors in Khartoum state was (1.1%), which is closely similar to result of Abu et al., 2009 in Nyala Hospital, western Sudan, who found it as 1% <sup>(26)</sup>, also similar to 1.3% reported in Shendi, River Nile State, northern Sudan <sup>(27)</sup>, however the present study was lower than 2.2% in Gezira, central Sudan to 4.8% in patients with shistosomal periportal fibrosis reported by *Mudawi, 2008* <sup>(28)</sup>, Whereas it was higher than 0.65% in South Darfur state in 2009 <sup>(29)</sup>, and 0.6% in Khartoum state which reported by *Elsheikh et al., 2007* <sup>(30)</sup>.

Typical result reported in other country by *Buseri et al*, in Osogbo, Nigeria 2009 who found it as 1.1% <sup>(31)</sup>, also in Egypt the northern neighboring country to Sudan reported the highest HCV seroprevalence in the world, 12 to 31% <sup>(32)</sup>.

### **Conclusion:**

The study concluded that the seroprevalence of hepatitis C virus among blood donors in Omdurman teaching hospital was (1.1%) was in a low rate, preventive measures should be delivered to the community through the different media.

### **Recommendations:**

Further recent confirmatory techniques like Western blot, Southern blot and Polymerase Chain Reaction (PCR) should be considered.

Quality assured screening of all donated blood for transfusion transmissible infections.

### **Acknowledgment:**

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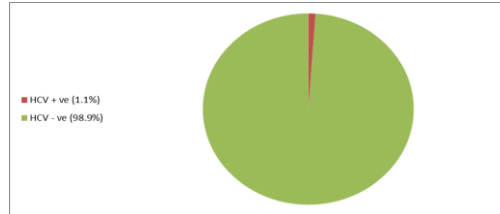


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therapy in the spread of hepatitis C virus in Egypt. Lancet355:887-891.



**Figure (1): Seroprevalence of hepatitis C virus among blood donors (n=90) attending Omdurman teaching hospital**

**Table (1): Seroprevalence of Hepatitis C virus among blood donors according to their age:**

Age	Frequency	HCV (+ve)	HCV(-ve)
Less than 20	6 (6.7%)	0	6
20_____29	52 (57.8%)	1	51
30_____39	25(27.8%)	0	25
40_____60	7(7.8%)	0	7
Total	90 (100%)	(1.1%)1	(98.9%) 89

**Table (2): Seroprevalence of hepatitis C virus among blood donors according to their risk factors:**

Risk factor	Frequency (%)	HCV +ve	HCV -ve	P .value
Previous surgical operation	10 (11.1%)	0	10	0.000
Previous dental operation	18 (20%)	0	18	0.000
Previous blood transfusion	0 (0%)	0	0	0.000
Cupping	1 (1.1%)	0	1	0.000
Blood donors with no of the above	61 (67.8%)	1	60	0.000
Total	90 (100%)	(1.1%)1	(98.9%) 89	