Hepatitis: Prevalence, Risk Factors and Associated Co-morbidities in Local Population of Karachi, Pakistan

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Abstract

Hepatitis is inflammatory condition of liver due to a viral infection which may results in acute and chronic form. Types A, B, and C are most prevalent hepatitis viruses. Frequent mode of transmission of these infections include oral, fecal and parenteral route. Hepatitis B, C and D are mainly transmitted through infected blood. Pakistan is endemic area for viral hepatitis B and C and their prevalence was estimated with 7.4 % infection rate in 2009. This population focused study with objective of monitoring of health status of local residents was carried out from February to July 2014 in Karachi, Pakistan. Data was collected (N=200) from patients and physicians using structured Questionnaire and by also reviewing medical records of subjects from various hospitals and clinics and interpreted to evaluate the risk factors, prevalence and associated comorbidities of hepatitis in local population. Rate of infection with Hepatitis C was found high (58%), followed by Hepatitis B (24%). Few cases of Hepatitis D coexisted with hepatitis B were also observed. Frequency of Hepatitis A was observed 10%. Different modes of viral transmission were also studied. Results were calculated with SPSS 20.0, using chi square and independent t-tests. It was also concluded that Hepatitis B and C infections are vital factors for causing drastic morbidity and mortality. Hence Initiation of awareness programs along with effective preventive measure is important to reduce the high prevalence of hepatitis in society.

Introduction

Health and literacy rate of Pakistan is below standard mark. Pakistan as a developing country is ranked 134th out of 174 countries in a report published by Human development index of the United Nations [1]. Rate of infection with hepatitis B and C is high in Pakistan as 12 million individuals are suspected to have this disease [2]. Beside these findings, In Pakistan foremost reason of acute viral hepatitis (AVH) is hepatitis E virus (HEV) mostly found in adult's population having low socioeconomic values and fecal contamination of water is the main source for spread of this disease [3]. General features of hepatitis virus A, B, C, D and E are presented in Table 1. Factors associated with high prevalence of infections include poor regulation of health standards for transmission of blood, inappropriate use of recycled and low quality needles and syringes, non-sterilized surgical tools and dental instruments, repeated exposure of infected syringes in drug users, tattooing, nose and ear piercing and shaving using same needle or blade, haemodialysis, sexual intercourse, needle-stick injuries and peri-natal infections [4,5]. Mostly hepatitis infections are acute but B, C and D may also lead to chronic infections, associated co- morbidities, disability and death [5-8]. Substantial proportion of liver diseases is associated with hepatitis B and C virus infections. According to WHO 2004 report yearly mortalities were found 308,000 and 785,000 respectively by liver cancer and cirrhosis caused by HCV while WHO also rated Pakistan as 2nd amongst world countries having drastically high rates of chronic infectivity. About 8.6 Million Pakistanis are affected with hepatitis C [9]. Co-infections with hepatitis are not infrequent, which also present a challenge for treatment of these conditions [10]. Estimated complications of these chronic infections are expected to rise in next few decades dramatically and hence eventually burdenize the health setup of a disease with greater annual health care expenditure [11,12].

Incredible efforts are obligatory to promote awareness in public and proper education programs need to be initiated regarding risk and hazards associated with transmission of viruses [13,14]. In present work, we studied the prevalence, mode of transmissions, risk factors, associated co-morbidities and treatment available for hepatitis in local population of Karachi, Pakistan. The main purpose of this study was to assess and monitor the health status of local population with the objective to figure out the related facts for this disease.

Material and Methods

Study design

This observational descriptive study was conducted between February to July 2014 and data was collected from different areas of Karachi, Pakistan (Clinics and Hospitals). Individuals having hepatitis infections were incorporated in this study. A well-designed questionnaire was developed which consisted of 20 close-ended plus 5 open ended questions. The format of questionnaire was designed to acquire important information about the respondents' disease type, severity and intensity, associated comorbidities, modes of transmission, and treatment protocols. Patient's demographic data was also tabulated for disease prevalence with respect to age and sex. During this study patient medical records were studied, and their lab values for liver function test (LFT), hemoglobin and Creatinine clearance were noted down. Furthermore patients and physicians were also interviewed for

Type	Transmission	Classification	Genome	Antigens	Incubation period	Chronicity
HAV	Enteric	Picornavirus	+ssRNA	-	15–45 days	No
HBV	Parenteral	Hepadnavirus	+dsDNA	HBsAg,HBeAg	45–160 days	Yes (common)
HCV	Parenteral	Hepacivirus	+ssRNA	Core antigen	15–150 days	Yes (common)
HDV	Parenteral	Deltavirus	-ssRNA	Delta antigen	30–60 days	Yes - with hepatitis B
HEV	Enteric	Hepevirus	+ssRNA	-	15–60 days	No

Note: HAV (hepatitis A virus), HBV (hepatitis B virus), HCV (hepatitis C virus), HDV (hepatitis D virus), HAV (hepatitis E virus)

Table 1: General Features of Hepatitis Viruses.

Age Group	Total N= 200		Female N=107		Male N= 93	
	No.	%	No.	%	No.	%
12-20	25	12.5	15	14.1	10	10.7
21-30	42	21.0	19	17.7	23	24.7
31-50	57	28.5	30	28.0	27	29.0
Above 50	76	38.0	43	40.1	33	35.4

Table 2: Age and Sex Distribution of Study Samples of Hepatitis.

Figure 1: Severity of Disease.
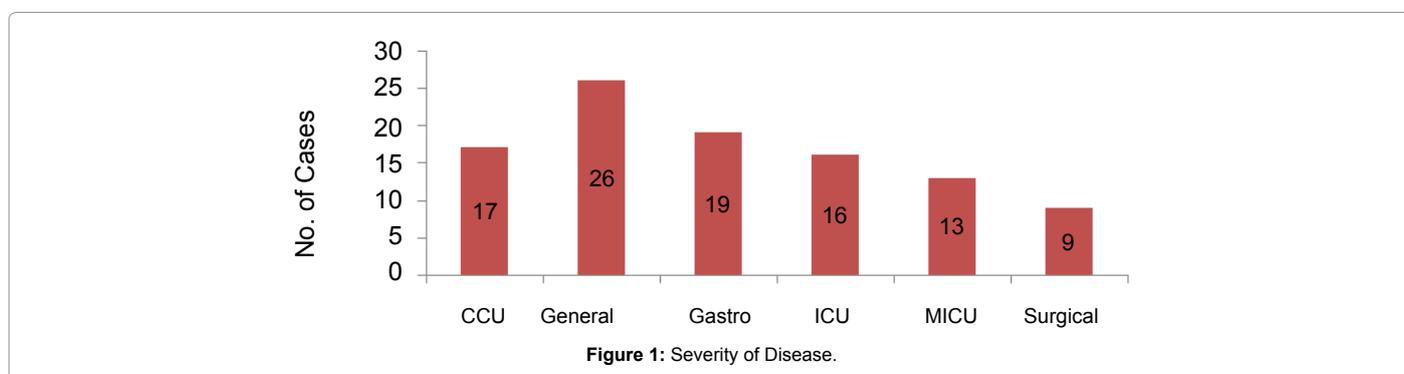
collection of relevant information including their knowledge regarding disease transmission. 100 cases from tertiary care hospitals were also included in this study and investigated for severity and frequency of viral hepatitis A, B, C, D and E. Results were analyzed by chi square χ^2 and independent sample *t* tests using SPSS 20.0

Result and Discussion

Hepatitis is becoming a serious health issue of developing countries, including Pakistan. Great numbers of research studies are performed with various cohorts of population including drug users, blood donors, and professional engaged to healthcare setup to signify the dominance of hepatitis in society [15-17]. However, mass awareness is still needed about the spread, symptoms, severity, treatment and prevention of this disease with associated morbidity and mortalities [18].

Present study was aimed to determine the prevalence of hepatitis in local population of Karachi, Pakistan and was comprised of convenience sample N=200. Patients were divided in four age groups including 12-20 yrs (12.5%), 21-30 yrs (21%), 31- 50 yrs (28.5%) and above 50 yrs (38%). Effect of age and sex in relevance to hepatitis was assessed in different studies. Ghias and Khalid also indicated the impact of age and calculated that one year increment in patient age can increase the risk of disease with factor of 1.034 times, while increment will double with 20 years increment in age calculated as exp $^{(10*0.034)}$=2.0.

In current study high prevalence of disease was found in patients above 50 yrs i.e. 38% (Table 2). For collection of the data structured questionnaire was developed with open and close ended questions and then information was collected from patients and physicians. Beside that 100 patients were also included in this study that were admitted

in different wards of tertiary care hospital and were also grouped in further six categories according to the severity of disease and admissions in different wards (Figure 1). Record of patients admitted in various wards of tertiary care hospitals having Hepatitis A, B, C, D or E is also presented in Figure 2.

In the present study the frequency of hepatitis A was found 10 %. Personal and public hygiene critically influence the epidemiology of hepatitis A virus. In Pakistan hepatitis A is present pandemic to epidemics especially in hot and rainy periods [19,20]. Frequency of hepatitis B in this study was estimated to be 24 %, hepatitis C 58%, hepatitis E 12% and low prevalence of Hepatitis D i.e. 4% (Figure 3). Adult groups are more prone to be effected by HEV. Different authors also reported small epidemics of hepatitis E in Pakistan [21,22]. The decrease in frequency of hepatitis B in contrast to Hepatitis C may be related to effective execution of the vaccination plan. Disease prevalence of hepatitis C in Pakistan was also reported in different studies between 4.6 to 23.8 % [23,24]. While high Prevalence in Africa and Asia is also reported by number of authors [25-27]. Comprehensive strategies need to develop and implement to reduce the disease transmission with vaccination campaigns. Communities counseling and education with respect to spread of disease is also important to commence. Routine childhood vaccination can also decline the age related burden of hepatitis.

During the study patient and physicians were asked for the main causes and spread of disease. Respondents rated drug users with common syringes (41%), transfused blood (24%), infected equipment (12%), followed by tattooing and ear piercing (6%), while 17% was found with unknown causes (Table 3). Around 350 million HBV positive cases were estimated in 2004 worldwide and over 10% in Asia.
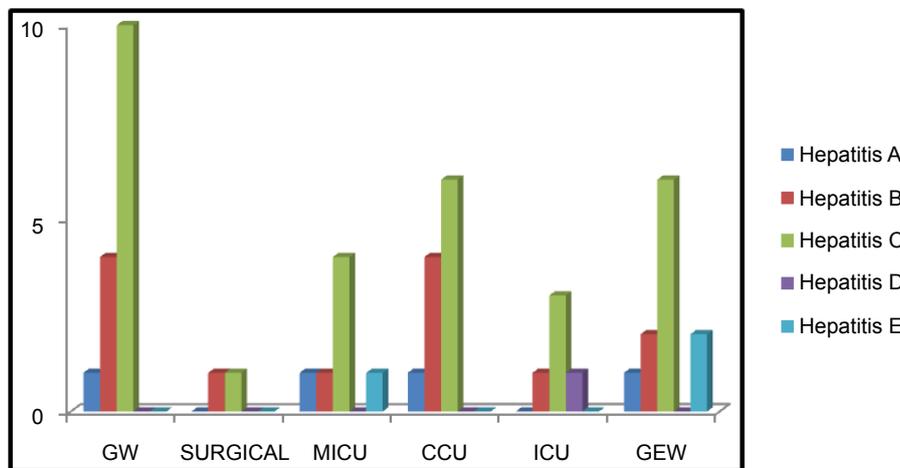
Note: GW (general ward), MICU (medical intensive care unit), CCU (critical care unit), ICU (intensive care unit), GEW (gastroenterology ward)

Figure 2: Record of patients admitted in various wards of tertiary care hospitals having Hepatitis A, B, C, D or E (severity of symptoms).
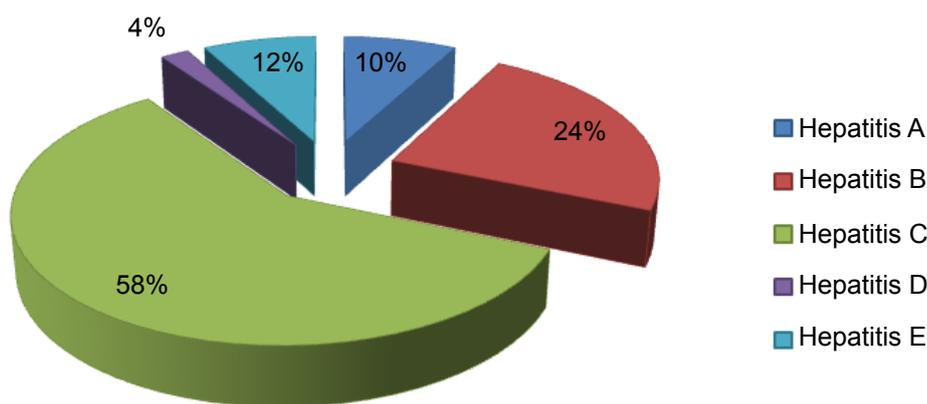
Figure 3: Prevalence of Hepatitis.

In various studies different mode of transmissions mainly drug abuse by injections, unprotected sex and transmission during childbirth were supposed to be the primary factors for spread of disease [28-30]. In another study rate of spread of hepatitis C was found 3-4 million per year [31]. Important labs finding including bilirubin aspartate amino-transferase (AST or SGOT), alanine amino-transferase (ALT or SGPT), hemoglobin and Creatinine values of respondents having viral hepatitis were presented in Table 4. These were extracted by reviewing the patient's medical records. These lab values were used in determining the disease intensity and rationale prescribing of medications. Normal range of total, direct and indirect bilirubin in adult's is found in order of 0.0-1.4 mg/dL or 1.7-20.5 mcmol/L, 0.0-0.3 mg/dL or 1.7-5.1 mcmol/L and 0.2-1.2 mg/dL or 3.4-20.5 mcmol/L. higher levels of these factors indicates the progression or development of hepatitis, cirrhosis and other liver diseases [32,33]. The customary values of aspartate amino-transferase (AST or SGOT) and alanine amino-transferase (ALT or SGPT) are ranged between 5 to 40 and 7-56 units per liter of serum. In case of liver injury due to hepatitis or other conditions levels of these enzymes change in blood and indicate the liver damage. Like in case of hepatitis A, very high levels of AST and ALT even in 1000U/L may found while in other cases including infection with HCV and other chronic liver diseases slight elevation of these enzymes can occur.

Hence, these enzymes are not used as sole indicators to forecast the liver damage [34-36].

The most prevalent comorbidities of viral hepatitis were also

Modes of transmission	Percentage of prevalence (%)
Syringes	41
Transfused Blood	24
Tattooing/ ear and Nose piercing	6
Infected Equipment	12
Unknown Reasons	17

Table 3: Respondents Knowledge about Modes of Transmission.

S.No.	Liver function test			Hb (mg/dL)	Creatinine (mg/dL)
	BILIRUBIN (mg/dL)	AST(U/L)	ALT(U/L)		
Hepatitis A	0.79-48.2	33-1200	42-860	8.54-15.8	0.70-2.88
Hepatitis B	0.54-85.5	28-1332	52-1023	9.26-16.2	0.41-1.58
Hepatitis C	0.43-64.9	20-4095	28-2262	10.1-16.6	0.64-4.54
Hepatitis D	0.50-3.25	25-86	57-118	9.12-11.8	0.72-1.25
Hepatitis E	1.42-21.5	47-1400	310-2262	9.02-15.1	0.98-1.52

Table 4: Important Labs Finding of Respondents Having Viral Hepatitis (N=200).

Age Groups	Cirhosis		Hepato-cellular carcinoma		Co infections (Respiratory & GIT)		Other viral infections		Encephalitis		Genitourinary infections		Neurological disorders	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
12-20yrs	4	21	0	25	13	12	12	13	10	15	6	19	7	18
21-30yrs	16	26	8	34	21	21	4	38	7	35	7	35	12	30
31-50yrs	25	32	20	37	21	36	21	36	8	49	8	49	37	20
above 50yrs	38	38	28	48	18	58	16	60	13	63	4	72	28	48
Total	83	117	56	144	73	127	53	147	38	162	25	175	84	116

Table 5: Prevalence of Comorbidities Associated with Viral Hepatitis.

Comorbidities	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Cirrhosis	9.289[a]	3	0.026	0.025	0.003
Hepato-cellular carcinoma	15.760[a]	3	0.001	0.001	0.000
Co- infections (Respiratory & GIT)	11.282[a]	3	0.010	0.010	0.001
Other viral infections	16.435[a]	3	0.001	0.001	0.133
Encephalitis	8.403[a]	3	0.038	0.038	0.037
Genitourinary infections	7.451[a]	3	0.059	0.055	0.006
Neurological disorders	18.234[a]	3	0.000	0.000	0.130

Table 6: Chi-Square Test for Associated Comorbidities.

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age	Equal variances assumed	13.253	0.000	0.466	198	0.641	0.0691	0.1482	-0.22319	0.36147
	Equal variances not assumed			0.459	176.3	0.646	0.06914	0.15047	-0.22782	0.36610

Table 7: Independent Samples Test.

Gender	N	Mean	Std. Deviation	Std. Error Mean
Female	93	2.9570	1.16015	0.12030
Male	107	2.8879	0.93493	0.09038

Table 8: Group Statistics and Prevalence of Hepatitis.

observed in present study and shown in Table 5. Chi- square test with 0.05% confidence Interval was used to evaluate the significant values of these comorbidities in patient samples and multiple conditions were found significant in different age groups of patients (Table 6) It was also observed that most of the patients suffered with coupled of comorbid symptoms. In previous studies associated co-morbidities of hepatitis C were also studied and cirrhosis, hepato-cellular carcinoma, and co-infection with HIV were most prevailing with annual deaths rates from 10,000 to 20,000 [37,38]. Prevalence of hepatitis in local population is also estimated with respect to gender by independent t-test using SPSS 20.0 (Tables 7 and 8) Available treatments for hepatitis were also recorded from patients profile and summarized in Table 9. It was also observed that different groups of antibiotics were also prescribed including amoxicillin, piperacillin/tazobactum, ceftriaxone, vancocin and meropenum [39-43] according to culture sensitive reports to control secondary bacterial infections, and during the therapies LFT values were closely monitored.

Conclusion

There is low awareness in community about the risk factors and associated co- morbidities of viral hepatitis. As treatment is costly, so preventive measures should be signified and more awareness for safer blood transfusions, importance of blood screening procedures,

TYPE OF INFECTION	AVAILABLE TREATMENTS
Hepatitis A	a. Accetaminophen b. Metaclopramide c. Immune globulin IM d. Hepatitis A & B Vaccines
Hepatitis B	a. Tenofovir Disopronil Fumarate b. Lamivudine c. Adefovir dipivoxil d. Entecavir e. Telbivudine
Hepatitis C	a. Protease Inhibitors • Simeprevir • Boceprevir • Telaprevir b. Interferons • Interferon alfa- 2b • PegInterferon alfa- 2b • Pegylated Interferon alfa- 2a c. RNA Polymerase Inhibitors • Sofosbuvir • Ribavirin d. Thromboprotien Receptor Agonist • Eltrombopag
Hepatitis D	a. Interferon alfa – 2a
Hepatitis E	a. Ribavirin b. Electrolyte Replacement

Table 9: Available treatments for hepatitis A, B, C, D and E.

effective techniques of sterilization for equipments, use of disposable blades and syringes must be highlighted in public.

Growing trend of viral hepatitis demands mass awareness and early detection of disease in the country. Thus Preventive measures and effective vaccination program need to be initiated to improve the health and literacy rate. However, a referral bias in this study cannot be excluded. Hence, suggest larger population focused studies to corroborate these findings.

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