RISK FACTORS OF HEPATITIS B VIRUS INFECTION IN URBAN AND RURAL AREAS OF QENA GOVERNORATE , UPPER EGYPT

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ABSTRACT

Background: *HBV infection is a significant health problem in Egypt which is categorized as an HB virus intermediate endemic area, with HB carrier rate ranging from 2%-7%. HBV infection is the 10th leading cause of death and HBV related hepatocellular carcinoma is the 5th most frequent cancer worldwide.* ***Aims of the study:*** *The present study aims to investigate the most important risk factors for transmission of HBV and HCV in urban and rural areas in Qena Governorate, Egypt.* ***Patients and Methods:*** *A matched case control study was conducted. The study included 600 patients, 100 HBV cases and 500 controls, aged above 20 years and below 70 years. Direct interview was done with each participant separately for filling the questionnaire during the period from January 2013 to January 2014. The collected data were reviewed, entered and statistically analyzed using SPSS version 19.* ***Results:*** *The mean age of cases and controls were 38.83 (± 12.62) and 44.26 (± 11.68) years respectively. Multivariate analysis shows that odds ratio of HBV infection is significantly higher among cases with some risk factors: injection by reused needle, sharing razors with others, dental procedures or oral surgery, blood transfusion and intravenous infusion and/or injection.* ***Conclusion and Recommendations:*** *The common risk factors exposures of hepatitis B infection included blood transfusion, dealing with patient blood, hospital admission, surgery, accidental stick with a blood contaminated needle, intravenous catheterization and dental procedures. There are statistically significant differences between HBV cases and their controls in the majority of these risk factors. The presence of these risk factors emphasizes the need for increasing the uptake of HB vaccine. Health care providers, health educators, and other community-based organizations must play an active role in counseling high-risk people*

Key words: *HBV- risk factors- Egypt- Rural –urban*

INTRODUCTION

Hepatitis B virus (HBV) infection is the 10th leading cause of death and HBV related hepatocellular carcinoma (HCC) is the 5th most frequent cancer worldwide (Datta, 2008). It has been estimated that about 2 billion individuals worldwide have been infected with the hepatitis B virus and about 350 million individuals live with chronic HBV infection. Approximately 600 000 deaths arise from HBV-related cirrhosis and hepatocellular carcinoma every year (Gheorghe et al., 2013). Egypt is among the countries with intermediate endemicity of hepatitis B surface antigen (HBsAg) (range 2%-7%) (Khattab et al., 2010). Furthermore, Egypt was one of the earliest countries to implement HBV vaccination in 1992 in the Expanded Program of Immunization (El Sherbini et al., 2003). Perinatal, child to child and parenteral transmission, transfusion of blood and its derivatives, haemodialysis, surgical interventions, dental extraction and tattooing are

considered as important routes of transmission in developing countries (Khan et al., 2008). Additional factors include large family size, poor socioeconomic status, older age, low educational status and a history of contact with a jaundiced person (Ben-Alaya-Bouafif et al., 2010). Other risk factors such as intravenous drug use, homosexual and heterosexual relations with multiple partners are more common in western countries, and infection in adolescents and young adults is the commonest mode of transmission in these settings (Bawazir et al., 2011). Transmission can occur from health care worker to patient, and vice versa, or between patients. The risk of acquiring the infection is mainly because of contact with infected blood or body fluids through needle stick or contaminated instruments. Hepatitis B viral transmission also has been documented in dental care settings that have caused sporadic outbreaks of HBV. There is lack of routine serological screening prior to surgery, which is one of the factors responsible for increased transmission. The major risk factors include reuse of contaminated instruments and improperly screened blood products (Thorburn et al., 2003). The frequency of HBV infection appears to be higher among males than females, among children than adults and among urban than rural communities (Mehmet et al., 2005). Rural residence could be a risk factor for HBV infection, socioeconomic conditions among the poor and less educated, and crowded living condition in the rural areas, may contribute to HBV exposure (Bwogi et al., 2009). The frequency of combined Hepatitis B and Hepatitis C amongst urban and rural population as 45% and 55% (Ahmad et al., 2006). The frequency is greater in rural than urban population. It may be due to increased rural population, illiteracy, poverty, lack of proper precautions, quackery in the rural area and less awareness regarding the causative agent and transmission (Hussain et al., 2009). Also the local medical care system in rural hospitals is not well developed, injections were usually given in local village clinics, many of which lacked standard infection control procedures compared to city hospitals (Zhang et al., 2010). Body piercing (including ear and nose piercing) and tattooing, circumcision was done mainly by barbers using improperly sterilized instruments, barbers shaving, and non-sterile surgical and dental practices are important risk factors for transmission of infection and by comparison between urban and rural areas for HBV showed these risk factors are more in rural than in urban and more than one risk factor was present in every individual (Aziz et al., 2010).

Aims of the study:

(1) Investigate the most important risk factors for transmission of HBV in urban and rural areas in Qena Governorate in order to help prevention and control of this health problem.

(2) Identify the relationship between the hepatitis B transmission and the demographic and personal characteristics as age, gender, occupation, education, socioeconomic status.

PATIENTS AND METHODS

Study design

A matched case control study was conducted.

Study area:

Internal Medicine Outpatient Clinics and Department at Qena University Hospital that was located in old campus in Qena city, the capital of Qena Governorate which is one of the governorates of South Upper Egypt it covers a stretch of the Nile valley.

Study population

The study included 600 patients aged above 20 years and below 70 years. 100 cases who were positive for HBV (100) who attending the Internal Medicine Outpatient Clinics and Department for the first time. The controls were 500 subjects sex and age matched who were negatives for HBsAg (seronegatives) seen as outpatients at the same clinics for problems other than liver diseases during the same time interval.

Instrument

Structured designed questionnaire consisted of two parts:

First part contains socio-demographic characteristics of participants. Second part contained the risk factors of HBV infection

(health care services exposure risk factors and community and behavioral associated risk factors)

Data collection

- Before starting final data collection, a pilot study was carried out on a sample of 10 participants (not included in the study) and the necessary modification in the questionnaire was done.
- Fieldwork took place during the period from January 2013 to January 2014
- Direct interview was done with each participant separately for filling the questionnaire by the researcher herself.
- The questionnaire filling took 20-30 minutes on average.
- The researcher assured that the participant had a comprehensive understanding of the questionnaire with full explanation of misunderstood questions.

Laboratory analysis:

Blood samples were collected under sterile conditions, serum separated and preserved at- 80ºC until analysis was done. HBsAg was detected by enzyme immunoassay (EIA) kits (Diagnostic automation Group, 31200 Avenida Del Yermo, Cathedral City, CA 92234).

Ethical considerations

The study proposal was approved by the Ethic Committee of Qena Faculty of Medicine. Administrative approval for the study was obtained from the Directorate of Qena University. Patient participation was voluntary. The written informed consent for hepatitis B testing and interview was obtained from each respondent.

The aims of the study were explained to the participants. The participants were informed that they are free to decline from participation in the study at any time and their non-compliance would not in any way influence their clinical services or treatment. Confidentiality was secured and access to the data of the participants will be only to the researcher. Data entry files had no names, only ID number of the participant.

Statistical analysis

The collected data were reviewed, entered and statistically analyzed using SPSS version 19. Descriptive statistics were including frequencies, percentages, mean and standard deviation. Chi-square test was used for testing the significant differences of qualitative variables between the studied groups. Independent samples t-test was done to compare quantitative variables between groups. The 0.05 level was chosen as the level of significance and 95% confidence interval.

RESULTS

Part I: <u>The description of the studied groups</u>:

Table (1): The relationship between HBV positive cases and their control according to the socio-demographic characteristics, Qena University Hospital, 2014

Item	HBV positive cases (n= 100)		Control group (n= 500)		P-value
	No.	%	No.	%	
Age: (years					
20 - 34	41	41.0	109	21.8	0.000*
35 - 49	37	37.0	176	35.2	
50 - 70	22	22.0	215	43.0	
Mean ± SD	38.83 ± 12.62		44.26 ± 11.68		0.000*
Sex:					
Male	76	76.0	359	71.8	0.391
Female	24	24.0	141	28.2	
Residence:					
Urban	41	41.0	192	38.4	0.626
Rural	59	59.0	308	61.6	
Marital status:					
Single	17	17.0	61	12.2	0.232
Married	78	78.0	392	78.4	
Divorced	1	1.0	23	4.6	
Widow	4	4.0	24	4.8	
Education:					
Illiterate	21	21.0	120	24.0	0.000*
Primary education	10	10.0	96	19.2	
Preparatory education	7	7.0	72	14.4	
Secondary education	52	52.0	139	27.8	
University or higher	10	10.0	73	14.6	
Occupation:					
Worker	29	29.0	117	23.4	0.029*
Employee	21	21.0	117	23.4	
Housewife	13	13.0	107	21.4	
Health care worker	11	11.0	22	4.4	
Business	6	6.0	46	9.2	
Farmer	4	4.0	23	4.6	
Not worked	15	15.0	50	10.0	
Retired	1	1.0	18	3.6	
Socioeconomic status:					
High	38	38.0	257	51.4	0.014*
Low	62	62.0	243	48.6	

Part II: <u>The most important risk factors for transmission of HBV</u>

Table (2): Health care services exposure risk factors for HBV among the studied groups, Qena University Hospital, 2014

Risk factors	HBV cases (n= 100)			Controls (n= 500)			P-value
	No.	% from exposures	% from Cases	No.	% from exposures	% from controls	
Transfusion of blood or other blood products	22	21.6	22.0	30	29.4	6.0	0.000*
Dealing with patient blood or body fluids	31	27.4	31.0	23	20.4	4.6	0.000*
Exposure to blood of someone else	21	21.0	21.0	45	45.0	9.0	0.000*
Accidental stick with a needle contaminated with blood	17	18.9	17.0	32	39.5	6.4	0.000*
Injection by reused needles	25	27.2	25.0	13	14.1	2.6	0.000*
Outpatient IV infusions and/ or injections	36	20.5	36.0	66	37.5	13.2	0.000*
Hospital admission	49	12.1	49.0	155	38.2	31.0	0.001*
Surgeries	30	9.0	30.0	111	33.3	22.2	0.093
Endoscopy	12	9.8	12.0	48	39.0	9.6	0.465
Dialysis	21	24.1	21.0	12	13.8	2.4	0.000*
Dealing with dialysis patients	20	29.0	20.0	38	55.1	7.6	0.000*
Cardiac catheterization	2	9.5	2.0	12	57.1	2.4	0.809
Organ transplantation	0	0.0	0.0	3	75.0	0.6	0.437
Dental procedures or oral surgery	47	13.6	47.0	91	26.3	18.2	0.000*
Teeth extraction	80	15.7	80.0	135	26.5	27.0	0.000*
Worked in medical field involving direct contact with human blood	9	23.7	9.0	22	57.9	4.4	0.058
Hepatitis B vaccine	6	5.2	6.0	99	86.1	19.8	0.001*

Table (3): Community and behavioral associated risk factors for HBV among the studied groups, Qena University Hospital, 2014.

Risk factors	HBV case (n= 100			Controls (n= 500)			P-value
	No.	% from exposed	% from cases	No.	% from exposed	% from controls	
Home contact with HBV infected persons	20	16.7	20.0	37	30.8	7.4	0.000*
Family history of HBV infection	6	6.3	6.0	22	22.9	4.4	0.665
Family history of HCV infection	20	57.1	20.0	13	37.1	2.6	0.000*
Family history of liver disease	4	10.5	4.0	18	47.4	3.6	0.846
Shaving of hair:••							
At home	11	5.2	11.0	133	63.3	26.6	0.000*
Commercial barbering	55	21.5	55.0	61	23.8	12.2	
In both	10	4.0	10.0	165	66.0	33.0	
Circumcision place:							
In hospital	9	3.6	9.0	220	88.4	44.0	
At home/ barber shop	71	11.7	71.0	188	30.9	37.6	0.000*
In private clinic	10	8.5	10.0	87	73.7	17.4	
Unknown	10	40.0	10.0	5	20.0	1.0	
Have sexual partner infected with HBV	2	25.0	2.0	6	75.0	1.2	0.874
Have more than one sexual partner	8	42.1	8.0	3	15.8	0.6	0.000*
Have sexual activity outside marriage	5	23.8	5.0	9	42.9	1.8	0.116
Delivery by TBA•••	11	8.6	11.0	38	29.7	7.6	0.061
Abortion•••	7	7.5	7.0	31	33.3	6.2	0.440
Smoking	38	8.8	38.0	237	54.9	47.4	0.085
Alcohol intake	7	15.9	7.0	21	47.7	4.2	0.341
IV drug abuse	7	12.1	7.0	33	56.9	6.6	0.884
Previous incarceration	4	9.1	4.0	24	54.5	4.8	0.931
Tattooing	2	3.2	2.0	23	36.5	4.6	0.361
Body piercing (other than ear)	0	0.0	0.0	20	42.6	4.0	0.084
Sharing razors with others ••	16	20.5	16.0	12	15.4	2.4	0.000*
Sharing toothbrush with others	1	33.3	1.0	1	33.3	0.02	0.751
Sharing nail clipper with others	51	13.8	51.0	159	43.1	31.8	0.000*
Sharing eating utensils with others	62	8.8	62.0	347	49.4	69.4	0.147

•• Concerning males **••• concerning females**

Table (4): Relationship of health care services exposure risk factors for HBV infection and the residence of cases, Qena University Hospital, 2014

Risk factors	Residence				P-value
	Urban (n= 41)		Rural (n= 59)		
	No.	%	No.	%	
Transfusion of blood or other blood products	8	19.5	14	23.7	0.617
Dealing with patient blood or body fluids	5	12.2	4	6.8	0.565
Exposure to blood of someone else	9	22.0	12	20.3	0.846
Accidental stick with a needle contaminated with blood	7	17.1	10	16.9	0.987
Injection by needles used before	10	24.4	15	25.4	0.907
Outpatient IV infusions and/ or injections	17	41.5	19	32.2	0.343
Hospital admission	23	56.1	26	44.1	0.237
Surgeries	12	29.3	18	30.5	0.894
Endoscopy	7	17.1	5	8.5	0.323
Dialysis	12	29.3	9	15.3	0.091
Dealing with dialysis patients	9	22.0	11	18.6	0.684
Cardiac catheterization	2	4.9	0	0.0	0.078
Dental procedures or oral surgery	20	48.8	27	45.8	0.766
Teeth extraction	30	73.2	50	84.7	0.155
Worked in medical field involving direct contact with human blood	5	12.2	4	6.8	0.565
Hepatitis B vaccine	3	7.3	3	5.1	0.973

Table (5): Relationship of community and behavioral associated risk factors for HBV infection according to the cases residence, Qena University Hospital, 2014

Risk factors	Residence				P-value
	Urban (n= 41)		Rural (n= 59)		
	No.	%	No.	%	
Home contact with HBV infected persons	6	14.6	14	23.7	0.263
Family history of HCV infection	1	2.4	5	8.5	0.411
Family history of HBV infection	8	19.5	12	20.3	0.919
Family history of liver disease	3	7.3	1	1.7	0.372
Shaving of hair:••	n= 26		n= 50		
Commercial barbering	23	88.5	32	64.0	0.072
At home	2	7.7	9	18.0	
In both	1	3.8	9	18.0	
Circumcision place:					
At home/ barber shop	28	68.3	43	72.9	0.197
In hospital	6	14.6	3	5.1	
In private clinic	5	12.2	5	8.5	
Unknown	2	4.9	8	13.6	
Have sexual partner infected with HBV	0	0.0	2	3.4	0.642
Have more than one sexual partner	4	9.8	4	6.8	0.869
Have sexual activity outside marriage	3	7.3	2	3.4	0.675
Delivery by TBA•••	7	46.7	4	44.4	0.916
Abortion•••	7	46.7	0	0.0	0.049*
Smoking	10	24.4	28	47.5	0.019*
Alcohol intake	2	4.9	5	8.5	0.768
IV drug abuse	3	7.3	4	6.8	0.917
Previous incarceration	0	0.0	4	6.8	0.237
Tattooing	0	0.0	2	3.4	0.642
Sharing razors with others••	4	15.4	12	24.0	0.382
Sharing toothbrush with others	1	2.4	0	0.0	0.854
Sharing nail clipper with others	22	53.7	29	49.2	0.658
Sharing eating utensils with others	31	75.6	50	84.7	0.252

•• Concerning males **••• concerning females**

Table (6): Multiple logistic regression analysis of factors associated with HBV infection, Qena University Hospital, 2014

Risk factor	P-value	OR	95.0% C.I.	
			Lower	Upper
Age (years)	0.063	0.976	0.950	1.001
Home contact with hepatitis B patient	0.309	1.543	0.669	3.556
Blood transfusion	0.027*	2.804	1.121	7.012
Outpatient IV infusion and/or injection	0.028*	2.327	1.097	4.937
Accidental stick with needle contaminated with blood	0.171	2.629	0.658	10.501
Injection by reused needle	0.000*	38.464	10.970	134.867
Dental procedures or oral surgery	0.000*	3.621	1.865	7.031
Sharing razors with others	0.000*	8.118	3.229	20.409

The distribution of HBV cases and the control group is summarized in Table (1) Mean age (± SD) of the cases was 38.83 (± 12.62) years while it was 44.26 (± 11.68) years among the controls with statistically significant difference. HBV was significantly higher among younger than the older patients as 41.0% of the patients were in the age group 20-34 years while 22.0% were in the age group 50- 70 years. On the other hand, among the control group HBV tests were negative more frequently with age after 34 years old ($P < 0.000$). As regards sex of the participants, 76.0% of the cases were males and 24.0% were females with male–female ratio; 3.2:1 and 71.8% of the controls were males and 28.2% were females with male–female ratio; 2.5:1 with no statistical significant difference. The table also shows that there is no statistical significant difference between HBV cases and control regarding the residence and marital status as the rural residents represented 59.0% of cases and 61.6% of controls and more than three quarters (78.0%) of the respondents were married. More than half (52.0%) of the cases had secondary education versus 27.8% among the controls. Heath care workers represented 11.0% of the cases in comparison with 4.4% of the controls and 13.0% of the cases were housewives versus 21.4% of the controls. The results found that HBV infection was more in patients with low socioeconomic status as 62.0% of the cases had low socioeconomic status versus 48.6% of the controls. These differences are statistically significant ($P < 0.05$). Health care services exposure risk factors for HBV among the studied groups were shown in Table (2). The common exposures included blood transfusion, dealing with blood, hospital admission, intravenous catheterization and , dental procedures. There are statistically significant differences between HBV cases and their controls in the majority of these risk factors. For example, the majority (80.0%) of HBV cases exposed to teeth extraction compared to 27.0% of the controls. Nearly half of the cases reported previous hospital admission versus 31.0% of their controls. Dental procedures and oral surgery were mentioned by 47.0% of the cases and 18.2% of the controls. These differences are statistically significant. More than one third (36.0%) of the studied cases received intravenous infusion and/ or injection compared to 13.2% of the controls. Dealing with patient blood or body fluids was mentioned by 31.0% of the cases and 4.6% of the controls with statistically significant differences. It was found that reused syringes significantly associated with HBV transmission as one quarter of the cases versus 2.6% of the controls were injected by syringes used before ($P < 0.05$). Nearly one fifth of the cases had a history of blood transfusion

and/ or exposure to blood of someone else compared to 6.0% and 9.0% among the controls, respectively. Hepatitis B vaccine as a protective risk factor was received by 19.8% of the controls versus 6.0% of the HBV cases. On the other hand, surgery, endoscopy, cardiac catheterization, organ transplantation and worked in medical field with blood contact possibility show no statistically significant differences between the cases and the controls. Table (3) shows the community and behavioral associated risk factors for HBV among the studied groups. Living with hepatitis B persons and positive family history of hepatitis C were statistically significant associated with hepatitis B infection as these factors were found among one fifth of the cases compared to 7.4% and 2.6% among the controls, respectively (P = 0.000). On the other hand, there are no statistical significant differences between HBV cases and the control group regarding the positive family history of hepatitis B and other liver diseases. The results revealed that 71.0% of the cases were circumcised by traditional healer at home or at barber shop versus 37.6% of the controls and more than half of the male cases shaved their hair in commercial barbering compared to 12.2% of the controls. These differences are statistically significant. It was found that people who had certain behaviors were at high risk for infected with hepatitis B. For example, sharing nail clipper and/ or razors with others and have more than one sexual partner**.** Other lifestyle risk factors such as sharing eating utensils, sharing toothbrush, body piercing and tattooing, smoking and illicit alcohol and drugs show no statistically significant association with hepatitis B infection. Among female participants, delivery at home by traditional personnel and history of previous abortion were not statistically significant different between the cases and their controls (P > 0.05). Relationship of health care services exposure risk factors for HBV infection according to the cases residence presented in Table (4). This study included 100 HBV cases; 41were urban residents and 59 came from rural areas. It was found that there is no statistically significant difference between the urban and rural HBV cases in all reported risk factors. Some risk factors were more among the cases resided urban areas than the cases from rural areas. Such as dealing with patient blood or body fluids (12.2% versus 6.8%), exposure to blood of someone else (22.0% versus 20.3%), intravenous infusions and/ or injections (41.5% vs. 32.2%), parenteral treatment of schistosomiasis (22.0% versus 10.2%), worked in medical field involving direct contact with human blood (12.2% versus 6.8%), dental procedures or oral surgery (48.8% versus 45.8%), hospital admission (56.1% versus 44.1%) , dialysis (29.3% versus 15.3%), dealing with dialysis patients (22.0% vs. 18.6%), endoscopy (17.1% vs. 8.5%) and cardiac catheterization was found only among two urban cases. Other risk factors were more frequent among the rural cases than the urban cases. As transfusion of blood or other blood products (23.7% versus 19.5%), injection by needles used before, (25.4% versus 24.4%), surgeries (30.5% versus 29.3%) and teeth extraction (84.7% versus 73.2%). Receiving Hepatitis B vaccine as a protective risk factor was more among the urban cases (7.3%) compared to 5.1% of the rural residents cases with no statistical significant difference. Table (5) shows the relationship of community and behavioral associated risk factors for HBV infection according to the cases residence. Among HBV cases it was found that there are no statistically significant differences between the urban and rural participants in almost all mentioned risk factors except smoking that was more frequent among rural cases (47.5%) than the urban residents (24.4%). Among female cases, previous history of abortion was reported by urban cases only (7 women, 46.7%) with statistically significant difference. Some risk factors were more among the urban cases than the cases from rural areas. Such as family history of liver disease (7.3% versus 1.7%), have more than one sexual partner (9.8% versus 6.8%), have sexual activity outside marriage (7.3% versus 3.4%), IV drug abuse (7.3% versus 6.8%), sharing nail clipper with others (53.7% versus 49.2%) and sharing toothbrush with others was found only among one urban case. Among male cases, shaving of hair at commercial barbering was more among the urban residents than the rural cases (88.5% versus 64.0%). Sharing razors with others was reported by nearly one quarter of the rural cases compared to 15.4% of the urban cases. Delivery by traditional personnel was reported by 7; 46.7% of the female urban cases compared to 4; 44.4% of the female rural cases. Among the rural cases,

some risk factors were more frequent than the urban cases. These factors are home contact with HBV infected persons (23.7% versus 14.6%), positive family history of HCV infection (8.5% versus 2.4%), positive family history of HBV infection (20.3% versus 19.5%), circumcision at home/ barber shop (72.9% versus 68.3%). alcohol intake (8.5% versus 4.9%) and sharing eating utensils with others (84.7% versus 75.6%). Having sexual partner infected with HBV and tattooing and history of previous incarceration were found only among two and four rural cases, respectively. Multivariate analysis in Table (6) shows that odds ratio of HBV infection is significantly higher among cases with some risk factors: injection by reused needle (OR= 38.5; 95% CI = 11.0–134.9), sharing razors with others (OR= 8.1; 95% CI = 1.1–7.0), dental procedures or oral surgery (OR= 3.6; 95% CI = 1.9–7.0), blood transfusion (OR= 2.8; 95% CI = 1.1–7.0) and intravenous infusion and/or injection (OR= 2.3; 95% CI = 1.1–4.9). Accidental stick with needle contaminated with blood (OR= 2.6; 95% CI = 0.7–10.5) and home contact with hepatitis B patient (OR= 1.5; 95% CI = 0.7–3.6) are insignificantly higher among the cases. On the other hand, old age shows protective factor (OR= 0.9; 95% CI = 1.1–7.0).

DISCUSSION

Hepatitis B virus infection is important community health problems in Egypt. Many studies were conducted and addressed HBV infection among different population groups in Egypt over the last two decades to assess the distribution and risk factors of infection in the population (Meky et al., 2006; Talaat et al., 2010; El-Sabah et al., 2011; Wasfi and Sadek, 2011).The present study was set to examine the most common risk factors of HBV infection in Qena Governorate.. The present study revealed that hepatitis B infection is more in young age, it represent 41% in age group 20-34 years compared to 21.8% in controls and only 22% in age group 50- 70 compared to 43% in controls. This result may be due to the rising incidence of risk factors for HBV infection toward the end of adolescence; this age coincides with the onset of high-risk behaviors, such as unsafe sexual practices and injecting drug use. As well, this is consistent with the allowed age range of blood donation and employment and child bearing age of the females. Our data agree with other studies conducted by Dawaki and Kawo (2006),Talaat et al. (2010), Nazzal and Sobuh (2014). On the other hand, other studies showed high prevalence of HBV infection among patients aged 40-60 years (Emechebe et al., 2009;Gabriel et al., 2013). Other studies showed no statistically significant differences in ages between HBV positive and negative patients (Comia et al., 1999; Covic et al., 1999). It was observed that 76% of HBV cases were males and 24% were females indicating that HBV infection is more common in males than in females, although this difference is not statistically significant, increase HBV infection in males may be related to the fact that males in Qena are more socially active than females. Furthermore, they are more exposed to males' related risk factors for HBV infection than females (e.g., hairdressing, circumcision and sharing razors). Several studies showed that male sex was considered as a risk factor for HBV infection (Ahmad et al., 2006; Talaat et al., 2010; Ozer et al., 2011; Shen et al., 2011). Other studies demonstrated HBV positivity was significantly higher among females than males (Mboto, and Edet 2012). No sex differences were observed in other studies (Liang et al., 2010). The present study identified that 59% of HBV cases are from rural areas compared to 61.6% of the controls and 41% came from urban areas compared to 38.4% of the controls with statistically insignificant difference. These data in agreement with the findings of Qu and his colleagues (2000). However, several studies revealed that infection by HBV was more in those who live in rural areas (Boisier et al., 1996; Chen, et al., 2000). Furthermore, other studies reported that prevalence of hepatitis B and C markers was higher in individual living in urban areas (Kuszewski and Czarkowski 2003). This study found no statistically significant relationship between HBV and marital status; as more than three quarters (78%) of the cases were married versus 78.4% of the controls and 17% of the cases were singles compared to 12.2% of the controls. This is in agreement with Comia et al., (1999) and in disagreement with other studies that showed that HBV is more prevalent among

married (Adekeye et al., 2013; Ayele and Solomon, 2013). Another study showed that the prevalence of HBsAg was found to be higher among divorced cases (Mboto and Edet, 2012). Occupation is a known as predisposing factor for HBV infection. Compared with the general population, physicians and other medical staff are exposed to a considerably higher risk of contracting acute hepatitis from contact with HBV infected patients. In the present study heath care workers represented 11.0% of the hepatitis B cases in comparison with 4.4% of the controls this indicate that hepatitis B infection is prevalent in cases had jobs related to blood exposure. This is in agreement with other studies (Awadalla, et al., 2011; Memon 2002) which proved that frequent and routine exposure to blood or serum is the common denominator of health care occupational exposure to HBV infection. Surgeons, dentists, oral surgeons, pathologists, operating room and emergency room staff and clinical laboratory workers who handle blood are at the highest risk. Rarely, transmission to patients from HBsAg positive health care workers had been documented (Alam et al., 2007). Moreover, a higher percentages of HBV are observed in workers (29%) followed by employees (21%). Other study reported that skilled workers had significantly higher seroprevalence of HBsAg compared with other occupational groups. This could be attributed to the clustering of risk factors such as history of unprotected sexual intercourse among this group (Gabriel et al., 2013). A significant relationship was also found between hepatitis B infection and socioeconomic status of the studied subjects. Less than two thirds of the HBV positive cases (62%) were belong to a low socio-economic standard. This was in agreement with Belgium (1999) ., Awadalla et al., (2011) and Board and. Moreover, the prevalence of HBV was the lowest in countries with the highest standards of living such as England, Canada, United States, Scandinavia and other European Nations (Glynn et al., 2002). In the present study more than half (52%) of the cases had secondary education versus 27.8% among the controls. This is consistent with the results of Gheorghe et al. (2013).This may be explained by that age of secondary education students extend to the end of adolescence; this age coincides with the onset of high-risk behaviors such as unsafe sexual practices and injecting drug use. Educational and socioeconomic status also plays an important indirect role in the transmission of HBV infection. This might be because individuals with a lower educational level are more likely to have a low income, an unhealthy lifestyle, limited access to health care and be less well informed about the prevention of infection. Analysis of the data identified hospitalization is a risk factor for HBV infection. Nearly half of the cases reported previous hospital admission versus 31% of their controls. This is consistent with what have been shown in other studies as Pereira et al., (2009), Nazzal and Sobuh (2014). This result may indicate deficiencies in HCWs' knowledge and practice of the standard infection prevention and control precautions in health care settings. Blood transfusion can be a cause of hepatitis B infection in countries, where blood donor is not screened. Transmission of HBV from transfusion of unscreened blood may account for a majority of infections among children and adults (Prescott et al., 2002). In the present study, nearly one fifth of the cases had a history of blood transfusion and/ or exposure to blood of someone else compared to 6% and 9% among the controls, respectively. This is consistent with other studies. Such as a recent study conducted among pregnant women showed that the history of blood transfusion is a significant risk factor (Omalu et al., 2012). As well, a cross sectional study done among health care workers showed same results (Braka et al., 2006). The result of the present study disagree with Khalil et al. (2005) and Vázquez-Martínez et al., (2003) who did not find association between HBV transmission and blood transfusion. Hemodialysis and dealing with dialysis patients were significant risk factor in this study, nearly one fourth of the HBV cases had a history of dialysis and or dealing with dialysis patients compared to 6.0% and 9.0% among the controls, respectively, consistent with Ozer et al., (2011). On the other hand, some studies revealed that dialysis is not risk factor for hepatitis B infection. This may occur if dialysis was done in centers where a prophylactic vaccination of all patients of chronic renal failure, and the use of HB positive labeled machine for the HB positive patients that are not used for HB negative patients (Nazzal and Sobuh, 2014) while in Egypt this condition is applied only in the large centers but not in the

private health centers with small hemodialysis units, as well few devices are available for large number of patients. Unhygienic dental care is a significant risk factor and plays a crucial role in HB transmission. It was found that the majority (80%) of HBV cases exposed to teeth extraction compared to 27% of the controls furthermore, 47% of HBV cases had history of dental procedure compared to 18.2%, theses differences between cases and controls are statistically significant. This might be explained by poor sterilization procedures for reusable materials in dental clinics. These results are in agreement with Alam et al., (2007) who found that people sharing unsterile medical or dental equipment are at high risk of contracting HBV infection. Similarly to our data dental procedures have been shown to be associated with HB infection in many studies (Afzal and Bashir, 2009; Hayajneh et al., 2010; Nazzal and Sobuh, 2014). These studies suggested the association of dental procedures and HBV has been attributed to the lack of sufficient knowledge and practice in clinical infection control and HBV can be transmitted in dental care clinic either through direct contact with blood and oral fluids, or through indirect contact with contaminated objects; instruments, equipments, and surfaces. These routes can transmit the disease from the dental staff to the patient, or vice versa, and from one patient to another (Woods, 1984). These results are in agreement with other studies (Taseer et al., 2010; Eke et al., 2011; EL-Shabrawi et al., 2013) that revealed no relationship between HB and dental procedures. It is estimated that unsafe injections may cause 8–16 million HBV infections each year worldwide, most of which occur in developing countries (Kane et al., 1999). It is generally accepted that a high viral load, a deep injury and a high amount of body fluid exchanged causes a greater risk of infection with HBV (FitzSimons et al., 2008). The results of this study demonstrated that more than one third (36%) of HBV positive cases received intravenous infusion and/ or injection outside hospital compared to 13.2% of the controls and 17% of positive cases were accidentally subjected to stick with a needle contaminated with blood in comparable to 6.4% of controls. Furthermore, it was found that reused syringes significantly associated with HBV transmission as one quarter of the cases versus 2.6% of the controls were injected by syringes used before ($P < 0.05$). In another study, contaminated and inadequately sterilized syringes and needles had resulted in outbreaks of hepatitis B among patients in clinics and physicians' offices (Tripathi et al, 2007). The reuse of the same, unsterilized needles and syringes for vaccination of many different children accounts for many unnecessary HBV infections (Talaat et al., 2003; Pan and Zhang (2005). Similarly Awadalla, et al., 2011) suggested that reuse of needles is relatively common in Egypt, while Talaat et al., (2010) did not find association between HBV and receipt of injections, with the exception of injecting drug use. In this study no statistically significant relationship was found between HBV prevalence and surgical operation. Similarly, Vázquez-Martínez et al., (2003); Khalil et al., (2005) and reported insignificant association of previous surgeries in the transmission of HBV infection among their studied women. Furthermore, low prevalence of HB was reported in a study aimed to determine the seroprevalence of HBV viral infection in patients undergoing elective eye surgery (Akhatar et al., 2007). However other studies shown that surgery is a risk factor for acquiring hepatitis infection in the general population (Harada et al., 2000; Carrere-Kremer et al., 2002). This contradiction may be due to differences in the type of surgery, the level of medical services and other factors related to the site where surgeries are performed. The present study revealed that 9% of HBV positive cases had jobs related to blood exposure and 31% of HBV positive cases had history of dealing with patient blood or body fluids comparable to 4.6% of the controls. This was in agreement with Memon (2002) Hepatitis B vaccine as a protective risk factor was received by 19.8% of the controls versus 6% of the HBV cases. Vaccination could be considered as a factor effective to decrease HBV prevalence; particularly among adolescents and youth. A decrease in the prevalence of chronic HBV infection among vaccinated patients has been documented in many studies. (Lin et al., 2003; McMahon et al., 2005). Regarding community and behavioral associated risk factors for HBV infection it was found that the unsafe and unhygienic personal and community practices are risk factors of HB transmission. The results of this

study demonstrated that more than half of the male cases of HBV shaved their hair in commercial barbering compared to 12.2% of the controls; this indicated that history of barber visit for shaving was significant risk factor to HBV infection. This can be explained by the fact that most of the barbers use the same blades and scissor for every customer that increases the transmission of Hepatitis to both customers and barbers. A study among barbers in China had shown the prevalence of HBsAg as 16.8% that was higher than found in subjects of other professions. Thus barbers shops are leading to occupational hazards and potential source of transmission of infection to the customers (She et al., 1988). This result is consistent with what have been found by Afzal and Bashir (2009). It was found that people who had certain behaviors were at high risk for infected with hepatitis B. For example, sharing nail clipper and/ or razors, tooth brushes with others, this can be explained by that HBV is stable on environmental surfaces for at least 7 days, and indirect inoculation of HBV can occur via inanimate objects like shaving equipments, razors, scissor and nail clipper, tooth brushes, baby bottles, and toys, eating utensils, hospital equipment and other objects, by contact of such unsterile instruments, that is contaminated with blood of the HB patient with mucous membranes or open skin breaks emphasizing the fact that sharing such objects is a risk of acquiring HBV infection (Akhtar et al., 2005; Sali et al., 2005; Pan and Zhang, 2005). In this study there are statistically significant differences with respect to sharing nail clipper and/ or razors with others, while no statistically significant difference between HBV positive cases and controls in tattooing, body piercing, sharing tooth brushes and eating utensils with others. The results of this study revealed that 71% of HBV cases were circumcised by traditional healer at home or at barber shop versus 37.7% of the controls. Presence of statistical difference in HBV percentages between who exposed to this procedure by traditional healer and who had undergone circumcision in hospital or private clinic suggesting inadequate sterile precautions at the various levels of the practice by traditional healer. These results were consistent with other studies which reported circumcision by traditional healer as significant risk factors (Ashraf et al., 2010; Moezzi et al., 2014). In contrast to these results other studies revealed that circumcision was not associated with seropositivity for HBsAg (Angyo and Yakubu, 2001; Chukwuka et al., 2003). History of previous incarceration in our study was statistically insignificant, this finding inconsistent with other study reported that the high prevalence of HBV infection among prisoners due to high-risk practices, such as injecting drug use, homosexuality or unsafe medical procedures, which associated with transmission in prisons (Macalino et al., 2004; Khan et al., 2005). The results regarding sexual transmission of HBV is somewhat confusing, this study revealed that HBV was higher among patients had more than one sexual partner, it was 8% incomparable to 0.6% in controls with significant difference. While it did not found any significant relationship between HBV positivity and having sexual activity outside marriage and/ or having sexual partner infected with HBV. This result may reflect difficulties in eliciting information on these exposures within the cultural context of Qena Governorate. The present results are consistent with other studies of Wilkinson (1984) and Nwokediuko (2010) who showed that the prevalence of HB was higher among those had multiple sexual partners, emphasizing that sexual mode of transmission plays a major role in HB transmission. Another study measured the prevalence of hepatic viruses among males' transvestite commercial sex workers (CSWs). The results showed high prevalence of HB among them, making prostitution a risky behavior for HB transmission. Russi et al., (2003) and Mboto and Edet (2012) reported that participants with history of sexually transmitted infections and those with multiple sexual partners were significantly associated with hepatitis B infection. Other studied failed to prove sexual transmission of HBV (El-Dalil et al.,1997; Smikle, 2001; Talaat et al., 2010). Living with hepatitis B and/ or C persons and positive family history of hepatitis C were statistically significant associated with hepatitis B infection as these factors were found among one fifth of the cases compared to 7.4% and 2.6% among the controls, respectively (P = 0.000). On the other hand, there are no statistical significant differences between HBV cases and the control group regarding the positive family history of hepatitis B and other liver diseases, our

results are in agreement with Sali et al., (2005) in transmission of HBV by household contact but disagreed them in HBV transmission by extramarital sexual activity. Salkic et al., (2009) conducted study on the family members of the HB chronic carriers to identify the interfamilial transmission of HB risk factors, emphasized that the vertical mode of transmission (from the mother) within the family is the main risk factor. Many factors were reported to be associated with intrafamilial transmission of HBV infection: sharing of various personnel and household articles such as a toothbrush, towel, handkerchief, clothing, razor, or ear piercing (Ordog et al., 2003; Suzuki et al., 2003: Lin and Kao 2007). These results are inconsistent with other studies that did not find intrafamilial transmission is a risk factor for HBV transmission (Awadalla, et al., 2011). No significant relationship was found between HBV and smoking (p=0.085), similarly to other studies (Zhang et al., 2011). While a previous study among general population in Taiwan showed that HBV is more prevalent among married and smoking persons (Wang et al., 2002). No significant relationship was found between HBV and alcohol consumption, these results are in agreement with other studies (Zhang, et al., 2011; Mboto and Edet, 2012) and disagreed other studies that revealed abuse in alcohol consumption may favor the development of HBV chronic infection because alcohol can compromise the immune system, also it increases the chances of acquiring the HBV infection since the liver detoxifies and is the predilection site for the virus (Ndako et al., 2011). The findings of this study indicated that 7% of HBV positive cases were IV drug abusers comparable to 6.6% of the controls, these differences were statistically insignificant in contrast to other studies suggesting IV drug abuse is important risk factor for HBV transmission (Lee et al., 2008; Talaat et al., 2010; Awadalla et al., 2011). These results may reflect difficulties in collecting information concerning highly sensitive cultural issues (e.g., information on the use of recreational drugs, alcohol consumption and abnormal sexual behavior) in Qena Governorate. There is no statistically significant difference between HBV cases and their controls respecting abortion and delivery by traditional birth attendants, this result were in agreement with other studies (EL-Shabrawi et al., 2013) and in contrast to other studies revealed an association between HBsAg positivity and history of abortion. Having history of abortion increased the risk of having HBV infection more than twice as compared with those who had not suffered such experience. This can be explained by abortion is directly related to sexually active women, and one most important mode of transmission for HBV is exposure to a heterosexual partner (Duncan et al., 1995). Furthermore, other reasons such as instrumentation during abortion and related activities may serve as source of exposure (Awole, and Gebre-Selassie, 2005). In multivariate analysis, the following risk factors are independently associated with an increase in HCV risk. Odds ratio is significantly higher among HCV cases with some risk factors: parental treatment by Tartaric emetic (OR= 19.8), injection by reused needle (OR= 10.5), sharing razors with others (OR= 6.6) dental procedures or oral surgery (OR= 4.0), and hospital admission (OR= 1.8). Logistic regression model were performed to examine probable risk factors for acquisition of hepatitis B virus infections and it was found that injection by reused needle (OR= 38.5), sharing razors with others (OR= 8.1), dental procedures or oral surgery (OR= 3.6), blood transfusion (OR= 2.8) and intravenous infusion and/or injection (OR= 2.3). Accidental stick with needle contaminated with blood (OR= 2.6) and home contact with hepatitis B patient (OR= 1.5) are insignificantly higher among the cases. On the other hand, old age shows protective factor (OR= 0.9). Hayajneh et al. (2010) conducted a case-control study of risk factors for hepatitis B virus infection in North Jordan and their logistic-regression analysis showed that significant risk factors for catching hepatitis B virus infection were sharing toothbrushes (odds ratio = 10.3), unhygienic dental care (odds ratio= 2.5) and living abroad for at least one year (odds ratio = 20.0). In another study among health care workers, logistic regression model showed that sex, increasing age, all job categories, dental treatment in the previous six months, and needle stick injury during the previous year were significantly associated with HBV infection (Petrosillo et al., 1995). The present study identified that 59% of HBV cases are from rural areas compared to 61.6% of the

controls and 41% came from urban areas compared to 38.4% of the controls with statistically insignificant difference. there are several studies show the evidence of an urban-rural difference in the epidemiologic pattern of HBV in different parts of the world. In developing countries, rural areas seem to have a higher risk than urban ones. For example, in Madagascar, a large difference in HBsAg prevalence was observed between urban (5.3%) and rural areas (26.0%) (Boisier et al., 1996). A study by Ahmed and his colleagues (2006) revealed the frequency of Hepatitis B and Hepatitis C combined amongst urban and rural population as 45% and 55% which is similar to our finding in that frequency is greater in rural than urban population. It may be due to increased rural population, illiteracy, poverty, lack of proper precautions, quackery in the rural area and less awareness regarding the causative agent and transmission. Other study showed greater frequency in urban than rural population. An outbreak was reported in rural India, which was epidemiologically linked to the use of inadequately sterilized needles and syringes by unqualified medical practitioners (Singh et al., 1998). In the Asia-Pacific Region, the prevalence of HBV infection is consistently higher in rural than in urban areas and several common sources of infection, including iatrogenic and sexual transmission, have been implicated (Chen et al., 2000). In contrast to our result, In Poland, the incidence of hepatitis B per 100,000 individuals was higher in urban (7%) than rural (4.9%) populations (Kuszewski and Czarkowski, 2003), and in Spain the prevalence of hepatitis B markers was higher in individual living in urban areas (Garcia-Fulgueiras et al., 1996). In China, it was reported that no substantial difference was seen between the rural and urban populations (Qu et al., 2000). Rural residence could be a risk factor for HBV infection, due to socioeconomic conditions among the poor and less educated, and crowded living condition in the rural areas, may contribute to HBV exposure (Mehmet et al., 2005; Bwogi et al., 2009). Risk factors for HBV infection may be different in urban areas and in rural areas, the strategies for the control of HBV infection should account for these differences. A study was conducted on Southeastern of Turkey revealed that there was no substantial difference in prevalence of HBV infection exposure between the rural and urban populations. The HBsAg positivity was higher in rural areas than urban areas; this result may have been due to the fact that maternal transmission is more prevalent in rural areas. Although illiteracy was not a significant factor in HBV infection in rural areas, HBV seropositivity was higher in illiterate persons in urban areas, as viral infections were independently associated not only with behaviors such as IV drug usage and commercial sex but also with low income and education levels (Stover et al., 2003). In urban areas, preventive measures are more available than in rural areas, but the use of these health facilities increases with the education level. People with a higher level of education tend to use health services like health education, vaccination, and high quality dentistry services, etc. (Mehmet et al., 2005). This study has some limitations: it selects an age range 20-70 years which may not reflect that all HBV infections. To minimize recall bias, incident cases of HB were included in this study and the researcher conducted the data collection. Even if cases were diagnosed for the first time at enrolment in this study, they may have been harboring the infection for years. The choice of a comparison population that is unlikely to reflect the true underlying population prevalence of HBV particularly challenging in hospital- and clinic-based case-control studies. But in this study University hospitals does not have well-defined catchment areas. Since the researcher selected controls from the same hospital presenting for same reasons as cases, both were subject to the same selection factors. Another limitation concerns the certain sensitive questions about behaviors (mainly alcohol use, drug use and sexual promiscuity) especially with women.

Conclusion and Recommendations

Several personal behavioral and health care service related risk factors were found to be more prevalent among the HB cases, such as blood transfusion, accidental stick with a blood contaminated needle, injection by reused needle, intravenous injection and/or infusion, dental treatment, sharing shaving equipment, similar to other communities reported in other studies

Based on the study findings, the following recommendations are suggested:

- Instituting routine HB screening and vaccination for high-risk groups, Ensure national law requires HBsAg screening of all pregnant women at initial prenatal visit, and all pregnant women are screened for HBsAg.
- Health care providers, health educators, and other community-based organizations must play an active role in counseling high-risk people and educating target population to prevent transmission by community and behavioral associated risk factors especially sharing razors and other shaving equipments and injection by reused needles.
- Health program planners are urged to acknowledge the diversity of Qena population and to develop their interventions accordingly. Messages must be developed that incorporate the community norms and values.
- Recurrent supervision visits by infection control committee should be conducted to different health facilities and dental clinics and to assess standards of infection prevention and control.
- Carriers and patients with chronic HBV infections should be properly counseled regarding lifestyle modifications and prevention of transmission.

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عوامل الخطورة للاصابة بالتهاب الكبد الوبائي بي في المناطق الحضرية و الريفية في محافظة قنا بصعيد مصر

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يعد التهاب الكبد الوبائي بي مشكلة صحية كبيرة في مصر و تشير التقديرات إلى أن حوالي ٢ بليون شخص في جميع أنحاء العالم مصابون بهذا المرض، المسبب لحوالي ٣٥٠ مليون حالة التهاب مزمن بالكبد و حوالي٦٠٠ ألف حالة وفاة بسبب مضاعفاته. ويتراوح معدل انتشاره في مصر بين ٢٪ -٧٪. وتهدف هذه الدراسة إلى معرفة أهم عوامل الخطورة المرتبطة بانتقال العدوى بفيروس الالتهاب الكبدي الوبائي بي في المناطق الحضرية والريفية بحافظة قنا وأجريت الدراسة من خلال استبيان يحتوي علي المواصفات الاجتماعية والديموغرافية للمشاركين وعوامل الخطورة للعدوى بالكبد الوبائي بي وسي . وشملت الدراسة ٦٠٠ مريض، ١٠٠ حالة مصابة بالتهاب الكبد الوبائي بي و ٥٠٠ شاهد، متوسط عمر الحالات ٨٣,٣٨ ± ١٢,٦٢ و وكان متوسط عمر الشواهد ٤٤,٢٦ ±١١,٦٨ عاما. ويظهر التحليل متعدد المتغيرات أن نسبة احتمالات الإصابة بالتهاب الكبد الوبائي بي هي أعلى بكثير بين الحالات مع بعض عوامل الخطورة مثل الحقن بواسطة إبر مستخدمة من قبل، وتبادل شفرات الحلاقة مع الآخرين، وعلاج الأسنان أو جراحة الفم ونقل الدم والحقن الوريدي. آما الشك العرضي بإبرة ملوثة بالدم والمخالطة المنزلية لمريض مصاب بالتهاب الكبد الوبائي بي هي أعلى بين الحالات لكن مع عدم وجود فروق ذات دلالة إحصائية.وتخلص هذه الدراسة علي أهمية وخطورة هذا المرض وضرورة زيادة وعي وتحسين معرفة المواطنين مع الحاجة أيضا إلي مزيد من التثقيف الصحي لخلق وعي صحي سليم تجاه مرض التهاب الكبد الوبائي بي بين المستهدفين لهذا المرض ومن في خطر متزايد للإصابة به. كما يجب على مقدمي الرعاية الصحية، والتثقيف الصحي، والمنظمات المجتمعية الأخرى أن تلعب دورا نشطا في تقديم تثقيف صحي فعال للمواطنين الأكثر عرضة للخطر