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FREQUENCY OF HEPATITIS B SURFACE ANTIGENAEMIA
AMONG HAEMODIALYSIS PATIENTS

Thesis

submitted for partial fulfillment of master
degree of tropical medicine



By

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Tharwat Kamel Karas

M.B.B.Ch.



Under The Supervision of :

- Dr. ABD EL RAHMAN MOHAMED EL ZAYADI
Professor of Tropical Medicine,
Ain Shams University

30372

- Dr. OSAIMA EL SAID SELIM
Professor of Clinical Pathology,
Ain Shams University

- Dr. SALMA MOHAMED EL OKBI
Lecturer of Tropical Medicine
Ain Shams University

Faculty of Medicine

Ain Shams University

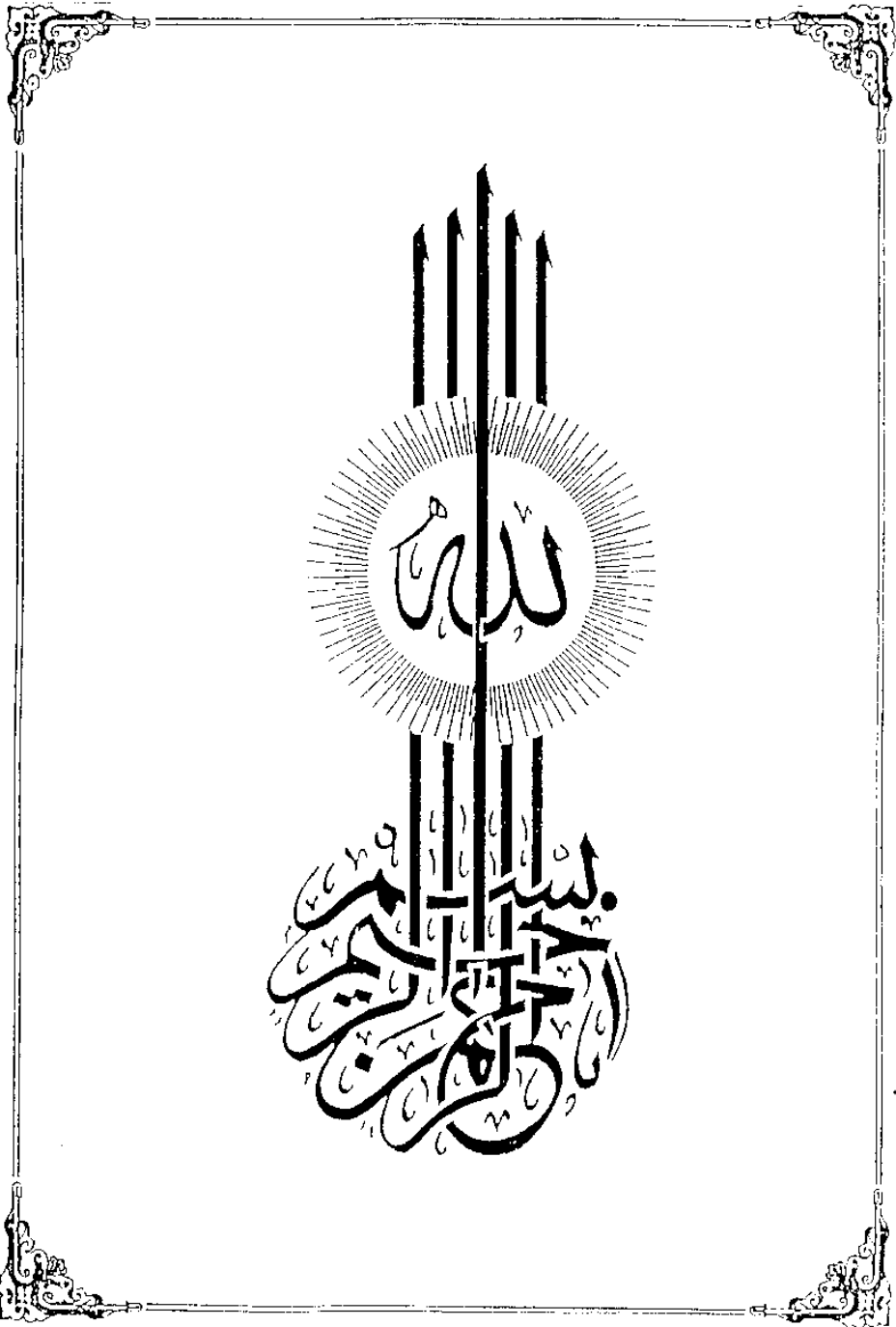
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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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Introduction and aim of the work

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Introduction :

Serum hepatitis has been an important problem among a number of infections, which may complicate dialysis, it forms 2-3% after septicaemia and bacterial pneumonia, which are considered in the infective causes of death in patients on regular dialysis (Parson et al., 1971; Marmion and Tonkin, 1972).

Dialysis patients are high risk group to develop hepatitis B viral infection, this is related to the deranged metabolism and nutritional impairment of the liver and to the impaired immunological mechanisms of the uraemic patients (Young and Parson, 1970).

Since hepatitis B is now recognized to be a major risk among haemodialysis patients, it seems important to evaluate the prevalence of hepatitis B virus.

Aim of the work :

The aim of this work is to study the frequency of hepatitis B among haemodialysis patients in Egypt.

Review of Literatures

Acute Viral Hepatitis

Acute viral hepatitis is caused by many of several agents and presents as a spectrum of syndromes ranging from entirely subclinical and inapparent to rapidly progressive and fatal (Ockner, 1988).

Viral hepatitis is caused by three major agents and several minor ones. The vast majority of cases are accounted for by hepatitis viruses A and B, and the so called non-A, non-B agents, of which there appear to be at least two (Ockner, 1988).

The infection caused by hepatitis A and hepatitis B viruses can now be identified by specific serological techniques for the specific viral antigens and antibodies. Non-A, non-B viral hepatitis agents are responsible for over 90% of transfusion associated hepatitis (Knodell et al., 1975), and (Feinstone et al., 1975), about 25% of sporadic hepatitis in adults (Dienstag et al., 1977), for a considerable number of cases of hepatitis in parenteral drug abusers (Mosley et al., 1977), and for some episodes of hepatitis in haemodialysis and renal transplantation units (Galbraith et al., 1975).

Other viral agents that cause an acute hepatitis syndrome include the Epstein-Barr virus (infectious mononucleosis), cytomegalovirus, herpes simplex, yellow fever, and rubella (Ockner, 1988).

Hepatitis A :

The causative agent (hepatitis A virus) is a 27-nm diameter RNA enterovirus (Ockner, 1988). The disease occurs sporadically or in epidemic form and is usually spread by the faecal-oral route. Parenteral transmission is rare if it ever occurs. Age 5-14 years is the group most affected and adults are often infected by spread from children (Sherlock, 1981).

Hepatitis D (Delta - Agent)

Infection with this unusual agent may be regarded as a complication of hepatitis B. The delta-agent is an incomplete RNA virus that requires antecedent or simultaneous HBV infection to infect the host cell. The agent exists in plasma in a coat of HB_sAg and is present in the nuclei of infected hepatocytes. It is most commonly found among intravenous drug addicts and recipients of multiple transfusions. In individuals chronically infected with HBV, superimposed acute HDV infection usually becomes chronic. Acute HDV infection may cause fulminant hepatic failure (Ockner, 1988).

Characteristics of common causative agents of acute viral hepatitis (Cited after Ockner, 1988).

	Hepatitis A	Hepatitis B	Hepatitis D	Hepatitis Non-A, Non-B (Two or More Agents)
Causative agent	27 nm RNA virus	42 nm DNA virus; core and surface components	36nm hybrid particle with HBsAg coat	Apparent similarities to hepatitis B virus
Transmission	Fecal-oral; H ₂ O-, food borne	Parenteral inoculation, or equivalent; direct contact	Similar to HBV	Same as for B, epidemic form attributed to HAV-like agent
Incubation period	2-6 weeks	4 weeks-6 months	Similar to HBV	2-20 weeks
Period of infectivity	2-3 weeks in late incubation and early clinical phases	During HBsAg positivity (occasionally only with anti-HBc positivity)	During HDV RNA or anti-HDV positivity	Unknown
Massive hepatic necrosis	Rare	Uncommon	Yes	Uncommon
Carrier state	No	Yes	Yes	Yes (? for epidemic form)
Chronic hepatitis	No	Yes	Yes	Yes (not for epidemic form)
Prophylaxis (see text)	Hygiene; immune serum globulin	Hygiene; hepatitis B immune globulin; vaccine	Hygiene; HBV vaccine	Hygiene; ? immune serum globulin; avoid commercial blood

Hepadna Viruses

The hepadna viruses are hepatotropic viruses which include the human hepatitis virus (HBV), the woodchuck hepatitis virus (WHV), the beechey ground squirrel hepatitis virus (GSHV), the pekin duck hepatitis B virus (DHBV), and a recently proposed member, the tree squirrel hepatitis B virus (THBV) (Feitelson et al., 1986). All these viruses lead to persistent virus infection, but only HBV and WHV cause chronic active hepatitis. The relationship between HBV and WHV chronic infection and hepatocellular carcinoma (HCC) is clearly established (Tiollais et al., 1985).

Hepatitis B Infection

History of serum hepatitis

In contrast to infectious hepatitis, serum hepatitis has a short history not earlier than 1883, when Luman described an epidemic in Bremen-Germany among factory workers inoculated with small pox vaccine containing human serum, he found that from 1289 persons vaccinated 191 developed the disease after 2 to 8 months from vaccination (Sherlock, 1963). During 1919, when Syphilis was treated by arsenicals, serum hepatitis probably transmitted by techniques used in clinics and not due to arsenical poisoning as was proposed because the transmission was continued also when penicillin was used for the treatment (Paul, 1945).

At 1920, jaundice appeared to be a complication of diabetes mellitus in patients treated in clinics and hospitals. In England during 1937, 41 cases of jaundice with 8 deaths among 104 recipients of a single batch of measles convalescent serum, administered subcutaneously had occurred. The epidemics of serum hepatitis that occurred in 1942 among U.S.A. army personnel immunized with yellow fever vaccine containing human serum, 28585 cases of jaundice with 62 deaths (Maxcy-Rosenau, 1975), the batches used were stopped and serum free preparations were substituted and no jaundice cases were proved to be associated with the preparation. Also during 1942, Chesney and others described a similar outbreak

in British troops threatened by mumps epidemic. Each soldier was given less than 14 ml of seitz filtered mumps convalescent plasma in one or two doses I.V., from 266 recipients 86 had developed jaundice (Maxcy-Rosenau, 1975). Recent studies by Krugman (Krugman S. et al., 1967) at the Willow-Brook state school of mentally retarded children at U.S.A., experimentally induced infection resulted in the isolation of Ms - 2 virus which resemble viral hepatitis type B, it had long incubation period 41 to 108 days. Contrary to the old concept, the Ms-2 strain was infective by mouth as well as parenterally and the patients with this disease were moderately contagious. So these studies proved a support for the contention that hepatitis B infection could be acquired by contact as well as the parenteral route. The discovery of Australia antigen by Blumberg et al., its association with viral hepatitis type B (Krugman & Giles, 1970) and the development of tests for the detection of hepatitis B antigen and antibody provided a new technology for the study of the natural history of the disease.

Epidemiology of hepatitis B

Geographical distribution :

The prevalence of HB_s Ag in adults ranges widely from 0.01 - 0.1% in northern Europe, North America and Australia to approximately 5 percent in countries bordering the Mediterranean, parts of Eastern Europe, the Middle and Far East, and to 15 percent or more in tropical areas (Howard, 1985). Prevalence in Egypt is relatively high, ranging between 4% and 10% (Sherif et al., 1985).

Approximate percentage carrier rate for HB_s Ag (by RIA) in healthy blood donors.

Scandinavia	0.1
United Kingdom	0.1
United States	0.1
Holland	0.2
Switzerland	0.2
Belgium	0.5
France	0.5
Spain	2.0
Southern Italy	3.0
Japan	3.0
Greece	5.0
South Africa	11.3
Taiwan	15.0
Singapore	15.0
Hong Kong	15.0

Cited after (Sherlock, 1981).

Age and Sex :

Hepatitis B is uncommon in children in western communities with the exception of children with Down's syndrome in institutions, multiply-transfused children and children with immunological defects. In contrast, in tropical areas and developing countries a significant proportion of children are asymptomatic carriers of the virus or have serological evidence of previous infection. In the remaining populations, the prevalence of HB_sAg increases notably in males with a general increase in the incidence of type B hepatitis among young adults (Howard, 1985). Males are six times more likely to become carriers than females (Sherlock, 1981).

Animal models :

Haemophagous insect vectors (as *Aedes aegypti*) may play a role in the transmission of hepatitis B by passive transference of the virus from persistently infected carriers to susceptible persons. It has been estimated from field studies that the minimum field infection rate for mosquitoes is of the order of 0.5 percent. In similar studies, HB_sAg has been found in bed bugs over four weeks. Approximately 10 to 30 percent of bed bugs of the species *Cimex hemipterus*, the predominant species in West Africa, have been found on capture to possess demonstrable markers of hepatitis. The particularly close association of these bugs with bed occupants who are carriers may be of prime epidemiological