CHAPTER ONE

INTRODUCTION

A virus is a small infectious agent having a simple acellular organization with a nucleic acid and aprotein coat.It lacks independent metabolism and replicate only within living hosts. A virus invades living cells and uses its chemical machinery to keep itself alive and replicate in the host. It may reproduce with fidelity or with errors (mutations); this ability to mutate is responsible for the ability of some viruses to change slightly in each infected person, making treatment difficult. Viruses cause many human infections and are also responsible for a number of rare diseases. The human diseases they cause may affect different organs or parts of the body. An inflammation of the liver is often referred to by a general term called Hepatitis, which is often caused by a variety of viruses which include hepatitis A, B, C, D and E. Of the viral causes of hepatitis, there are few of greater global importance than hepatitis B (Ganem *et al*, 2001).

The hepatitis B virus (HBV) belongs to the family Hepadnaviridae,which consists of hepatotropic DNA viruses. The family of Hepadnaviruses comprises members recovered from animal species including the woodluck hepatitis virus (WHV), the ground squirrel hepatitis virus (GSHV), and the duck HBV. Common features of all of these viruses are enveloped virions containing 3 to 3.3 kb of relaxed circular partially duplex DNA and have reverse transcriptase activities. Hepadnaviruses show narrow host ranges, growing only in species close to the natural host, like gibbons, African green monkeys, rhesus monkeys and woolly monkeys (Gitlin,1997).The Hepatitis virus belongs to the genus *Hepadnavirus*. It is a 42nm partially double stranded DNA virus, composed of a 27nm nucleic acid core (HBcAg), a DNA polymerase reverse transcriptase, surrounded by an outer lipoprotein coat (called envelope) containing the surface antigen (HBsAg)that play a major role in the diagnosis of HBV infection (Ganem *et al*; 2001; Gitlin,1997). The genome consists of a partially double-stranded circular DNA molecule of about 3200 base pairs in length with known sequence as well as genetic organization. Virion particles are identical to the virion ‘tails’- they vary in length and have a mean diameter of about 22nm. They sometimes display regular, non-helical transverse striations.

The viral DNA polymerase-reverse transcriptase is encoded by the polymerase gene [P] and is of central importance for viral replication. Different from all known mammalian DNA viruses, hepadnaviruses replicate via reverse transcription of a RNA intermediate (Summers*et al*.,1982), the pregenomic RNA, which is a strategy central to the life cycle of RNA retroviruses. Similarities and differences between retroviral and hepadnaviral replication have been defined (Nassal, 1999). Based on the unique replication cycle of HBV, antiviral therapeutic strategies aimed at the reverse transcription of HBV RNA or at HBV reverse transcriptase have been successfully used as antivirals to treat HBV infection (Feld, 2002).

The prevalence of HBV infection varies in different countries or regions in the world as well as in different ethnic groups. HBV endemicity has been classified into three categories, high (>8%), intermediate (2–8%), and low (<2%), depending on the prevalence of hepatitis B surface antigen (HBsAg) seropositivity. The highly endemic areas in the world include East and Southeast Asia, the Pacific, sub-Saharan Africa(Nigeria inclusive), and parts of southern Europe. In North America, and western and northern Europe, HBV infection is relatively rare, with a prevalence rate of around 0.1%.Hepatitis B virus (HBV) infection is a serious global health problem, with 2 billion people infected world-wide, and 350 million suffering from chronic HBV infection. HBV is the 10th leading cause of death worldwide, HBV infections result in 600 000 deaths

annually (Ott *et al* 2012). 1.2 million deaths per year are caused by chronic hepatitis, cirrhosis, and hepatocellular carcinoma; the last accounts for 320 000 deaths per year (WHO, 2000). In Western countries, the disease is relatively rare and acquired primarily in adulthood, whereas in Asia and most of Africa, chronic HBV infection is common and usually acquired perinatally or in childhood.

The whole of Africa is regarded as highly endemic, coming only behind Asia. Although overall Africa is considered a high endemic area with 7–26% prevalence of HBsAg, Tunisia, Morocco, and Zambia have intermediate endemicity (Andre, 2000). In West Africa, countries like Senegal and Gambia have over 90% of their populations exposed to and becoming infected with HBV during their lives (Edmund WJ. *et al*., 1996). In Nigeria, not less than 23 million people are estimated to be infected with HBV (Bukola, 2015), making Nigeria one of the countries with the highest incidence of HBV infection in the world.

Hepatitis B is caused by hepatitis B virus. The 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. HBV may cause up to 80 per cent of all cases of hepatocellular carcinoma (HCC) worldwide, second only to tobacco among known human carcinogens (WHO, 2001). Most people do not experience any symptoms during the acute infection phase. However, some people have acute illness with symptoms that last several weeks, including yellowing of the skin and eyes (jaundice), dark urine, extreme fatigue, nausea, vomiting and abdominal pain. In some people, the hepatitis B virus can also cause a chronic liver infection that can later develop into cirrhosis of the liver or liver cancer (WHO, 2014).

Susceptibility to HBV infection is general. Only people who have been vaccinated successfully or have developed anti-HBs antibodies after HBV infection are immune to HBV infection. Persons with congenital or acquired immunodeficiency including HIV infection, those with immunosuppression including those with lymphoproliferative disease, patients treated with immunosuppressive drugs including steroids and by maintenance haemodyalisis are more likely to develop persistent infection with HBV.

Hepatitis B can be spread by

- unprotected sex
- sharing IV drug needles
- living in a household with an infected person
- an infected mother to her newborn child at birth
- sharing earrings, razors, or toothbrushes with an infected person
- unsterilized needles, including tattoo or piercing needles
- human bites (www.hepb.org).

People are most at risk for hepatitis B if they

- are born to mothers who are infected with HBV
- live in close household contact with a chronically infected individual
- adopt a child from a country where HBV is prevalent
- have unprotected sex or have more than one sexual partner in a six month period
- have ever been diagnosed with a sexually transmitted disease (STD)
- are men who have sex with men
- share needles and syringes
- are health care provider or emergency responder with possible contact with bodily fluids

• are a patient on kidney dialysis
• live or work in an institutional setting, such as a prison or group home (www.hepb.org).

Diagnosis of hepatitis is made by biochemical assessment of liver function. Initial laboratory evaluation should include: total and direct bilirubin, ALT (alanine transaminase,) AST (aspartate aminotransferase), alkaline phosphatase, prothrombin time, total protein albumin, globulin, complete blood count, and coagulation studies(Hollinger*et al.*,2001). Diagnosis is confirmed by demonstration of specific antigens and/or antibodies.

There is yet no treatment for acute HBV infection, but it is a vaccine-preventable infection. Several vaccines have been used in the prevention of this infection, the prominent ones including Lamivudine, Adefovir, Dipivoxil, Famvir, FTC, Ritonavir, Theradigm-HBV, Ganciclovir (Hadziyannis *et al*.,1999).

1.1 **OBJECTIVES**

Hepatitis B virus infection is of global concern. More importantly, it is of national concern as over 23 million Nigerians are infected with HBV. The incidence of the infection in South-Western Nigeria is of no less importance as the region is still ravaged with high cases of immunization difficulties. Most texts have been on HBsAg, whereas other markers are equally important.

The purpose of the this study, therefore, is

To determine the presence of Hepatitis B envelope antibody in patients who have been previously screened for the surface antigen.

To determine the class of individuals mostly affected

THE PRESENCE OF HEPATITIS B ENVELOPE ANTIBODY IN PATIENTS WHO HAVE BEEN PREVIOUSLY SCREENED FOR THE SURFACE ANTIGEN

Regards!!!