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Studies on the Prevalence of Hepatitis B Virus in Relation to Sex, Age, Promotive Factors, Associated Symptoms and Season Among Human Urban Population of Multan, Pakistan

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The present study was carried out to assess prevalence of hepatitis B virus (HBV) in relation to sex, age, promotive factors, associated symptoms and season among human urban population of Multan, Pakistan for a period of 32 months from June 2001-February 2004. The present study was based on the data, collected randomly from the human population aging from 1-72 years. The population was divided into three age groups i.e old (age above 50 years), mature (age 13-50 years) and young (age below 13 years). The results from the present study suggested that among the observed urban population of Multan (n=2531), prevalence of HBV was 7.94%. The prevalence of HBV when studied in different age groups of both sexes, it was found that prevalence of HBV was maximum (9.63%) in mature males as compared to young males (6.14%) and old males (5.44%). The prevalence of hepatitis B surface antigen was higher (7.94%) in young females as compared to mature females (7.32%) and old females (6.80%). The main promotive factors for HBV were unscreened blood transfusion 56 (27.86%), infected syringes 34 (16.91%), contaminated barber, parlor tools 32 (15.92%), contaminated dentist equipments 29 (14.43%) and contaminated surgery equipment 25 (12.44%). The reported cases of HBV positive patients were maximum in summer 146 (72.63%) as compared to 55 (27.36%) in winter.

Key words: Hepatitis, population, sex, age, season, virus

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INTRODUCTION

Hepatitis is primarily caused by infection with one of at least five different viruses, each of which has a different epidemiologic pattern of transmission, a different clinical outcome and a different mean of prevention. According to Seegar and Mason[1], Kamal[2] different viruses including hepatitis A, B, C, D, E and G cause viral infections of human liver. Hepatitis B is a serious disease caused by a virus that attacks the liver. The virus, which is called hepatitis B virus (HBV), can cause lifelong infection, cirrhosis of the liver, liver cancer, liver failure and even death. Hepatitis B is a serious and common infectious disease of the liver, affecting millions of people through out the world[3,4]. Hepatitis B has also been called type B Hepatitis, serum hepatitis and homologous serum jaundice[3]. Hepatitis B virus interferes with the functions of the liver while replicating in hepatocytes. The immune system is then activated to produce a specific reaction to combat and possibly eradicate the infectious agent. As a consequence of pathological damage, the liver becomes inflamed. The severe pathological consequences of persistent HBV infections include the development of chronic hepatic insufficiency, cirrhosis and the hepatocellular carcinoma[3,5]. The children and adults are at equal risk of becoming infected with HBV. The children become infected with HBV through a variety of means including perinatal HBV infection and person to person transmission during the first five years of life[6]. The risk of perinatal HBV infection among infants born to HBV an infected mother ranges from 10-85%[7]. Infants who become infected by perinatal transmission have a 90% risk of chronic infection and up to 25% will die of chronic liver disease as adults[8]. Even when not infected during the perinatal period, children of HBV infected mothers remain at high risk of acquiring chronic HBV infection by person to person transmission during the first five years of life. Hepatitis B virus occurs worldwide[9] if the world can be divided into three areas where the prevalence of chronic HBV infection is high (>8%), intermediate (2-8%) and low (<2%)[3]. High endemic areas include South East Asia and the Pacific Basin (excluding Japan, Australia and New Zealand), sub Saharan Africa, the Amazon Basin, parts of the Middle East, the central Asian Republics and some countries in Eastern Europe. In these areas about 8-20% of people are HBV carriers. In countries such as China, Senegal and Thailand, infection rates are very high in infants and continue through early childhood. At that stage the prevalence of HBsAg in serum may exceed 25%. Low endemic areas include North America, Western and Northern Europe, Australia and parts of South America. The carrier rate here is less than 2%. The rest of the world falls into the intermediate range of HBV prevalence, with 2-8% of a given population being HBV carriers[3,4]. The prevalence is lowest in countries with the highest standards of living, such as Great Britain, Canada, United States, Scandinavia and some other European Nations. Every year there are over 4 million acute clinical cases of HBV and about 25% of carriers are reported and one million people a year die from chronic active hepatitis, cirrhosis or primary liver cancer[10]. HBV may be the cause of up to 80% of all cases of hepatocellular carcinoma worldwide, second only to tobacco among known human carcinogens[4,10]. In Pakistan, unfortunately the hepatitis B carrier rate is estimated around 10% which is alarmingly high. The acute and chronic consequences of hepatitis B virus infection are among the major health problems in Pakistan. Many chronically infected persons are at risk of long term sequel, such as chronic liver disease and primary hepatocellular carcinoma. The course of hepatitis B may be extremely variable. Hepatitis B virus infection has different clinical manifestations depending on the patient's age at infection, immune status and the stage at which the disease is recognized[9]. During the incubation phase of the disease (6 to 24 weeks), patients may feel unwell with possible nausea, vomiting, diarrhea, anorexia and headache. Patients may then become jaundiced although low-grade fever and loss of appetite may improve. Sometimes HBV infection produces neither jaundice nor specific symptoms[4,9]. The present study was carried out to assess prevalence of Hepatitis B virus in relation to sex, age, promotive factors, associated symptoms and season among human urban population of Multan, Pakistan.

MATERIALS AND METHODS

The present study was carried out for a period of 32 months from June 2001 to February 2004. Blood samples of 1394 males and 1137 females of different age groups were collected randomly from the population. The male population was divided into three age groups i.e. old male (age above 50 years), mature male (age 13-50 years) and young male (age below 13 years). The female population was also divided into similar three groups. Efforts were made to include samples of all those persons who were willing to cooperate in carrying out the purpose of present study and were apparently normal, without any diagnosis of hepatitis B or freshly diagnosed. Blood was withdrawn by vene-puncture arm vein. Three mL of blood sample was used for antibody titer evaluation. The estimation was carried out immediately after the collection of blood samples by using rapid chromatographic immunoassay from Acon Laboratories USA for the

qualitative detection of hepatitis B surface antigen in serum or plasma. The Acon HBsAg one test device is a qualitative, solid phase, two-site sandwich immunoassay for the detection of hepatitis B surface antigen (HBsAg) in serum or plasma. The membrane is pre coated with anti HBsAg antibodies on the test line region and anti-mouse antibodies on the control line region. During testing, the serum or plasma samples reacts with the dye conjugate (mouse anti HBsAg antibody colloidal gold conjugate) which has been pre coated in the test device. The mixture migrates upward on the membrane chromatographically by capillary action to react with anti HBsAg antibodies on the membrane and generate a red line. Presence of this red line indicates a positive result, while its absence indicates a negative result. Regardless of the presence of HBsAg, as the mixture continues to migrate across the membrane to the immobilized goat anti mouse region, a red line at the control line region always appears. The presence of this red line serves as verification for sufficient sample volume and proper flow and as control for the reagents. Serum was obtained from the clot of red cells immediately after collection of blood samples to avoid hemolysis. Only clear, non-hemolyzed specimens were used. Vacuum tubes were used for the collection of serum or plasma. The test device used for the qualitative detection of hepatitis B surface antigen in serum or plasma was tested with a sensitivity panel ranging from 0-300 ng mL^{-1}. The test device can detect HBsAg levels of 5 ng mL^{-1} in 15 min. The test device used was when compared with a leading commercial RIA and EIA test of HbsAg the correction between these two systems was 98%. Specificity of HBsAg test device was also tested with laboratory strains of hepatitis A and C. They all yielded negative results. The presenting complaints and the history of the subjects with a special emphasis on personal past history and family history was also noted. The data so obtained was statistically analyzed.

RESULTS

The results from the present study suggested that among the observed urban population of Multan (n=2531), prevalence of HBV was 7.94% (Table 1). The prevalence of HBV when studied in different age groups of both sexes, it was found that prevalence of HBV was maximum (9.63%) in mature males as compared to young males (6.14%) and old males (5.44%) (Table 1). The results suggested that among the observed female population, prevalence of HBV was higher (7.94%) in young females as compared to mature females (7.32%) and old females (6.80%) (Table 1). The predominant symptoms with HBV were elevated bilirubin (5.97%), dark yellow urine (5.47%), elevated liver enzymes (4.98%), diarrhea (4.98%) and yellowish eyes, skin coloration (4.47%) (Table 2). The associated symptoms with HBV were tiredness (6.96%), fever (5.97%), stomach pain (5.47%), vomiting (3.98%) and loss of appetite (3.48%). The results also show that 149 (74.12%) patients were although carrier of HBV but they had no symptom (Table 3). The main promotive factors of HBV in patients of all age groups of both sexes

Table 1: Prevalence of hepatitis B surface antigen in different age groups of both sexes

Type	Age	Sex	N	Normal	Hepatitis B positive
Old	>50	M	294	278	16 (5.44%)
Mature	13-50	M	986	891	95 (9.63%)
Young	<13	M	114	107	07 (6.14%)
Old	>50	Fe	235	219	16 (6.80%)
Mature	13-50	Fe	751	696	55 (7.32%)
Young	<13	Fe	151	139	12 (7.94%)
Total			2531	2330	201
%age				92.06	7.94

Table 2: Predominant symptoms of hepatitis B positive patients of all age groups of both sexes

Type	Age	Sex	HBsAg positive	No symptom (carrier)	Dark yellow urine	Diarrhea (Yellowish coloration)	Elevated bilirubin	Elevated liver enzymes	Yellowish eyes and skin
Old	>50	M	16	04	02	02	03	03	2
Mature	13-50	M	95	82	03	03	02	02	3
Young	<13	M	07	01	01	01	02	01	1
Old	>50	Fe	16	08	01	01	03	02	1
Mature	13-50	Fe	55	47	03	02	01	01	1
Young	<13	Fe	12	07	01	01	01	01	1
Total			201	149	11	10	12	10	9
%age				74.12	5.47	4.98	5.97	4.98	4.47

Table 3: Associated symptoms of hepatitis B positive patients of all age groups of both sexes

Type	Age	Sex	HBsAg positive	No symptom (carrier)	Fever	Loss of appetite	Stomach pain	Tiredness	Vomiting
Old	>50	M	16	04	03	2	02	03	2
Mature	13-50	M	95	82	02	1	03	04	3
Young	<13	M	07	01	02	1	01	01	1
Old	>50	Fe	16	08	03	1	00	03	1
Mature	13-50	Fe	55	47	01	2	03	01	1
Young	<13	Fe	12	07	01	0	02	02	0
Total			201	149	12	7	11	14	8
%age				74.12	5.97	3.48	5.47	6.96	3.98

Table 4: Main promotive factors of HBV in patients of all age groups of both sexes

Type	Age	Sex	HBsAg positive	Unscreened blood transfusion	Infected syringes	Contaminated barber +Parlor tools	Contaminated surgery equipments	Contaminated dentist equipments	Tattooing
Old	>50	M	16	05	03	03	01	01	1
Mature	13-50	M	95	23	12	27	09	14	1
Young	<13	M	07	04	01	00	02	00	0
Old	>50	Fe	16	07	03	00	02	02	0
Mature	13-50	Fe	55	12	12	02	09	11	2
Young	<13	Fe	12	05	03	00	02	01	0
Total			201	56	34	32	25	29	4
%age				27.86	16.91	15.92	12.44	14.43	2.0

Table 5: Associated promotive factors of HBV in patients of all age groups of both sexes

Type	Age	Sex	Saliva	Semen	Vaginal secretions	Ear and nose piercing	Heamo dialysis	Acupuncture infected needles	Others (Not defined)
Old	>50	M	0	0	0	0	0	1	01
Mature	13-50	M	1	0	1	0	1	2	04
Young	<13	M	0	0	0	0	0	0	00
Old	>50	Fe	0	0	0	1	0	0	01
Mature	13-50	Fe	1	1	0	1	0	1	03
Young	<13	Fe	0	0	0	0	0	0	01
Total			2	1	1	2	1	4	10
%age			1.00	0.50	0.50	1.00	0.50	2.0	4.92

Table 6: Reported cases of HBV positive patients in summer and winter

Type	Age	Sex	N	Normal	Hepatitis B positive	Reported in summer months	Reported in winter months
Old	>50	M	294	278	16	11	05
Mature	13-50	M	986	891	95	63	32
Young	<13	M	114	107	07	06	01
Old	>50	Fe	235	219	16	14	02
Mature	13-50	Fe	751	696	55	43	12
Young	<13	Fe	151	139	12	09	03
Total			2531	2330	201	146	55
%age						72.63	27.36

were unscreened blood transfusion (27.86%), infected syringes (16.91%), contaminated barber and parlor tools (15.92%), contaminated dentist equipment (14.43%), contaminated surgery equipments (12.44%) and tattooing (2.0%) (Table 4). The associated factors of HBV were acupuncture infected needles (2.0%), saliva (1.0%), Ear and nose piercing (1.0%), semen (0.50%), vaginal secretion (0.50%), heamodialysis (0.50%) and others which could not be defined were (4.92%)(Table 5). The results revealed that (72.63%) of HBV positive cases were reported in summer as compared to (27.36%) which were reported in winter (Table 6).

DISCUSSION

Hepatitis is a public health problem worldwide. According to Gow and Mutimer[11] viral hepatitis is the major cause of chronic liver disease worldwide. The hepatitis B virus, is a 42 nm partially double stranded, circular DNA virus, composed of a 27 nm nucleocapsid core surrounded by an outer lipoprotein coat containing the surface antigen[3,4,12]. HBV is transmitted through percutaneous or parenteral contact with infected blood, body fluids and by sexual intercourse. In addition HBV carriers can transmit the disease for many years[3,5]. HBV is able to remain on any surface it comes into contact with for about a week without losing its infectivity[4,9]. HBV does not cross the skin or the mucous membrane barrier. Some break in this barrier, which can be minimal and insignificant, is required for transmission[4,9]. Percutaneous exposures that have resulted in HBV transmission include transfusion of unscreened blood or blood products, using unsterilized injection needles for intra venous drug use, heamodialysis, acupuncture, tattooing and injuries from contaminated sharp instruments sustained by hospital personnel[3,9]. Sexual intercourse with multiple partners can be dangerous. One should not judge by appearance because most infected people look perfectly healthy and have no symptoms of disease, yet may be highly infectious. All persons who are hepatitis B surface antigen (HBsAg) positive are potentially infectious. The many millions of people around the world who become HBV carriers are a constant source of new infections for those who have never contracted the virus[9]. Contaminated food or water, insects or other vectors does not transmit HBV. However, only blood, vaginal and menstrual fluids and semen have been shown to be infectious[4,9]. HBV is stable on environmental surfaces for at least 7 days and indirect inoculation of HBV can occur via inanimate objects like toothbrushes,

razors, hospital equipment and other objects by contact with mucous membranes or open skin breaks[9]. Frequent and routine exposure to blood or serum as surgeons, dentists, oral
surgeons, pathologists, operating room and emergency room staff and clinical laboratory workers who handle blood are at the highest risk[9]. According to Remis[13] prevalence of hepatitis is generally found highest during young and middle adulthood years. In this study hepatitis cases are found with highest prevalence among mature males of age group 13-50 years (9.63%) and young females of age group 1-13 years (7.94%) while lowest prevalence (5.44%) in old males of age group >50 years. The results of this study also agree with the findings of Shah[14]. They observed the high prevalence of chronic hepatitis among the middle age group. It is a possibility that these age groups may be exposed highly to risk factors like surgery, blood transfusion, multiple injection and razor trauma of shaving. In this study the prevalence of hepatitis B is high in males (4.66%) as compared to females (3.27%) which correlate the study of Remis[13] who found that prevalence of hepatitis was higher in males than females. The reasons of this may be more exposure of males to contaminated environment, accidental cuts, razor trauma of shaving and circumcision. Transfusion of unscreened blood or blood products, sharing unsterilized injections for intra venous drug use, haemodialysis, circumcision and shaving by barbers, use of unsterilized equipment in parlors and acupuncture needles are also observed as a risk factor during study. The extensive literature review indicate that such type of studies, which were focused to show relationship of these parameters with that of spread of HBV are rare in Pakistan. Researchers in Pakistan are stimulated to begin to identify strategies for HBV screening, medication compliance and adherence to lifestyle change recommendations. Therefore results of this study might gave a wake up call to influence the attitude of physicians as well as the society towards control and prevention of these multitude factors.

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