Prevalence of hepatitis B and C viruses infection among military personnel at Taiz city , Yemen.

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Abstract- Hepatitis B virus (HBV) and hepatitis C virus (HCV) are the major public health problems. Military personnel are high risk people for blood-borne infections such as HBV & HCV. Date regarding HBV and HCV prevalence among military personnel in Yemen is absent. Hence, the study aimed to determine prevalence and associated risk factors of HBV and HCV among military personnel in Taiz, Yemen. Across-sectional study was conducted in a total 203 military personnel from 13th to 16th of January 2020. Socio-demographic characteristics and risk factors were collected through face to face interview using questionnaire. HBV and HCV infections were determined using HBsAg and HCV antibody rapid tests and confirmed the positive sample by Cobas e 411. The seroprevalence of HBV and HCV infections (3.9%) and (0.5%) respectively. Higher seroprevalence of HBV (6.52%) and HCV (2.2%) was observed in the age group 37-46 years. HBV infection was in elementary (5.66%), High school (4.55%), collage (2.91%) and HCV infection in collage (0.97%), also reported high seroprevalence of HBV and HCV in married persons (4.58%) and (0.65%) respectively. HBV and HCV were statistically significant with liver symptoms (x^2=16.363, P<0.05) and (x^2=19.396, P<0.05) respectively, also HCV statistically significant with blood transfusion (x^2=6.281, P<0.05), other disease (x^2=4.364, P<0.05) and ABO groups (x^2=39.796, P<0.05). Intermediate seroprevalence of HBV and low seroprevalence HCV were observed among military personnel.

Key words: Hepatitis B virus, hepatitis C virus, military personnel, Taiz-Yemen.

1 Introduction

THE Hepatitis B virus (HBV) and Hepatitis C virus (HCV) infection are the major public health problems, the most common blood –borne infections and occurring endemically in all place of the world [1]. HBV&HCV are mainly cause viral hepatitis. HBV is DNA, double-stranded enveloped hepadnevirus, while HCV is an RNA single stranded flavivirus. HBV & HCV share some common made of transmission such as blood to blood contact and contaminated tools as razors, needle and syringe [2]. The global burden of hepatitis B and C viral infection is widely present: around one third of the world's population has been exposed to the HBV infection an estimated 350-400 million people are infected and one million people deaths of hepatitis B –related disease [3].

The World Health Organization (WHO) estimates that HCV infects more than 185 million people worldwide and estimates that mortality rate will continue to increase over the next 20 years [4].

Among Middle Eastern countries, Bahrain, Islamic republic of Iran and Kuwait have low HBV endemicity; Cyprus, Iraq and United Arab Emirates have intermediate endemicity; while Egypt, Jordan, Oman, Palestine, Yemen and Saudi Arabia have high endemicity [5].In Yemen,

chronic hepatitis is an important cause of cirrhosis and liver cancer but studies on the prevalence of these viruses in the general population are scarce [6]. In a study conducted in Yemen reported that prevalence of HBsAg is about 12.9 % and anti-HCV is about 14.2 %, This apparently high prevalence of HBV and HCV infection in Yemen is important, because of the potential adverse effect of HBV and HCV on the health of Yemen population [7] .

Most of epidemiological studies were done in different cities in Yemen the prevalence rates of HBsAg and HCV antibodies are 10.5 % and 2.3% in Sana'a, 4.75% and 0.6% in Aden, 5.6% and 0.8% in Hajah, 26.3% and 5.1% in socotra respectively [8] and the prevalence of HBsAg is 16.9% in Taiz [9].

According to our knowledge , there are no published studies on the HBV and HCV infections among the military personnel in Yemen . Thus our study is the first of its kind in Yemen , this study primarily aimed to determine the prevalence of HBV and HCV infections and associated risk factors among military personnel (at Taiz city-Yemen), because they are remain the most time in military camps and combat fronts which contribute to predispose them to HBV and HCV transmission through some routes. The risk of sharing tools such as razors and toothbrushes also wounds and injuries.

2 Materials and Methods

After explain to the military personnel the goal of the study and testing .Blood samples were collected from 203 military male personnel in the area of saber mountain in Taiz city (allowed due to war condition in the city especially and the country in general) during the period from (13th to 16th of January 2020) the age of participants was ranged from 17 to 60 years old.

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2.1 Data Collection

A standard questionnaire was submitted to the study subjects by the team of this study before blood collection.

Where a total of 203 military personnel interviewed by face to face in order to measure the knownledge and practices toward HBV & HCV.

The questionnaire inquired about Socio-demographic characteristics of individuals (Age, marital status, Blood group, level of education, history of previous hepatitis), risk factors for hepatitis B &C, family history of liver disease and about vaccination, smoking and chewing Qat.

2.2 Blood sampling

1. A blood sample (5ml) was taken from each subject by venipuncture using a Gel & clot activator (vacutainer).
2. The sample was allowed to clot and centrifuge in 3500 for 5 minutes for serum recovery then analysis it.
3. Serum sample were tested for HBsAg and anti-HCV by using commercial kits (One Step HBsAg Rapid Test, Standard Diagnostics SD, INC.) and (One Step of anti-HCV Test, Standard Diagnostics, INC).
4. Positive samples were confirmed by (Roche Diagnostics, Cobas e 411 Immunoassay analyzer, German)

3 Data analysis

Data was checked and cleared before entry. Data was analyzed using statistical package of social science (SPSS version - 24).

The chi-square test was used statistically to compare all data to determine the significance of our result. P-value < 0.05 was considered to be statistically significant.

4 Results

A total 203 military personnel with (17-60) years old undergone for testing (HBs Ag and Anti-HCV). Theoverall seroprevalence of HBV and HCV infection was 8/203 (3.9%).Whereas, the only one individual was positive for HCV (0.5%).

According to individuals age, a high rate of HBV infection 3(6.52%) was observed among military personnel aged between 37-46 years, while the low infection 1(1.41%) was obtained from the age group of 17-26 years.

The seroprevalence rate of HBV infection was relatively increased with the age to reaches 6.52 % in 37-46 age group, and decreased after that, there was no significant difference ($\chi2$=2.135, P> 0.05).

The seroprevalence of HCV 1(2.2%) showed in the age range of 37-46 years, with no significant difference($\chi2$=3.430, p>0.05), as shown in (Table 1).

In relation to education level, the higher seroprevalence of infection with HBV was recorded among the military personnel had elementary education 3 (5.66%), while the least rate was among those with collage education qualification 3 (2.91%), no infection in unlettered military personnel, there was no significant difference ($\chi2$ =0.867, P> 0.05). The seropositive infection of HCV showed among those had collage education qualification only 1(0.97%), there was no significant difference ($\chi2$= 0.976, P>0.05),(Table 2).

Table 1

Seroprevalence of HBV and HCV among military personnel in Taiz city, according to age group.

Age group	No. examined	HBV Positive(%)	HBV Negative(%)	χ^2	P value	HCV Positive(%)	HCV Negative(%)	χ^2	P value
				2.135	0.545			3.430	**0.330**
17-26	71	1 (1.41)	70 (98.59)			0 (0)	71 (100)		
27-36	66	3 (4.55)	63 (95.45)			0 (0)	66 (100)		
37-46	46	3 (6.52)	43 (93.48)			1 (2.2)	45 (97.8)		
47-60	20	1 (5.00)	19 (95.00)			0 (0)	20 (100)		

Table 2

Seroprevalence of HBV and HCV among military personnel in Taiz city according to educational level

Educational level	No. examined	HBV Positive(%)	HBV Negative(%)	χ^2	P value	HCV Positive(%)	HCV Negtive(%)	χ^2	P value
				0.867	0.833			0.976	**0.807**
Unlettered	3	0 (0)	3 (100)			0 (0)	3 (100)		
Elementary	53	3 (5.66)	50 (94.34)			0 (0)	53 (100)		
High school	44	2 (4.55)	42 (95.45)			0 (0)	44 (100)		
Collectors	103	3 (2.91)	100 (97.09)			1 (0.97)	102 (99.03)		

The marital status prevalence revealed that the seroprevalence rate of HBV infection was higher among the married 7(4.58%) then the singles having 1(2.00%), there was no significant difference ($\chi 2$ =0.660, P>0.05), (Table 3). The same table showed that the seroprevalence of HCV among the married was 1(0.65%), no infection among singles, without significant difference($\chi 2$ =0.328, P>0.05).

The seroprevalence rate of HBV and HCV positivity in military personnel in relation to appearance some hepatitis symptoms or not. The rate of infection with HBV in associated with jaundice and fatigue as a multiple symptoms was 2(33.33%) followed by jaundice 1(10%), fever 1 (4.55%) and fatigue 1(3.03%) as a single symptom each alone; whereas a jaundice, fatigue and fever aggregated was 1(4.17%). There was high statistically significant correlation between HBV infection and hepatic symptoms ($\chi 2$= 16.363; P<0.05), (Table 4). Also, regarding the hepatitis symptoms, this table showed that the HCV was more prevalent among military personnel associated with jaundice only 1 (10%), with high significant correlation ($\chi 2$=19.396; P<0.05).

"Table **5**" demonstrates exposure military personnel to injury by sharp tools as a risk factor for infection by HBV and HCV. The seroprevalence rate of HBV infection was higher 4 (5.33%) among the military personnel exposed than those non exposed 4 (3.13%), there was no significant difference (χ^2 = 0.609, P>0.05). Regarding the seroprevalence of infection with HCV, the same table showed that the seroprevalence rate of infection by HCV 1 (0.78%) was only observed among military personnel non- exposed to injury by sharp tools. There was no statistically significant (χ^2 = 0.589, P >0.05).

The seroprevalence of infection with HBV among military personnel exposed to accident or surgery was closely lower 3(3.85%) than those non-exposed 5(4%); not statistically significant ($\chi 2$=0.003; P>0.05). In relation to HCV, the seroprevalence of infection 1(1.28) was only observed among those exposed to accident or surgery, but there was no statistically significant ($\chi 2$= 1.610; P>0.05), (Table 6).

TABLE 3

SEROPREVALENCE OF HBV AND HCV AMONG MILITARY PERSONNEL IN TAIZ CITY ACCORDING TO SOCIAL STATUS

Social status	No. examined	HBV Positive(%)	HBV Negative(%)	χ^2	P value	HCV Positive(%)	HCV Negative(%)	χ^2	P value
				0.660	0.417			0.328	**0.567**
Married	153	7 (4.58)	146 (95.42)			1 (0.65)	152 (99.35)		
Single	50	1 (2.00)	49 (98.00)			0 (0)	50 (100)		

TABLE 4

SEROPREVALENCE OF HBV AND HCV AMONG MILITARY PERSONNEL IN TAIZ CITY ACCORDING TO SYMPTOMS OF LIVER

Symptoms of liver	No. examined	HBV Positive(%)	HBV Negative(%)	χ^2	P value	HCV Positive(%)	HCV Negative(%)	χ^2	P value
				16.363	0.022*			19.396	**0.007***
A symptoms	79	2 (2.53)	77 (97.47)			0 (0)	79 (100)		
Jaundice	10	1 (10.00)	9 (90.00)			1 (10.00)	9 (90.00)		
Fever	22	1 (4.55)	21 (95.45)			0 (0)	22 (100)		
Fatigue	33	1 (3.03)	32 (96.97)			0 (0)	33 (100)		
Jaundice – fatigue	6	2 (33.33)	4 (66.67)			0 (0)	6 (100)		
Fever- fatigue	27	0 (0)	27 (100)			0 (0)	27 (100)		
Jaundice- fatigue- fever	24	1 (4.17)	23 (95.83)			0 (0)	24 (100)		
Jaundice –fever	2	0 (0)	2 (100)			0 (0)	2 (100)		

TABLE 5

SEROPREVALENCE OF HBV AND HCV AMONG MILITARY PERSONNEL IN TAIZ CITY ACCORDING TO INJURY BY SHARP TOOLS.

Injury by sharp tools	No. examined	HBV Positive(%)	HBV Negative(%)	χ^2	P value	HCV Positive(%)	HCV Negative(%)	χ^2	P value
				0.609	0.435			0.589	**0.443**
YES	75	4 (5.33)	71 (94.67)			0 (0)	75 (100)		
NO	128	4 (3.13)	124 (96.88)			1 (0.78)	127 (99.22)		

TABLE 6

SEROPREVALENCE OF HBV AND HCV AMONG MILITARY PERSONNEL IN TAIZ CITY ACCORDING TO EXPOSURE TO ACCIDENT OR SURGERY.

Exposure to accident or surgery	No. examined	HBV Positive(%)	HBV Negative(%)	χ^2	P value	HCV Positive(%)	HCV Negative(%)	χ^2	P value
				0.003	0.956			1.610	**0.204**
Yes	78	3 (3.85)	75 (96.15)			1 (1.28)	77 (98.72)		
No	125	5 (4.00)	120 (96.00)			0 (0)	125 (100)		

"Table 7" showed that the military personnel which given to them blood had high rate of infection with HBV 2 (7.14%) compared with those which not given 6(3.43%); there was no significant difference ($\chi2$=0.880; P>0.05).

In addition, the military personnel who reported having blood transfusion had a high prevalence of HCV 1(3.57%) compared to those who reported not having blood transfusion; there was high statistically significant ($\chi2$=6.281; P<0.05).

As observed in (Table 8) the seropositivity of HBV was higher in military personnel that haven't any disease 7(4.24%) than those other disease 1 (2.63%), there was no significant difference ($\chi2$ =0.212, P >0.05), while HCV seropositivity was in the military personnel that have other disease 1(2.63%), there was statistically significant ($\chi2$ =4.364, P <0.05).

TABLE 7

SEROREVALENCE OF HBV AND HCV AMONG MILITARY PERSONNEL IN TAIZ CITY ACCORDING TO BLOOD TRANSFUSION.

Blood transfusion	No. examined	HBV Positive (%)	HBV Negative (%)	χ^2	P value	HCV Positive (%)	HCV Negative(%)	χ^2	P value
				0.880	0.348			6. 281	**0.012***
YES	28	2 (7.14)	26 (92.86)			1 (3.57)	27 (96.43)		
NO	175	6 (3.43)	169 (96.57)			0 (0)	175 (100)		

TABLE 8

SEROREVALENCE OF HBV AND HCV AMONG MILITARY PERSONNEL IN TAIZ CITY ACCORDING TO OTHER DISEASE.

Other disease	No examined	HBV Positive(%)	HBV Negative(%)	χ^2	P value	HCV Positive(%)	HCV Negative(%)	χ^2	P value
				0.212	0.645			4.364	**0.037***
Yes	38	1 (2.63)	37 (97.37)			1 (2.63)	37 (97.37)		
No	165	7 (4.24)	158 (95.76)			0 (0)	165 (100)		

* High statistically significant .

In relation to different ABO group, the seropositivity of HBV was found in O^+ group 6 (5.77%) and A^+ group 2 (2.44%) only, there was no statically significant ($\chi 2=2.104$, $P>0.05$). Whereas, the seropositivity of HCV was observed in B^+ group 1(20%), there was high statistically significant ($\chi 2=39.796$, $P<0.05$), (Table 9).

5 Discussion

This is the first study on the prevalence of HBV and HCV viruses infection among the military personnel in Yemen.

It is found to be graded intermediate and low according to WHO criteria [10].

The prevalence of HBV infection can be graded high when the prevalence is >8%, intermediate when the prevalence is between 2-8% and low when the prevalence is <2% [11]. Hepatitis C virus infection can be also graded high, moderate or low when the prevalence is > 3.5, 1.5-3.5 and 1.5% respectively [12].

TABLE 9
SEROPREVALENCE OF HBV AND HCV AMONG MILITARY PERSONNEL IN TAIZ CITY ACCORDING TO ABO GROUPS.

ABO group	No examined	HBV Positive(%)	HBV Negative(%)	χ^2	P value	HCV Positive(%)	HCV Negative(%)	χ^2	P value
				2.104	0.835			39.796	**0.000****
A^+	82	2 (2.44)	80 (97.56)			0 (0)	82 (100)		
A^-	4	0 (0)	4 (100)			0 (0)	4 (100)		
O^+	104	6 (5.77)	98 (94.23)			0 (0)	104 (100)		
O^-	6	0 (0)	6 (100)			0 (0)	6 (100)		
AB^+	2	0 (0)	2 (100)			0 (0)	2 (100)		
B^+	5	0 (0)	5 (100)			1 (20.00)	4 (80.00)		

** Very high statistically significant .

Our result showed overall the seroprevalence of HBV infection among the military personnel was intermediate (3.9%). In other studies, the prevalence of HBsAg in Yemen is between (12.7% -18.5 %) [13] and(16.9 %)in Taiz [9]. It also reported higher infection in different cities in Yemen than our result, where the prevalence rats of HBsAg in Sana'a (10.5%), Aden (4.75%), Hajah (5.6%), and Socotra (26.3%)[8] . While the researchers reported the prevalence of HBV infection in blood donors in Aden (5.1%) and according to the profession , was the infected military personnel between them (6.1%) [14]. Also in Sana'a reported HBV infection in solider (8.4%) as occupation [15].

This study recorded high seroprevalence (3.9%) in comparison with HBsAg prevalence that was found among Greek military recruits (0.3%) [16], Turkish recruits (2.8%) [17], and Pakistan military groups (2.9%) [18], while the almost equal figures of prevalence HBV infection was reported in Saudi Arabia (4%) [17], and (4.2%) at Bahir Dar Armed forces General Hospital, Ethiopia [19].

The seroprevalence of HCV in the present study was lower (0.5%), in comparison with the prevalence of anti-HCV in Yemen (14.2%) [7], Blood donors in Taiz (1%) [20], children at school in Taiz (2.1%) [21], healthy pregnant women in Taiz (3.3%) [22], in Sana'a (2.3%) and in Socotra (5.1%) [8]. Also a high prevalence reported in military personnel (1.1%) as occupation from among blood donors in Aden [14], and in Pakistan military groups (1.7%) [18]. In nearly similar our result reported in Hajah (0.8%), Aden (0.6%) [8], Brazilian military personnel (0, 7%) [23], Afghan National Army recruits (0.8%)[24] , and at Bahir Dar Armed forces General Hospital, Ethiopia (0. 2%) [19].

On the other hand , the HBV and HCV infections distributed in various age groups but it was high in 37-46 years, where HBV was (6.52%) and HCV was (2.2%), also among blood donors in Aden in ≥ 30 years where the HBV & HCV rate infections were (6.3%) and (1.6%) respectively [14], and at Bahir Dar Armed Forces General Hospital, Ethiopia was in ≥40 years reported higher rate than the previous, where HBV and HCV rate infections were (11.3%) and (1.4%) respectively [19].

Also our study demonstrates high infection of HBV & HCV in learning category, where the HBV infection in collage (2.91%), in elementary (5.66%), in high school (4.55%), and HCV in collage (0.97%), this higher infection also reported in military personnel at Bahir Dar Armed Forces General Hospital, Ethiopia where HBV in high school (6%), collage (3.1%) and HCV in high school (0.5%) [19], although in a previous study of HCV in Yemen reported highly prevalence in illiterate people 14(0.59%) [25].

As well the current study showed higher infection of HBV and HCV in married (4.58%) and (0.65%) respectively.

comparing to single (2.00% and 0%) respectively. The same result was at Bahir Dar Armed Forces General Hospital, Ethiopia, where in married was HBV (5.6%), HCV (0.5%) and in single the HBV (2.8%) and HCV (0.0%) [19].

HBV causes the most serious form of viral hepatitis [2]. This study recorded high prevalence in military personnel with jaundice and fatigue (33.33%) . Infection with HCV is often asymptomatic only about 10% of individuals become jaundiced [2] .In the present study reported HCV infection among military personnel with jaundice (10.00%).

Blood transfusion, injury by sharp tools and exposure to accident or surgery as the mode of transmission and risk factors for HBV and HCV infection where could be occur infection during transfusion of infected blood or blood products when donor blood is not screened, too needle stick injury and other sharps injuries, reuse contaminated needles, syringes, lancets and razors, also occur transfer infection open wounds, cuts and grazes [2].

In our study reported that *schistosomiasis* was common in an infected persons with HBV and *amoebiasis* those were infected with HCV, we suggest both of them could be facilitated the liver injury for this viruses, there is a study demonstrated the prevalence of HBV/*Schistosomiasis* co-infection in countries where *schistosomiasis* is endemic was high approximately (0.5%) for HBV. Concurrent infection between HBV and *schistosomiasis* is often associated with countries where *schistosomiasis* is endemic and may lead to chronic liver inflammation [26]

Several studies have demonstrated the association of blood groups with HBV infection, so reported the blood group A^+ was higher than other blood types in the chronic hepatitis B (44.3%) [27] . In our result the higher infection was in O^+ group (5.77%), as for the HCV was in B^+ group (20.00%), while study in Taiwan showed the prevalence of HCV to be higher in O^+ group (2.1%) [28], this different could be due to small samples size as other studies with large samples size.

In the end, we suggest many reasons that may be interpreted the prevalence of HBV and HCV among military personnel as life style for them, absence or limited access to health care and health education, also may be barbers, random razor and not sterilizing could be source of infection in positive cases, and probably due to these individuals are far from home, so exposed to several infections agents, and because of unemployment may be most people even the learning category go into military, so highly prevalence infection was among learning category.

6 Conclusion

In conclusion this study shows an Intermediate seroprevalence of HBV and low seroprevalence of HCV among military personnel in Taiz city, Yemen.

Higher seroprevalence of HBV infection was observed among military personnel with O^+ blood group then with A^+ blood group, and HCV seropositivity observed in B^+ blood group, also high seroprevalence of HBV and HCV was in learning category, not unlettered .

There were significant difference in symptoms of liver with HBV and HCV, and in blood transfusion and other disease with HCV.

Also high significant difference in ABO blood group with HCV.

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