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Prevalence and associated factors of Hepatitis B, Hepatitis C and HIV infections among adult citizens in Mazar-e-Sharif city, Afghanistan

Khwaja Mir Islam Saeed (MD, MSc) [1]

[1]*Head of Grant and Service Contract Management Unit (GCMU), Ministry of Public Health, Kabul-Afghanistan, Tel: 0093700290955,*

ABSTRACT:-Background: Viral hepatitis is an important public health challenge worldwide. The objective of this study was to estimate the seroprevalence of HBV, HCV, HIV infections and the risk factors associated to HBV among adult populations in Mazar-e-Sharif city, Afghanistan.

Methods and Materials:A total of 1231 adult citizens in Mazar-e-Sharif were included in the study using a cross-sectional design in April-May 2015. Demographic, socioeconomic and lifestyle factors were collected by WHO STEP wise approach. Rapid tests were conducted to identify the prevalence of HBV, HCV, and HIV infections. Statistical analysis performed to find association of factors with HBV.

Results: Out of 1231 study subjects 664 (3.9%) were females and 567 (46.1%) males.More than half (59.3%) were illiterates and (83.7%) were married and 72% had income of less than 10000 AFN. 9.9% were smokers and (8.3%) were mouth snuff users. The prevalence of HBV was 5.6% (69 out of 1231) for HBsAg on rapid test and 67 (5.4%) were confirmed positive after ELIZA test. Totally 3 subject (0.2%) were seropositive for anti-HCV on rapid tests. None of subjects had co-infections and none of specimen were positive for HIV infection. By multivariate logistic regression analysis, independent predictors for HBsAg infection were sex, history of jaundice, blood transfusion and living with hepatitis.

Conclusion: The prevalence of HBV infection was at intermediate level while it could be much more in high risk groups. Public awareness and health education regarding risk factors for viral hepatitis and encouragement for vaccination is recommended.

Keywords: *Hepatitis, HBV, HCV, HIV infection, risk factors, Afghanistan*

I. INTRODUCTION

Viral hepatitis is an important challenge to health worldwide. There are the five types of hepatitis viruses (A- E) and of them hepatitis B virus (HBV) infection and hepatitis C virus (HCV) infection have the greatest impact on morbidity and mortality. They together resulted in an estimated 1.4 million deaths in 2010 [1]. HBV and HCV cause acute illness but more commonly lead to progressive liver fibrosis, cirrhosis, and an increased risk of liver cancer [2-3]. Globally 57% of cirrhosis is attributable to either HBV (30%) or HCV (27%) [4]. There are considerable heterogeneity in the estimates for global prevalence and numbers infected for HCV, HBV and HIV-HCV and HIV-HBV co-infection. The difference between some of these estimates is as great as 100 million (120–200 million for number HCV infected and ranged between 240–350 million for number HBV infected). Even the annual number of deaths from HBV and HCV ranged from 200 000 to 1.2 million and 350 000 to over 1 million, respectively [5]. As a general it is estimated that about 2 billion persons have serologic evidence of HBV infection while over 350 million people are carriers of chronic HBV. Besides approximately 170 million people have chronic HCV infection and 3-4 million people are newly infected annually [6-7]. It is reported that globally the prevalence and number of people with anti-HCV has increased from 2.3% to 2.8% [8]. Between 1990 and 2013, global viral hepatitis deaths increased from 0·89 million to 1·45 million; and viral hepatitis was the seventh leading cause of death, in 2013, worldwide, compared with tenth in 1990. In 2013, the number of deaths attributed to viral hepatitis was lower in low-income and lower-middle-income countries than in upper-middle-income and high-income countries [9]. In the Middle East region, the prevalence of HBV carriers among adults varies from less than 2%, as in Bahrain, to more than 15%, as in the Republic of Yemen [10]. In a study which was conducted in Lahore Pakistan among tested samples 4.9% of the subjects were confirmed to harbor active HCV infections in adult population without gender difference [11]. In a hospital based study in Pakistan it was reported that hepatitis B and C was present in 5.15% of which 3.12% were suffering from hepatitis C and 2.02% were suffering from hepatitis B while co-infection was present in 0.12% patients [12]. Factors such as the higher age, sex, absence of vaccination, history of jaundice, family history of liver disease, dental procedures, sexual contact, perinatal infection, blood and its derivatives, hemodialysis, intravenous and percutaneous drug use, occupational, habitual, and social behavior

have been identified as risk factors for hepatitis transmission [13]. In Afghanistan regular surveillance and nationwide study to reflect the burden of viral hepatitis among general population is not available. The endemic level of HBV is classified as high (≥8%), intermediate (2-7%) and low (>2%) [14]. Afghanistan and its neighboring countries lies in intermediate level [15-16]. In eastern Mediterranean region risk of infection with HBV is high in five countries including Afghanistan, Pakistan, Yemen, Sudan and Somalia [17]. A prevalence study in Jalalabad city among adult population reported that 3.8% were seropositive for HBsAg on rapid test and 3.4% were confirmed positive after ELIZA. Totally 0.9% were seropositive for anti-HCV on rapid tests. Independent predictors for HBsAg infection were being male (p-value <0.01) traditional practice of tattooing (p-value <0.05) and history of jaundice (p value <0.001) [18]. The overall prevalence of HBV and HCV among injecting drug users were 6.5% and 36.6% respectively in 2005-2006 [19]. In 2005 it is estimated that 7% of the general population have chronic HBV infection [20]. A meta-analysis estimates the prevalence of 1.9% for HBV and 1.1% for HCV in general population [21]. As per health facilities' records, a total of 18,081 and 18,438 cases of all types of acute viral hepatitis were reported in 2010 and 2011 [22]. However according to the disease early warning system (DEWS) data 76% of all acute viral hepatitis cases were reported in the group over five years of age [23]. The main high risk groupsthat is a concern for health authorities in the country are people with low socio-economic status, injecting drug users (IDUs), sexual workers, healthcare workers, unsafe health practitioners, mobile populations and prisoners [21]. The proportion of HBV in IDUs ranged from 5.8-6.5%, with an overall prevalence of 6.15% while the prevalence of HCV in same population was 36.4 % [24]. The prevalence of hepatitis B surface antigen (HBsAg) and HCV in obstetric populations in Kabul hospitals were 1.53% and 0.3% respectively [19]. In addition the prevalence of HCV and HBV in Female Sex Workers (FSWs) in three big cities in the country was 1.92%, and 6.54% respectively [25]. Testing of 1, 25,832 blood donors during the years 1989-2005 reported that 1.76% were positive for HBsAg and 0.63% for HCV [26]. Hundreds of thousands of people are displaced within and outside of the country leaving them in worse health situation [27]. The higher rates of hepatitis viruses has been reported among internally displaced and refugee populations of Afghanistan [28-30]. A genotype study reported that genotype D is the predominant genotype circulating in Afghani's population after which the genotypes C, A and B predominates [31]. Afghanistan is experiencing a low and concentrated HIV epidemic and among the countries in Central and South Asia that are confronted with a growing risk of HIV and AIDS, mainly due to the high incidence of injecting drug use that partially intersects with sex work [32]. It has a low HIV prevalence (>0.5%) but at high-risk for spread of HIV infection [33]. This study aimed to estimate the seroprevalence of HBV, HCV and HIV infection among adult populations in Mazar-e-Sharif city and identify some risk factors associated with infections.

II. METHODS AND MATERIALS

Study Design and Setting

A provincial cross sectional survey was conducted in Mazar-e-Sharif, a north urban city of Afghanistan, adapting and using the WHO STEP-wise tool [34]. The main objective of the study was to determine the level of risk factor for noncommunicable diseases while along with that the variables for Hepatitis was included in questioners and blood samples tested for HBV, HCV and HIV infection to additionally identify the proportions. All permanent household members aged ≥25 years, who were residents of the city during the study period and gave consent to participate were included in the study. Temporary residents and those living in institutionalized settings or insecure areas were excluded. Due to the unavailability of previous estimates of risk factor prevalence in this city we assumed the highest prevalence or sample size calculation (50%), 95% confidence interval (CI) and margin of error of 5%. After adjustment for cluster sampling methods finally 1200 subjects were enrolled in the study. In actual data collection totally data for 1231 subjects were collected and cleaned for analysis.

Strategy for Sampling

At the onset the list of city districts received from Mazar-e-Sharif municipality website. It includes the name, population size, number of households and its boundaries. Using the multistage cluster strategy from this list we conventionally selected five districts using random number of excel sheet. In the second stage from each selected district we randomly selected the five areas (called Guzar). Later the overall sample of 1200 household distributed among these selected area according to the proportion to the size of household number in each districts/ areas. Afterwards the number of households in each area divided by the sample size assigned for each areas, it enabled us to select household systematically.

Data collection and analysis

Data collectors including males and females were trained and field test was conducted ahead of time and questionnaire were adjusted accordingly before actual data collection. In each household the interviewer enumerated all persons who were eligible for our study based on the inclusion criteria. In households with more

than one eligible person, we used a lottery system to select the respondent for this survey. Various group of targeted data including demographic, behavioural and clinical variables were collected in Mazar-e-Sharif city from April to May. Following the interview blood samples were collected and shipped in cool boxes (2-8°C) from field to provincial public health office on the day of sample collection. After processing and separation the samples were shipped to Central Public Health Laboratory (CPHL) in Kabul in consignments. Using Cry-vials the samples were coded with ID number of the questionnaire. On arrival in CPHL all serum samples were stored at -80°C until biochemical test conducted. Altogether 1231 blood samples were tested for biochemical measurement as well as rapid tests for HBV, HCV, and HIV infections. The standard questionnaire which is designed by WHO for collection of data for risk factors were revised and variables thought being factors for hepatitis B, C and HIV infection included. Data management and analysis were done using statistical packages *ofEpi-info* version 7.0 and *SPSS*, version 20. The study protocol was approved by the institutional review board (IRB) of the Ministry of Public Health. Informed consent was taken ahead of interview.

Serological laboratory

Blood specimens were collected by trained data collectors using local standard operating procedures developed for this purpose. After centrifuging the samples in local provincial lab by a qualified lab technician, they were packaged and send to central public health laboratories in Kabul where it was stored for serological tests. Viral serology included HBsAg and hepatitis C antibodies (HCV-Ab) and HIV rapid tests provided by National HIV control Program. Initially rapid tests was run for all samples with specificity and sensitivity of 99% (Standard diagnostic, China) and later on confirmatory test conducted for Hepatitis B using ELISA (Biored Company, France). It should be mentioned the results of rapid tests for HCV and HIV infection is not further process for any confirmatory test.

III. RESULTS

As a general 1231 subjects with a mean age of 40.5± 13.22 (mean ± SD) years were enrolled in the study. The prevalence of HBV was 5.6% (69 out of 1231) for HBsAg on rapid test and 67 (5.4%) were confirmed positive after ELIZA test. Totally 3 subject (0.2%) were seropositive for anti-HCV on rapid tests. None of subjects had co-infections. None of specimen were positive for HIV infection showed zero prevalence. Two third of participants (59%) were illiterate and close to half of participants (47%) were housewives doing indoor affairs. Minority (10.2%) of study subjects worked as official employees of government or non-governmental organizations. Being a sensitive issue participants were reluctant to give answer regarding the monthly income of family although it was given as a range, however 72% out of all participants had income of less than 10000 Afghani (1$=67Afghani) (table 1). Furthermore 59% of study subjects knew about hepatitis and it was found that 3.5% of participants were exposed to blood transfusion. In addition 4.6% and 16.4% have experienced surgical and dental procedures. More than half of subjects (53.8%) had been exposed to needle injection, 1.9% had history of jaundice, 51.3% had received piercing of nose and ear, 4.1 % had practiced tattooing, 6.3% had visited hospitals, 5% had been vaccinated by their expression and 16.2% had lived with infected chronic patients. A minority of them (5.4%) had been exposed to street barbers while 29.3% and 13.5% exposed to simple and modern barber shops. Smoking and mouth snuffing was 9.9% and 8.3% prevalent among study participants (table 2). As shown in table 3 the association of factors were assessed with infection with HBV. Odds of being HBV positive in female was higher as compare to males (OR=2.04, 95%CI: 1.23-3.4). Those who were single (unmarried) were at lower risk of being infective with Hepatitis B virus (OR=0.42, 95%CI: 0.22-0.83). Type of barber shop used by customers also had a relationship with HBV infection. For instance odds of being HBV positive after using street type (OR=1.94, 95%CI: 0.43-5.34), simple (OR=1.05, 95%CI: 1.1-3.58) and clean type barbers (OR=1.4, 95%CI: 0.64-3.06) were higher as compare to no use of barber shops. Out of them association of using simple barber shop with HBV infection were statistically significant. We could not find any significant association between HBV infection and socioeconomic variables such as income level, job categories and age of participants. At univariate analysis the factors such as exposure to blood transfusion (OR=2.99, 95%CI: 1.23-7.37), history of jaundice (OR=5.13, 95%CI: 1.84-14.27), piercing (OR=0.54, 95%CI: 0.33-0.91), and living with Hepatitis patients (OR=2.7, 95%CI: 1.58-4.62) were significantly associated with being positive for HBV infection (table 4). However the factors such as tattooing, surgical procedures, dental procedures and knowledge of disease were not significantly associated with HBV infection in our study. Finally risk factors already found significant in the bivariate analysis were reanalyzed at multivariate model. The risk of HBV infection was statistically significant for sex, history of jaundice, blood transfusion and living with hepatitis patients (table 5).

IV. DISCUSSION

Due to years of war and conflict, Afghanistan has been suffering from communicable and noncommunicable diseases [18-23, 35-36]. Recently ministry of public health in Afghanistan formulated policy

documents [37] to ensure both communicable and noncommunicable diseases. The results of this study on prevalence of HBsAg positivity (5.6%) at level of rapid test and confirmatory test (5.4 %) are an outstanding findings to fill the gap of data in literature. Furthermore the study reflected the prevalence of HCV as 0.2%. The findings for HBV infection is higher than Jalalabad city of Afghanistan while the prevalence of HCV is lower [18]. Such results are reported in other settings as well [30, 38]. Nevertheless the prevalence is HCV (0.2%) is much lower as compare to its prevalence estimated by World Health Organization (WHO) worldwide [39]. However the prevalence of both infections are higher in high risk groups, for instance n 2012 hepatitis C prevalence among intravenous drug users ranged from 70% in Herat to 27.6% in Kabul. Hepatitis B prevalence among those who inject drugs was estimated at 6% in 2012 [40]. Moreover the prevalence of HBV reported here was comparable with other regional countries such as Egypt (4.7%) [41] Iran (3%) [42] and Pakistan (2.4%) [43]. In addition the prevalence of HCV was lower than other countries which are reported [44-45]. None of samples were positive for HIV infection in this study which means the prevalence of diseases is low, however, due to high level of risk factors for HIV/AIDS the country is at higher risk. The statistically significant risk factors for HBV infections detected in our study were being male, having history of jaundice and exposure to blood transfusion and living with chronic patterns. Sex (male) as a non-modifying factor had association with HBV and this could be due to more exposure of male stratum to risky practices out of home as compare to female who mostly housewives. This finding is supported by other studies as well [46]. Tattooing has been found a risky behavior in other study [47] while we could not find any association. History of jaundice means that the subject has possibly been exposed to viral hepatitis which is supported by other studies [48-51]. One of limitation of this study was not being designed specifically for hepatitis and we could not report most of the factors to be associated. However there are factors which have been statistically significant in other studies while due to samples size the association could have not been established by this study. The prevalence of HBV which shows the intermediate rate of disease in this city is a trigger point for planning and conduction of more studies to estimate the national burden of hepatitis in the country. Prevalence (Zero) of HIV infection among general population could be due to not including all ages and particularly the risk groups. However it should be considered with caution because it could be more prevalent in other high risk groups. Public awareness and health education regarding risk factors for viral hepatitis and encouragement for vaccination is recommended.

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Table 1: Frequency distribution of demographic characteristics of the study participants, Mazar-e-Sharif city (N=1231)

Variables	**Categories**	**Female**		**Male**		**Total**	
		N	**%**	**N**	**%**	**N**	**%**
Age							
	25-34	305	45.9	255	45	560	45.5
	35-44	175	26.4	108	19	283	23
	45-54	112	16.9	76	13.4	188	15.3
	55+	72	10.8	128	22.6	200	16.2
Level of Education							
	Illiterate	472	71	258	45.5	730	59.3
	Primary and unofficial	118	17.8	152	26.8	270	21.9
	Secondary school	37	5.6	82	14.5	110	9.7
	High school and over	37	5.6	74	13.1	111	9
	Refused	0	0	1	0.2	1	0.1
Job Categories							

	Official Employees	26	3.9	100	17.6	126	10.2
	Students	11	1.7	25	4.4	36	2.9
	Private Business	3	0.5	125	22	128	10.4
	Worker/Farmer	14	2.1	176	31	190	15.4
	Jobless	14	2.1	55	9.7	69	5.6
	Housework	568	85.5	10	1.8	578	47
	Unable to work/DKN	28	4.2	76	13.4	104	8.4
Monthly Income in AFN							
	Less than 10000	471	70.9	415	73.2	886	72
	More than 10000	135	20.3	110	19.4	245	19.9
	Refused	58	8.7	42	7.4	100	8.1
Marital Status							
	Single	41	6.2	80	14.1	121	9.8
	Married	552	83.1	478	84.3	1030	83.7
	Widow/Widower	71	10.7	8	1.4	79	6.4
	Divorced	0	0	1	0.2	1	0.1
Cigarette Smoking Status							
	No	626	94.3	483	85.2	1109	90.1
	Yes	38	5.7	84	14.8	122	9.9
Duration of smoking in years							
	< 10 years	22	48.9	36	34.3	58	38.7
	10 - 20 years	20	44.4	47	44.8	67	44.7
	≥ 20 years	3	6.7	22	21	25	16.7
Mouth Snuff Status							
	No	641	96.5	488	86.1	1129	91.7
	Yes	23	3.5	79	13.9	102	8.3

Table 2: Behavioral characteristics of study participants in Mazar-e-Sharif city

Characteristics	**Groups**	**Female**		**Male**		**Total**	
		N	%	N	%	N	%
Knowledge of Hepatitis							
	No	220	33.1	283	50	503	41
	Yes	444	66.9	283	50	727	59

Blood Transfusion							
	No	639	96.2	549	96.8	1188	96.5
	Yes	25	3.8	18	3.2	43	3.5
Surgery Procedure							
	No	634	95.5	540	95.2	1174	95.4
	Yes	30	4.5	27	4.8	57	4.6
Dental Procedure							
	No	563	84.8	462	81.5	1025	83.3
	Yes	101	15.2	105	18.5	206	16.7
History of Jaundice							
	No	649	97.9	558	98.4	1207	98.1
	Yes	14	2.1	9	1.6	23	1.9
Needle Injection							
	No	274	41.3	295	52	569	46.2
	Yes	390	58.7	272	48	662	53.8
Piercing							
	No	40	6	560	98.8	600	48.7
	Yes	624	94	7	1.2	631	51.3
Tattooing							
	No	631	95	549	96.8	1180	95.9
	Yes	33	5	18	3.2	51	4.1
Hospital visit							
	No	621	93.5	533	94	1154	93.7
	Yes	43	6.5	34	6	77	6.3
Living with Hepatitis Patients							
	No	574	86.4	457	80.6	1031	83.8
	Yes	90	13.6	110	19.4	200	16.2
Vaccination Status							
	No	624	94.1	543	95.9	1167	95
	Yes	39	5.9	23	4.1	62	5
Type of barber used							
	Street Side	19	2.9	48	8.5	67	5.4
	Simple Shop	50	7.5	311	54.9	361	29.3
	Modern Shop	30	4.5	136	24	166	13.5

	None	565	85.1	72	12.7	637	51.7

Table 3: Hepatitis B virus infection status and its relationship to socieodemographic factors in study participants in Mazar-e-Sharif city

Characteristics	Groups	HBV Negative	HBV Positive	Odds Ratio	CI 95%
Age in years					
	25 - 34	522 (44.8)	38 (56.7)	1.05	0.54 - 2
	35 - 44	274 (23.5)	9 (13.4)	0.47	0.20 - 1.13
	45 - 54	181 (15.5)	7 (10.4)	0.55	0.22 - 1.43
	54 and over	187 (16.1)	13 (19.4)	1	Reference
Sex					
	Female	639 (54.9)	25 (37.3)	2.04	1.23 - 3.40
	Male	525 (45.1)	42 (62.7)	1	Reference
Level of education					
	Illiterate	695 (59.8)	35 (52.2)	1.36	0.83 - 2.22
	Literate	468 (40.2)	32 (47.8)	1	Reference
Monthly income (Afghanis)					
	≤ 10000	835 (78)	51 (83.6)	0.69	0.35 - 1.39
	≥ 10000	235 (22)	10 (16.4)	1	Reference
Marital Status					
	Single	108 (9.3)	13 (19.4)	0.42	0.22 - 0.83
	Married	1056 (90.7)	54 (80.6)	1	Reference
Knowledge of Hepatitis					
	No	478 (41.1)	25 (37.7)	1.17	0.70 - 1.95
	Yes	685 (58.9)	42 (62.7)	1	Reference
Visiting Barber type					
	Street type	62 (5.3)	5 (7.5)	1.94	0.43- 5.34
	Simple saloon	333 (28.6)	28 (41.8)	1.05	1.18 - 3.58
	Clean saloon	157 (13.5)	9 (13.4)	1.4	0.64 - 3.06
	None	612 (52.6)	25 (37.3)	1	Reference

Table 4: Hepatitis B virus infection status and its relationship to socieodemographic behavioral risk factors in study participants in Mazar-e-Sharif city

Characteristics	Groups	HBV Negative	HBV Positive	Odds Ratio	CI 95%
Knowledge of Hepatitis					
	No	78 (41.1)	25 (37.3)	1.17	0.70 - 1.95
	Yes	685 (58.9)	42 (62.7)	1	Reference
Blood Transfusion					
	No	1127 (96.8)	61 (91)	2.99	1.23 - 7.37
	Yes	37 (3.2)	6 (9)	1	Reference
Surgery Procedure					
	No	1113 (95.6)	61 (91)	2.14	0.88 - 5.19
	Yes	51 (4.4)	6 (9)	1	Reference
Dental Procedure					
	No	974 (83.7)	51 (76.1)	1.6	0.90 - 2.88
	Yes	190 (16.3)	16 (23.9)	1	Reference
History of Jaundice					
	No	1145 (98.5)	62 (92.5)	5.13	1.84 - 14.27
	Yes	18 (1.5)	5 (7.5)	1	Reference
Needle Injection					
	No	544 (46.7))	25 (37.3)	1.47	0.88 - 2.45
	Yes	620 (53.3)	42 (62.7)	1	Reference
Piercing					
	No	558 (47.9)	42 (62.7)	0.54	0.33 - 0.91
	Yes	606 (52.1)	25 (37.3)	1	Reference
Tattooing					
	No	1115 (95.8)	65 (97)	0.7	0.16 - 2.94
	Yes	49 (4.2)	2 (3)	1	Reference
Hospital visit					
	No	1094 (94)	60 (89.6)	1.82	0.80 - 4.13
	Yes	70 (6)	7 (10.4)	1	Reference
Living with Hepatitis Patients					
	No	986 (84.7)	45 (67.2)	2.7	1.58 - 4.62
	Yes	178 (15.3)	22 (32.8)	1	Reference
Vaccination Status					
	No	1101 (94.8)	66 (95.8)	0.27	0.03 - 2
	Yes	61 (5.2)	1 (1.5)	1	Reference

Table 5: Multivariate analysis of risk factors and HBV among study participants in Mazar-e-Sharif city Afghanistan

Variables	Categories	Odds Ratio	CI 95% Lower Limit	CI 95% Upper Limit	P Value

Sex					
	Female	1	Reference		
	Male	0.515	0.31	0.857	0.011
Blood Transfusion					
	Yes	1	Reference		
	No	0.354	0.138	0.906	0.03
History of Jaundice					
	Yes	1	Reference		
	No	0.25	0.085	0.739	0.012
Living with HBV patients					
	Yes	1	Reference		
	No	0.405	0.237	0.695	0.001