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ORIGINAL ARTICLE

Intra –Familial Transmission of HBV In Aswan governorate: A single-center study

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ABSTRACT

Keyword: Hepatitis B virus (HBV), HBV PCR, HBV vaccine, HBs Ag

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Background: Household HBV transmission is a serious health risk that affects patients, their families, and the healthcare system. The intra-familial HBV transmission incidence ranged between 11% and 57%, thus, intra-familial prevalence of HBV infection among home contacts of chronic HBV carriers increased. There are errors in the precise epidemiological data about HBV in Egypt. Luckly, after application of Expanded Program of immunization in 1992, Egypt's HBV prevalence rate has decreased. **Aim of the study:** to study the HBVs-Ag positive family members with occult infection in Aswan governorate. **Methods:** This cross-sectional study was carried out on 50 HBV patients and their family members from gastroenterological outpatient clinic of Aswan University Hospital. **Results:** About one-quarter of the family members were positive for HBVs-Ag. Risk factors for HBV transmission among cases were; sexual, vertical, intravenous drug abuse while among family members were; sexual, vertical-incidence transmission, blood transfusion, intravenous drug abuse, and sharing personal items. **Conclusions:** The current study showed that 23% of HBV patients had family members' infection, with positive HBsAg. Sexual and vertical transmission were the most predominant risk factors.

INTRODUCTION:

Because of the acute infection and its aftereffects, such as cirrhosis and cancer, hepatitis B virus (HBV) infection is regarded as a significant public health issue and places a significant strain on health systems (1). Another serious health hazard that affects patients, their families, and the healthcare system is the intra-familial spread of HBV (2). As the incidence of HBV transmission within carriers' family members ranged from 11 to 57%, a high rate of intra-familial HBV infection is observed among contacts of chronic HBV carriers (3).

HBV transmission risk varies depending on the index case's viral markers, family role, and sociodemographic circumstances**.** Blood, sexual contact, vertical, and horizontal transmission are the main modes of HBV spread (4).

Early childhood vertical and horizontal transmission have a significant role in the HBV dissemination among family members in areas where the infection is endemic. Further, sexual intercourse and injectable drug use are the main routes of HBV spread in areas with low HBV endemicity, such as Western Europe and North America (5). Vertical HBV transmission is uncommon in these regions.

Despite that intra-familial transmission of HBV has been assessed in multiple regions, further investigations in various locations can yield important information regarding the routes of HBV transmission in the population and aid in identifying the main mechanism of intra-familial HBV spread and its local characteristics.

Thus, this work aimed to assess serological indices of hepatitis B infection among family members of long-term HBV carriers in Aswan Governorate.

Therefore, we aimed to evaluate serological markers of hepatitis B infection among family members of chronic HBV carriers in Aswan governorate.

The main objective of this study was to evaluate the HBVs-Ag positive family members with occult infection in Aswan governorate.

PATIENTS AND METHODS:

This cross-sectional study involved 50 HBV patients tested positive for HBsAg for more than six months as index cases and 100 family members consented to take part in the research, from the outpatient clinic of the gastro-entrology department at Aswan University Hospital.

Sample Size calculation: Steven K. Thompson equation for descriptive studies was used according to the next formula (6)

$$n = \frac{N*P\,(1-P)}{((N-1*\,(d^2/Z^2)) + P\,(1-P)}$$

n: Sample Size (150), N: Population Size (250), Z: Confidence level at 95 % (1.96), d: Error Proportion (0.05), P: Probability (50%)

Ethical Consideration: An informed written consent was obtained from the patient and his family members. The study was done after approval from the Ethical Committee Aswan University Hospitals.

Careful history taking about potential risk factors for HBV transmission, clinical assessment, HBsAg using ELISA for all family members and those with positive HBsAg HBV DNA were requested. The duration of the study was 8 months.

Statistical analysis

Data was processed using IBM SPSS software 20.0. (7). Qualitative data was expressed as frequency and percentage. Normality of variables was explored using Kolmogorov-Smirnov test. Quantitative data was expressed as mean, standard deviation (SD), median and range.

RESULTS:

Patients' age ranged between 27-92 years with a mean ± SD 46.36 ± 14.4 years while in the family members age ranged between 17-73 years with a mean ± SD 38.09 ± 13.5 years. Male sex was 31 (62%) while in female sex 19 (38%) while in family members 54 (54%) were male and 46 (46%) were female. In index cases 42 (84%) were wife and 3 (6%) were widow and 5 (10%) were single. while in family members 24 (24%) were single, 75 (75%) were married and 1 (1%) were widow (**Table 1).**

Table 1: General characteristics of cases and their family members

		cases (n = 50)	**Family members (n = 100)**
Age (years)	**Mean ± SD**	46.36 ± 14.4	38.09 ± 13.5
	Range	27 - 92	17 – 73
Gender	**Male**	31 (62.0%)	54 (54.0%)

	Female	19 (38.0%)	46 (46.0%)
Marital status	**Single**	5 (10.0%)	24 (24.0%)
	Married	42 (84.0%)	75 (75.0%)
	Widow	3 (6.0%)	1 (1.0%)

Risk factors in cases show that 10 (20%) were sexual, 7 (14%) had vertical-incidence transmission, 12 (24%) were blood transfusion, 8 (16%) were IV drug abuse, 43 (86%) were sharing personal items and 24 (48%) had other risks like (tattooing, coinfection with HCV, HIV, reuse of syringe, dental risk, surgical procedure, etc.) while in family members 37 (37%) were sexual, 35 (35%) had vertical-incidence transmission, 1 (1%) were blood transfusion, 3 (3%) were IV drug abuse, 34 (34%) were sharing personal items and 9 (9%) had other risks like (tattooing, coinfection with HCV, HIV, reuse of syringe, dental risk, surgical procedure, etc.) **(Table 2)**. The percentage of HBVs-Ag positive among family members was 23%.

Table 2: Risk factors of HBV transmission in cases and their family members

Risk Factors	**cases (n = 50)**	**Family members (n = 100)**
No	1 (2%)	35 (35%)
Sexual	10 (20.0%)	37 (37.0%)
Vertical-incidence transmission	7 (14.0%)	35 (35.0%)
Blood transfusion	12 (24.0%)	1 (1.0%)
IV drug abuse	8 (16.0%)	3 (3.0%)
Sharing personal items	43 (86.0%)	34 (34.0%)
Mixed	24 (48.0%)	9 (9.0%)
HBVS-Ag Positive		23 (23%)

Table 3: Distribution in family members as regard medical history and clinical signs of liver disease

		Family members with Positive HBVs-Ag (n = 23)
Medical history	**HTN**	6 (26.1%)
	DM	3 (13%)
	LL Edema	2 (8.7%)
	History of Upper Endoscopy	1 (4.3%)
	Abdominal swelling	1 (4.3%)
	Melena	1 (4.3%)
	Hematemesis	1 (4.3%)
	Encephalopathy	0 (0%)
Clinical signs	**Jaundice**	1 (4.3%)
	Gynecomastia	0 (0%)
	Dilated veins	0 (0%)
	Splenomegaly	0 (0%)
	Ascites	0 (0%)

Table 4: Distribution in cases and their family members as regard laboratory investigations

	cases (n = 50)	**Family members (n = 100)**
CBC		
• **Hb**	11.35 ± 2.4	13.22 ± 1.9
• **Platelet**	209.10 ± 82.3	316.90 ± 64.1
• **WBCs**	7.80 ± 2.9	7.89 ± 2.3
Liver Function		
• **ALT**	92.82 ± 155.8	26.60 ± 16.6
• **AST**	123.59 ± 221.6	28.20 ± 18.5
• **Total Bilirubin**	2.89 ± 2.9	0.98 ± 0.4
• **D. Bilirubin**	1.61 ± 2.2	0.33 ± 0.4
• **Albumin**	3.36 ± 0.5	3.96 ± 0.4
Kidney Function		
• **Urea**	38.40 ± 19.6	30.74 ± 32.6
• **Creatinine**	1.25 ± 0.4	0.98 ± 0.3

HBV PCR in cases ranged between 10-1200000 with mean ± SD 54188.27 ± 200058.500 while in family members was ranged between 245-100000 with mean ± SD 7603.50 ± 21991.864. Table 6

Table 6: Distribution in cases and their family members as regard HBV PCR

	cases (n = 50)	**Family members (n = 100)**
Not done	0 (0%)	77 (75.0%)
Undetected	13 (26.0%)	0 (0%)
Detected	37 (74.0%)	23 (20.0%)
Mean ± SD	54188.27 ± 200058.5	7603.50 ± 21991.9
Range	10-1200000	1-100000

DISCUSSION

Household HBV transmission is a significant public health concern. There is a notable prevalence of HBV infection in those who have household contacts with HBV carriers (8). In the current study, about one-quarter (23%) of the family members screened positive for HBsAg. A study by Mohammadi et al., (8) showed that about one-tenth (11%) screened positive HBsAg. Also, Nemr et al., (9) found that about one-third (29%) screened positive HBsAg.

The current study showed that age in cases ranged between 29-75 years with mean ± SD 55.0 ± 12.286 years while in Family members was ranged between 37-77 years with mean ± SD 59.15±8.701 years. However, Nemr et al., (9) study included 96 individuals: 14 cases with mean age of 29.78±5.82 years and 82 Family members with mean age of 15.87 ± 13.2 years. While Ragheb et al., (3) revealed that the mean age of all cases was 41 ± 10.7 years and all the cases, but the mean age of family members was 20.6 ± 14.6 years.

Regarding sex, in cases there were 31(62.0%) males and 19(38.0%) were females while in Family members 54(54.0%) were male and 46(46.0%) were female. However, Nemr et al., (9) showed that there were 50% males in index group but in family group there were 46.3% males. The study also showed that among the Family members, active HBV were higher in males than females in cases while among children, it is higher in females than males in cases. Also, Yousef et al., (10) revealed that (52.3%) of cases are males and in family members males were (53.9%). In this study, a significant risk factor identified in relation to contracting the infection within the family was the existence of a female who was infected with HBV.

Regarding Marital Status, it was revealed that in cases 5(10.0%) were Single, 42(84.0%) were married and 3(6.0%) were Widow while in Family members 24(24.0%) were Single, 75(75.0%) were married and 1(1.0%) were Widow.

However, El-Sayed et al., (11) in an Egyptian study revealed that among cases there were 47.7% of patients were married and 40.6% were blew age.

Sexual, parenteral, and horizontal transmission via intimate contact within the same family comprise the HBV transmission pathway (12). While Ismail et al., (13) revealed that there was no discernible relationship was observed between HBsAg prevalence and marital status. The study also revealed that among the HBV infected patients 77% were married.

The current study showed that the most prevalent risk factors for HBV infection in cases was Sharing personal items (86%) followed by Blood Transfusion (24%) then sexual in (20%). Also, Nemr et al., (9) revealed that previous surgical operations were identified as the primary risk factors for HBV infection in 75 (78.1%), whereas dental treatments were reported in 55 (57.3%). One case (1%) who served as the case remembered receiving a blood transfusion, but no one mentioned using intravenous drugs. Also, regarding possible routes of infection Elsabaawy et al., (14) revealed that there were 135 (73.7%) had a record of unsanitary behaviors, including the sharing of toothbrushes and shaving razors. Risk factors associated with surgical and dental treatments were documented in 13.1% of the patients. Documentation of blood transfusion was present in 2.7% of the cases. There was no documented history of substance abuse or abnormal sexual behavior.

Regarding HBV-PCR in cases, it ranged between 10-1200000 with mean ± SD 54188.27±200058.500 while in Family members was ranged between 245-100000 with mean ± SD 7603.50±21991.864. Consistent with this study, Yousef et al., (10) revealed that among cases; about one-half (n=31) have DNA level of HBV < 2000 and the other half (n=32) > 2000 IU. However, among family members of cases; about two-thirds (n=40) DNA level was < 2000 and about 37% (n=23) was > 2000 IU.

Limitations: Being single-center research hinders the generalizability of the results. Also, although using as a single marker (HBVS-Ag) is ideal for screening purposes, other markers (anti-HBc and anti-HBs) would have confirmed the diagnosis

CONCLUSION:

This study found that the prevalence of intra-familial HBV infection was high (23%). Sexual and Vertical-incidence transmission were the most predominant risk factors in our family members.

Declarations

- **Ethics approval and consent to participate:**

The current work was conducted in line with the Declaration of Helsinki after obtaining Institutional Review Board (IRB) approval (Serial: 342/2/19). Prior to the study execution and after full explanation of the aims, methods, benefits and risks of participation, an informed written consent was obtained from all participants who agreed to take part.

- **Consent for publication:** Non applicable
- **Data Availability:** All the study data are available upon request.

- **Competing interests:** None
- **Funding:** None
- **Authors' contributions:**

AAA (Awny Abd-elrahman); concept, design, editing and review. NAE (Nihal Abdeldayem Embaby); literature search, manuscript preparation clinical studies, statistical analysis, and SMH (Sahar Mohamed Hassany); concept, design, manuscript preparation, and final review

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