Impact of hepatitis B on male reproductive hormones

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Background
Hepatitis B virus infection is a serious disease affecting more than 400 million people worldwide. It has serious effects on reproductive hormones.

Aim of the work
The purpose of the study was to evaluate some of the hormones in male patients with chronic hepatitis B.

Patients and methods
The participants of the study were classified into two groups: 73 patients with chronic hepatitis B without liver cirrhosis (group 1), ranging from 18 to 46 years in age, and 31 healthy volunteers constituting the control group (group 2), ranging in age from 19 to 37 years. Serum levels of follicle-stimulating hormone, luteinizing hormone, total testosterone, free testosterone, estradiol (E2), prolactin, and sex hormone binding protein were measured in all patients. All reproductive hormones were measured by enzyme-linked immunosorbent assay. Liver function tests, detection of hepatitis markers, and abdominal ultrasonography were performed for exclusion of liver cirrhosis.

Results
As regards sex hormone binding protein, prolactin, total testosterone, and luteinizing hormone, there was a significant difference between patients and controls ($P = 0.000$).

Conclusion
Hepatitis B virus has serious effects on reproductive hormones.

Keywords:
hepatitis B, male patients, reproductive hormones

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Introduction

Hepatitis B virus (HBV) infection is a serious public health problem affecting more than 400 million people worldwide [1]. Infection with HBV may lead to acute or chronic hepatitis. HBV infections were previously much more frequent and 620 000 die every year from the late sequelae liver cirrhosis or from hepatocellular carcinoma. HBV is one of the most prevalent blood-borne viruses worldwide [2].

Much interest has been focused on the relationship between HBV infection and male reproductive performance [2].

Aim of the work

The purpose of the study was to evaluate some of the hormones in male patients with chronic hepatitis B (CHB).

Patients and methods

The study was conducted in the Assiut University Hospital in collaboration between the Dermatology, Venereology and Andrology Department, Tropical Medicine and Gastroenterology Department, and Clinical Pathology Department between August 2014 and August 2015.

Approval of the institutional ethics and research committee of the Faculty of Medicine of Assiut University was obtained.

This work included 73 male patients ranging in age from 18 to 46 years with CHB infection without liver cirrhosis (group 1).

In addition, a control group of healthy volunteers (31 persons) ranging in age from 19 to 37 years (group 2) was formed.

Informed consent was taken. Serum levels of follicle-stimulating hormone (FSH), luteinizing hormone (LH), total testosterone (T. TES), free testosterone (F.TES), estradiol (E2), prolactin, and sex

hormone binding protein (SHBG) were measured by enzyme-linked immunosorbent assay.

Venous blood sample was collected from each patient's peripheral vessels. Blood samples were centrifuged and the sera were stored at −55°C until analysis. Liver function tests, detection of hepatitis markers, and abdominal ultrasonography were performed for every patient for exclusion of liver cirrhosis.

Testosterone was measured directly using the testosterone enzyme immunoassay kit (catalog number: BC-1115) (BioCheck Inc., European). Its normal range is 3–10 ng/ml.

F. TES was measured using the free testosterone kit (Diagnostic Biochem Anada Inc.) (catalog number: CAN-Fte-260). Its normal range is 3.84–34.17 pg/ml.

LH was measured using the LH enzyme immunoassay test kit (BioCheck Inc.) (catalog number: BC-1031). Its normal range is 1.24–7.8 mIU/ml.

Estradiol (E2) was measured using the estradiol enzyme immunoassay test kit (BioCheck Inc.) (catalog number: BC-1111). Its normal range is less than 60 pg/ml.

Prolactin was measured using the prolactin enzyme immunoassay test kit (BioCheck Inc.) (catalog number: BC-1037). Its normal range is 3–14.7 ng/ml.

FSH was measured using the FSH enzyme immunoassay test kit (BioCheck Inc.) (catalog number: BC-1029). Its normal range is up to 11 mIU/ml.

SHBG was measured using the microplate enzyme immunoassay test kit (Immunospec) (catalog number: E2–121). Its normal range is 10–57 nmol/l.

Exclusion criteria

(1) Presence of genital infection, varicocele, hypogonadism or cryptorchidism, testicular atrophy, congenital bilateral absent vas, obstructive infertility, or any other chronic illnesses
(2) A primary diagnosis of medical, physiological, and social problems preventing inclusion
(3) Any cause of chronic liver disease, including hepatitis C virus.

Inclusion criteria

(1) Male patients who were diagnosed with chronic HBV infection
(2) Normal control males with negative serology for hepatitis and with normal liver functions.

Statistical analysis

Data entry and data analysis were carried out using SPSS version 19 (Statistical Package For Social Science, USA). Data were presented as mean, SD, median, and range. The Mann–Whitney test was used to compare quantitative variables between patients and controls. Spearman's correlation was determined to measure the correlation between quantitative variables. *P* values less than 0.05 were considered statistically significant.

Results

This study included 73 patients with CHB infection without liver cirrhosis and 31 controls. The age of the patients ranged from 18 to 46 years (mean = 32.23 ± 7.25 years). The age of the controls ranged from 19 to 37 years (mean = 29.39 ± 5.24 years). The two groups were well matched with respect to all demographic data (Table 1).

As regards SHBG, prolactin, T. TES and LH, there was significant difference between patients and controls (Table 2).

Table 1 Age of patients and controls

	Patients (*n*=73)	Control (*n*=31)	*P*
Age (years)			
Mean±SD	32.23±7.25	29.39±5.24	0.166
Range	18-46	19-37	
Median (range)	0.77 (0.2-1.95)	0.20 (0-0.3)	

Table 2 Reproductive hormones of the patients and controls

	Patients (*n*=73)	Control (*n*=31)	*P*
FSH (mIU/ml)			
Mean±SD	5.17±4.90	5.47±2.86	0.386
Median (range)	5.3 (0.01-25.5)	5.0 (1.5-10)	
Free testosterone (pg/ml)			
Mean±SD	26.37±31.39	12.42±5.78	0.394
Median (range)	12.1 (0.01-122.9)	10.0 (4-26)	
PRL (ng/ml)			
Mean±SD	20.99±13.53	6.39±2.60	0.000*
Median (range)	16.7 (5.1-75.9)	6.0 (3-13)	
E2 (pg/ml)			
Mean±SD	12.57±13.78	8.61±8.83	0.062
Median (range)	8.9 (0.5-82.4)	7.0 (0.5-43)	
Total testosterone (ng/ml)			
Mean±SD	3.13±3.82	5.90±2.23	0.000*
Median (range)	1.5 (0.1-13.5)	6.0 (3-9)	
LH (mIU/ml)			
Mean±SD	11.58±4.97	5.00±1.65	0.000*
Median (range)	10.6 (4.9-35.5)	5.0 (2-7)	

*$P<0.05$. E2, estradiol; FSH, follicle-stimulating hormone; LH, luteinizing hormone; PRL, prolactin; SHBG, sex hormone binding protein.

Discussion

Few studies have been carried out on the effects of HBV infection on reproductive hormones.

In the present study, as regards total serum testosterone, there was significant difference between patients and controls (P = 0.000). Total serum testosterone level was significantly reduced in HBV-infected patients compared with controls.

On the contrary, Mao *et al.* [3] designed a study to investigate the association between total serum testosterone and different disease states in HBV-infected male patients.

In all, 252 male patients, including 30 with acute hepatitis B, 127 with CHB, and 95 with chronic severe hepatitis B (CSHB), and 48 healthy controls were enrolled in this study. All male patients had normal levels of T. TES, which were not significantly different compared with those of healthy controls.

In the present study, as regards serum estradiol levels, there was no significant difference between patients and controls (P = 0.062).

In contrast to this result, Mao *et al.* [3] designed a study to investigate the association between estradiol and different disease states in HBV-infected male patients. A total of 252 male patients, including 30 with acute hepatitis B, 127 with CHB, and 95 with CSHB, and 48 healthy controls were enrolled in this study. They demonstrated that in CSHB and CHB patients, estradiol level was significantly increased. Increased estradiol levels were clinically associated with severe liver disease.

As regards the serum level of prolactin, there was significant difference between patients and controls (P = 0.000). It was significantly high in HBV-infected patients compared with that of controls.

Gill-Sharma [5] suggested that testosterone regulates the secretion of prolactin through a long feedback mechanism, which appears to have been conserved from rats to humans. The studies have filled in a major lacuna pertaining to the role of prolactin in male reproductive physiology by demonstrating the interdependence between testosterone and prolactin. Systemic levels of prolactin play a deterministic role in the mechanism of chromatin condensation during spermiogenesis [6].

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Nil.

Conflicts of interest

There are no conflicts of interest.

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