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SERO-PREVALENCE OF HEPATITIS C VIRUS INFECTIONS AMONG BLOOD DONORS AND CLINICAL VISITORS IN AMRAN GOVERNORATE,YEMEN

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ABSTRACT

Hepatitis C virus is identified as a member of the RNA *Flaviviridae* that can cause acute and chronic infections in human. So, the present study was conducted in Amran general hospital, Amran city, Yemen, eight hundred (800) members: 500 (63%) from blood donors, 300 (37%) from clinical visitors, 680(85%) were males and 120 (15%) were females. Out of 800 human samples: 10 (2%) were positive for HCV among blood donors, 8 (2.7%) were positive for HCV among clinical visitors, which were detected by immune-chromatographic technique (ICT) and were further processed by ELISA:12 (2.4%) were positive for HCV among blood donors, 10 (3.3%) were positive for HCV among clinical visitors, the validity of ICT was high: Specificity (100%) and Sensitivity (81.8%). The overall prevalence of anti-HCV among blood donor were 22 (2.8%) and clinical visitors 18(2.8).Our results showed 13/22 (59.1%) cases were positive from Amran city, while 9/22 (40.9%) cases were positive from rural area, there were no significant differences (P >0.05) were found between gender, residency, marital status, ages groups and occupational and & educational status. Finally, our findings also showed that the most risk factor of HCV infection were visitors to dentists, followed by family history, surgery, perinatal injuries, blood transfusion and cupping.

KEY WORDS: HCV infections, Blood donors, Clinical Visitors, Amran,Yemen.

INTRODUCTION

Viral hepatitis is a major global public health problem, the discovery of hepatitis C virus (HCV) in 1989 as a responsible agent for 80% of blood transfusion (non- A & non- B) hepatitis infections.[1, 2] HCV is an important cause of morbidity and mortality among human population both from acute, chronic hepatitis, cirrhosis and primarily liver cancer.[3] The main routes of HCV transmission are perinatal exposure, blood transfusion, surgery, dialysis and dental clinics and different surgery, however, controversy still rises concerning other routes of transmission such as, family contacts, horizontal and vertical transmissions.[2] Six HCV genotypes and 80 subtypes have been identified around the world.[3] Identification of HCV genotypes before prescribing therapy, response to interferon therapy and also on duration of therapy is important, because it has a significant influence on disease severity. Genotype 1b has been shown to be associated with more severe hepatic disease as compared to other genotypes, HCV have increased substantially in the 20th century due to a combination of intravenous drug abuse and reused of poorly sterilized medical equipment.[3] Rates are high (>3.5%) of population infected in Central and East Asia, they are intermediate(1.5% - 3.5%) in South and Southeast Asia, Sub-Saharan Africa, Indian, Central and Southern Latin America, Caribbean, Oceania, Australasia and Central, Eastern and Western Europe and they are low (<1.5%) in Asia Pacific, tropical Latin America and North America.[4] The number of deaths by HCV has increased to 15,800 in 2008 at USA, in Europe the percentage of people with chronic infections has been estimated to be between (0.13% and 3.26%).[4] Meager information regarding the prevalence of HCV infections in Yemen, the only documented information were reported from blood donors in Hajjah[5], Sana'a[6], Aden[6] and Hodeida.[7] Other previous study conducted on 6304 Yemeni blood donors revealed that the prevalence of HCV infections were 1.45 % and the prevalence of anti-HCV among patients with liver disease seemed to be higher than expected 36/100 36 (36%) had anti-HCV.[8] So, the present study was designed for detection on the sero-prevalence of HCV infections among blood donors and clinical visitors in Amran governorate, Yemen.

MATERIALS AND METHODS

This cross-sectional study was conducted in Amran general hospital at city center of Amran governorate,this study was conducted during a period of one year, starting

from January 2018 to December 2018. eight hundred (800) members : Five hundred (500) from blood donors, Three hundred (300) from clinical visitors were enrolled in this study. A full demographic and clinical data were taken from each participant and the data were recorded in a predesigned questionnaire. Principally, the detection of antibodies to HCV by collection aseptically of 5mL whole blood from each individual, serum was separated by centrifugation following clotting of blood and stored at -20Ċ until time of laboratory investigation. All samples were examined by immune-chromatographic technique (ICT) for the qualitative detection of antibodies to HCV in human serum by dispense 1 drop (10 µL) of serum to the circular sample well of the test cassette, then add two drops of sample diluent to sample well immediately after the specimen,the positive results, appeared as a distinct colored band on the test region (T) in addition to the control band and negative results appeared as only one colored band appears in the control region (C).[9 ,10] Enzyme linked immunosorbent assay (ELISA) for the detection of antibodies to HCV in human serum by set a positive and a negative controls for each test into the coated wells, 0.05ml serum sample were added, then one drop (approximately 0.05ml) of the enzyme conjugant into the same coated wells were added, were mixed thoroughly and incubated for 60 minutes at 37Ċ, then the liquid in all wells were discarded and were brought them to dry, the wells were filled with wash solution, the liquid in all wells were discarded and brought them to dry, repeated 5 times and one drop (approximately 0.05ml) of substrate were added A and B respectively to each well and incubated for10 minutes at 37Ċ and finally one drop (approximately 0.05ml) of stop solution were added into each well to stop the reaction, the absorbance were measured at 450 nm. The plate reader was calibrated well and the absorbance was read with micro well spectrophotometer reader at 450 nm, the results were calculated by relating each sample optical density (OD) value to the Cut off (C.O) value : C.O =2.1, negative results: samples giving absorbance less than Cut-off value are negative for thisassay, but, positive results: samples giving absorbance equal to or greater than (C.O), which considered initially reactive, samples with absorbance O.D. ≤ Cut-off are considered borderline and should be retesting of these samples in duplicates.[11] Finally, Data analysis were analyzed by (Statistical Package of Social Science) SPSS version 22.

RESULTS

The present study included eight hundred (800) members :500 (63%) from blood donors, 300 (37%) from clinical visitors, 680(85%) were males and 120 (15%) were females. Our finding showed that the prevalence of HCV infections which were detected by ICT in 800 human samples were10 (2%) among blood donors and 8 (2.7%) among clinical visitors, but the results ELISA were 12 (2.4%) among blood donors, 10 (3.3%) among clinical visitors. The overall prevalence of anti-HCV among blood donor were 22 (2.8%) and clinical visitors 18(2.3), the validity of ICT was high: Specificity (100%) and Sensitivity (81.8%), as showing in **Table.1.2** and **Figure.1.**

Table 1. The results of ICT test for detection of HCV infections.

Results of ICT test	Blood donors		Clinical visitors		Total	
	No.	%	No.	%	No.	%
Positive	10	2	8	2.7	18	2.3
Negative	490	98	292	97.3	782	97.7
Total	500	100	300	100	800	100

Table 2. The results of ELISA for detection of HCV infections.

Results of ELISA	Blood donors		Clinical visitors		Total	
	No.	%	No.	%	No.	%
Positive	12	2.4	10	3.3	22	2.8
Negative	488	97.6	290	96.7	778	97.2
Total	500	100	300	100	800	100

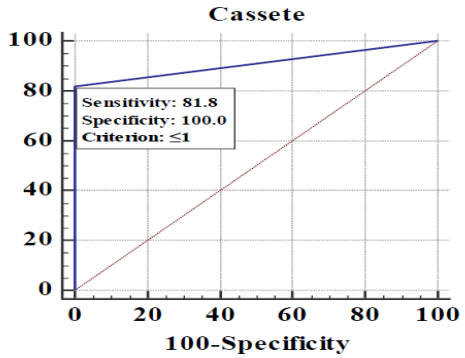

Figure 1. ROC curve of Specificity and sensitivity of ICT.

Our results of HCV infections showed that a significant differences (p<0.05) according residency and marital status, as showing in **Figure.2** and **Table.3**.

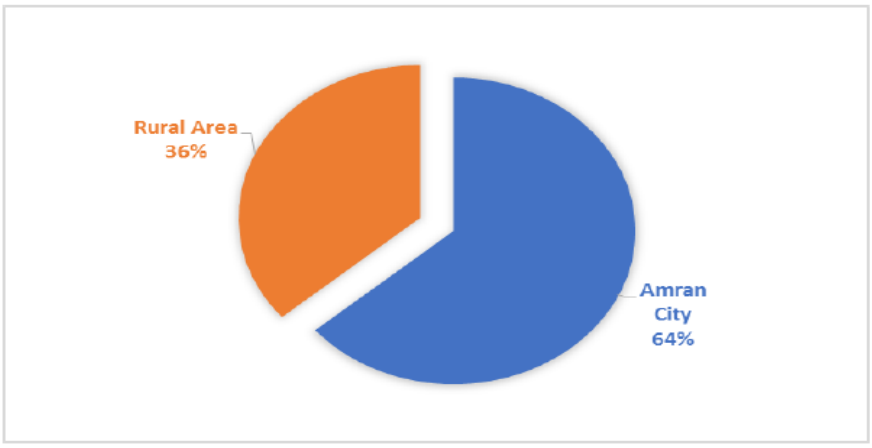

Figure 2. HCV infections according residency.

Table 3. The prevalence of HCV infections according marital status.

Marital status	Positive	%	Negative	*P-Value*	Odd ratio	95% Confidence Interval	
						Lower	Upper
Married	18	81.81*	558	0.04	1.77	0.594	5.301
Single	4	18.2	220				
Total	22	100	778				

*P<0.05

Also, our results showed that there were no significant differences (P >0.05) between ages groups and occupational & educational status and HCV infections, as showing in **Table.4,5,6.**

Table 4. Distribution of HCV infections according to ages groups.

Ages groups	Positive	%	Negative	*P- Value*
< 20 Years	0	0.00	37	0.242
21 - 30 Years	10	45.45	243	
31 - 40 Years	10	45.45	289	
41 - 50 Years	2	9.09	182	
> 50 Years	0	0.00	27	
Total	22	100	778	800

Table 5. Distribution of HCV infections according to educational Status.

Education Status	Positive	%	Negative	*P-Value*
Illiterate	8	36.36	114	0.084
Primary	4	18.18	186	
Secondary	6	27.27	232	
University	4	18.18	246	
Total	22	100	778	800

Table 6. Distribution of HCV infections according to occupational Status.

Occupational Status	Positive	%	Negative	*P- Value*
Farmers	5	22.72	134	0.75
private sectors	4	18.18	140	
public sectors	3	13.63	139	
Soldiers	1	4.54	29	
Students	6	27.27	142	
Un-employed	3	13.63	194	
Total	22	100	778	800

Finally, In all HCV infections, the major risk factors were visitors to dentists followed by family history, surgery, perinatal injuries, blood transfusion and cupping, as showing in **Table. 7.**

Table 7. The major Risk factors of HCV infections.

Risk factors		Positive	Negative	P. Value	Odd ratio	95% Confidence Interval	
						Lower	Upper
Family history	Yes	5	38	0.005	5.73	2.01	16.35
	No	17	740				
	Total	**22**	**778**				
Surgery	Yes	4	9	0.00	18.988	5.35	67.35
	No	18	799				
	Total	**22**	**778**				
Blood transfusion	Yes	3	178	0.229	0.532	0.156	1.82
	No	19	600				
	Total	**22**	**778**				
Visitors to dentists	Yes	7	64	0.002	5.206	2.05	13.23
	No	15	714				
	Total	**22**	**778**				
Cupping	Yes	2	20	0.12	3.79	0.829	17.33
	No	20	758				
	Total	**22**	**778**				
Perinatal injuries	Yes	4	271	0.008	3.247	1.357	7.902
	No	18	507				
	Total	**22**	**778**				

DISSICUSION

HCV is well known as cause of acute and chronic infection in human.[10,11] Our findings showed that the prevalence of HCV were (2.8%),these results were higher than those reported in Sudan (1.3%)[12], Ghana (0.9%)[13], Ethiopia (1.7%)[14] and Senegal (1.2%).[15] However, some previous studies performed in Yemen among an Africa residents from Sana'a and Sogotra Island which were Showed that HCV prevalence were (5.2%) and (5.1%), respectively[6], but in Yemeni patients were (0.2 %) in Sana'a and (0.6 %) in Aden[6] and other studies in Yemen that reported about (0.79%) of the donors in Hodeidah Governorate were infected with HCV[7] and the prevalence rate of HCV in Hajjah were (1.1%).[5] Also, Many other studies in nearby countries were showed a lower prevalence rates of HCV among blood donors in Saudi Arabia were (0.4%)[16], in Iraq were (0.3%)[17], in Brazil were (0.90%)[18] and in Cameron were (1.46%).[19] While, the slightly higher prevalence rates of HCV were (1.8%) in USA[20] and the very high prevalence rates of HCV were (3.5%) in Egypt, (3.2%) in Syria.[21] Additionally, our data showed that the prevalence of Anti-HCV by ICT were 10 (55.6%) among blood donors, 8 (44.4%) among clinical visitors and the prevalence of Anti-HCV by ELISA were 12 (54.5%) among blood donors, 10 (45.5%) among clinical visitors with no significance differences (P > 0.05) were found between of them, the validity of ICT was high sensitivity(100%) and specificity (81.8%), these results similar to other reports.[22] The prevalence of HCV infections in relation to residency were lower at rural area as 9 (40.9%), higher in Amran city as 13 (59.1%),which agreement with a nearly similar result was reported in Aden.[8] The prevalence of HCV infections in relation to occupation were higher in student followed by farmer, private sectors, public sector, unemployed, while the lowest prevalence were in soldiers ,these results were disagreement with other reports in Aden which showed the higher prevalence were found among soldiers.[8] The results of HCV infections in relation to education were higher in illiterate, followed by secondary, primary, university 4 with no significance differences (P >0.05) between them, the link between clinical data and prevalence rates of HCV infections were revealed that visitors to dentists were the major risk factor followed by family history, surgery, perinatal injuries, blood transfusion, and cupping, which disagreement with other reports in the Middle East which showed that the majority of HCV infections occurred through childhood period followed by perinatal transmission[23] and hospital-acquired infections is very common in Yemen and prevention ,due to apply of a standard policies of sterilization, disinfection and personal training to enforce these policies and ensure for the screening of blood donors.[24]

CONCLUSION

Our finding indicated that the overall prevalence rate of HCV infections in Amran governorate was high (2.8%), the most risk factor was the visitors to dentists and the validity ICT was sensitive and specific .Importantly, our study suggested further advanced confirmatory tests such as polymerase chain reaction (PCR) and the quality assurance of screening tests for all blood donors and clinical visitors should be performed to prevent HCV transmission infections in our country "Yemen.

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CONFLICT OF INTEREST

There is no conflict of interests regarding the publication of this paper.

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