Research into the hepatitis b virus

Hepatitis B is an infectious illness caused by hepatitis B virus which infects the liver of humans, and cause an inflammation called hepatitis (World Health Organization, 2010). It is formerly known as ‘ serum hepatitis’, the disease has caused a widespread outbreak that infects many people at the same time in parts of Asia and Africa, and specific regional in China. There are more than 2 billion people who have been infected with the hepatitis B virus, including 350 million chronic carriers of the virus (Wikipedia 2010). They are a viral infection that can lead to serious illness or death.

Hepatitis is defined as the inflammation of the liver that can be caused by viruses, alcohol, drugs and other toxins, or less commonly by a breakdown in a person’s immune system (Hepatitis Australia, 2010). There are five types of viruses that can cause infection of the liver and may produce similar symptoms. They are hepatitis A, hepatitis B, hepatitis C, hepatitis D and hepatitis E. The main difference between the hepatitis viruses is how they are transmitted and the effects they have on a person’s health. Hepatitis is described as either an acute or chronic illness, the acute illness will only last a short time and despite the fact it can be severe, most people recover from the illness within a few weeks with no lasting effects. A chronic illness will last for a long time, often for the rest of a person’s life. Hepatitis B is the most common liver infection in the world and is caused by the hepatitis B virus which is the virus that affects the liver which can cause pain and swelling (Hepatitis Australia, 2010). The infection leads to damage of cells in the liver which can cause the organs to not function properly (Oxford Medical Dictionary, 2010).

How is HBV transmitted? Well HBV is a very infectious virus. It can be transmitted by infected blood or blood products contaminating hypodermic needles, blood transfusion, or tattooing needles, or by unprotected sexual contact (Better Health Channel, 2010). This can happen with people that have unsafe sex by not using a condom or someone who gets a body piercing or a tattoo if the person doing the piercing or tattooing is not very careful with making sure that everything is very clean (disinfected and sterilised does not happen). It also happen to people on drugs who shared needles with each other and also if someone steps on a needle that has been used by someone using drugs. HBV can also be transmitted by family members who have been infected such as sharing razor blades or toothbrushes (Kids Health, 2010)

Also an infected mother might pass it to a newborn baby at the time of the baby's birth. In the research article of ' Perinatal transmission of hepatitis B virus: an Australian experience' , it states that " reported rates of transmission from mothers who are positive for hepatitis B " e" antigen vary from 7% to 28%." The research article concludes that the mothers who had Hepatitis B " e" antigen-positive have very high viral loads. So a mother who is positive for Hepatitis B surface antigen have a 20% risk of passing the infection to her offspring at the time of birth. This risk is as high as 90% if the mother is also positive for Hepatitis B " e" antigen (Wiseman et al. 2009). Mothers who are bound to Hepatitis B " e" antigen positive who have very high viral loads meaning having a severe viral infection, this is referring to the research article ' perinatal transmission of hepatitis B virus: an Australian experience'.

After exposure to HBV (Hepatitis B virus), it can cause acute or chronic infection (Margaret, F (ed.), 2006). Acute infection usually last a short time but they can make you feel uncomfortable with signs and symptoms. If a person is unable to clear the hepatitis B virus from their system after a period of time, the person is said to be chronically infected (Wrong Diagnosis, 2010). Chronic infection means continuous damage to the liver, which can result in cirrhosis, liver failure, hepatocellular cancer, and even death. Patients infected during childhood are at greatest risk for developing chronic hepatitis B infection. (Centers for Disease Control, 2010).

The HBV is a double stranded DNA virus that comes from the group Hepadnaviridae (eMedicine Medscape 2010). HBA is a hepatotropic virus meaning it has a special attraction for the liver, which it prefers to infect the liver over and any other part of the body (Medical Dictionary: The free dictionary, 2010) thus it replicates in the liver and cause hepatic dysfunction. The virus is made up of a nucleocapsid and an outer envelope that consist three main hepatitis B surface antigens (HBsAgs) that is part of a role in the diagnosis of HBV infection. It is thought that this virus causes inflammation of the liver by inducing apoptosis (programmed cell death) which then causes HBV-induced liver injury (Baumert, et. al 2007)

The liver is an organ that has many important roles in our body; we cannot live without a liver. The liver helps remove harmful chemicals from your blood, it fights infection, helps digest food, store energy, and also store nutrients and vitamins. The liver is the only organ in the body that has the capability to regenerate itself and make new liver tissue (NDDIC, 2010)

The hepatitis viruses that generate into a chronic infection have what it takes to cause liver damage because the virus reproduces in the liver. The process fibrosis occurs after some time has gone pass, more of the liver cells will become damaged and destroyed which will cause the scar tissue to take place. If the fibrosis is severe it can cause the liver to become hardened, and it will keep it from working normally which is called cirrhosis of the liver. (Hepatitis Australia, 2010).

In a small number of cases, serious damage to the liver can lead to liver failure and liver cancer. (Hepatitis Australia, 2010).

A long duration of infection with hepatitis B virus may be associated with a long duration inflammation of the liver (chronic hepatitis), leading to cirrhosis over a period of several years. This type of infection will greatly increase the incidence of Hepatocellular Carcinoma (Wikipedia, 2010) so this is the reason why Hepatitis B Virus exposure may lead to the development of Hepatocellular Carcinoma.

The hepatitis B virus can cause illness which can last for several weeks but for some people they do not become ill, their symptoms may be flu-like or some do not become sick at all. Children are less likely to have symptoms than adults when infected. A person with the infection will feel tired and lose their appetite which can last for many weeks. Their skin and eyes will look yellow, this is called jaundice. Their urine will look very dark and they may feel nauseous which can lead to vomiting a lot. They might have pain in their joints, pain in their liver and also have a fever. (Kids Health, 2010)

There are also itchy skin signs which could a possible symptom for all hepatitis virus types. The illness lasts for a few weeks and then gradually improves in most affected people. A few patients may have more severe liver disease and may die as a result of it. (Better Health Channel, 2010)

To detect whether you have Hepatitis B infection or not, a liver function test must be carried out. First the doctor or nurse will check your blood to see if your liver is working normally. When the liver function test is carried out, it measure the levels of enzymes found in the liver, heart and muscles. The Enzymes are the proteins that cause or increase chemical reaction in the living organisms. The laboratory tests include Bilirubin, AST, ALT, Alkaline Phosphatase, GGT and LDH. (The Body, 2010)

Bilirubin is like a yellow fluid produced when red blood cells break down. If you have high levels, this can indicate liver disease but might also be caused by the antiviral drugs indinavir (Crixivan) and atazanavir (Reyataz). (The Body, 2010).

AST which stands for Aspartate Aminotransferase, it is used with the ALT test to detect liver disease. (The Body, 2010).

ALT stands for Alanine Aminotransferase; it is used with the AST test to detect liver disease. (The Body, 2010).

Alkaline Phosphatase if you have high levels of this, it indicates that you may have liver or bone disease. (The Body, 2010).

GGT stands for Gamma Glutamyl Transpeptidase, this tells you if the results can show whether other abnormal test results are due to liver problems or bone problems. (The Body, 2010).

LDH stands for Lactic Dehydrogenase; it is a normal indicator of tissue damage (The Body, 2010)

There is also liver biopsy where it involves by removing a small piece of tissue from the liver by just using a fine needle. The tissue is then examined under a microscope to look for inflammation or liver damage and alpha-fetoprotein is a blood test which can sometimes detect liver cancer. (The Body, 2010)

People with hepatitis B have no signs of illness and do not realise they have the virus in their body so hepatitis B is diagnosed through different kind of blood tests, which look for markers of the hepatitis B virus in the blood. (Hepatitis Australia, 2010)

Figure 1: Here is a table that gives an understanding of the Tests (Hepatitis Australia 2010)

Test	Abbreviation	What is shows
Hepatitis B surface antigen	HBsAg	

Shows that the person is infected with hepatitis B which can be detected during acute and chronic infection.

Hepatitis B surface antibody

HBsAb or Anti-HBs

Shows that the person has developed immunity to hepatitis B which can be detected in people who have recovered from hepatitis B or been vaccinated against hepatitis B.

Hepatitis B e antigen

HBeAg

Shows that hepatitis B virus is multiplying.

Hepatitis B e antibody

HBeAb or Anti-HBe

Shows that the person’s immune system has responded against hepatitis B and the virus is not actively reproducing.

Hepatitis B core antibody

HBcAb or Anti-HBc

Shows that the person is infected with hepatitis B which can be detected during acute and chronic infection.

Hepatitis B virus DNA

HBV DNA

Shows that the person has developed immunity to hepatitis B which can be detected in people who have recovered from hepatitis B or been vaccinated against hepatitis B.

(Hepatitis Australia 2010)

The antigen is the foreign substance in the body, such as the hepatitis B virus and the. And the antibody is a protein that the immune system makes in responses to a foreign substance (Hepatitis Australia, 2010)

Normal references values. For ALT test if a person (Age <20 years) was to have a result of > 80 U/L (units per litre), they could have Mixed hepatocellular and cholestatic disease. But they have <80 U/L result they need to get a GGT test, so if their GGT result is > 90 U/L it could result to Cholestatic liver disease or bone disease. But if their result is <90 U/L then are in the isolated elevated ALP which resulting to high serum ALP. (Melbourne Pathology, 2010)

For predominant Hepatocellular Pathology, result of ALT or AST Or > 150 U/L; ALP <200 U/L results can be cause by an infection such Hepatitis A, B, C. (Melbourne Pathology, 2010)

A study of perinatal transmission of HBV was conducted between August 2002 and May 2008. The people who participated were pregnant women who attend Sydney South West Area Health Service antenatal clinics and they were tested positive for hepatitis B surface antigen (HbsAg), also their babies. The babies for hepatitis B surface antigen undergo 9 months follow

up for further virological testing which involves HBV DNA sequencing. The pregnant women have a clinical and biochemical assessment which includes tests for their liver enzymes, Hepatitis B virus DNA and Hepatitis B “ e” antigen. (Wiseman et al. 2009).

Before November 2006, the study used laboratory methods to test for Hepatitis B virus in pregnant women and their babies. Hepatitis B virus serology was performed using the AxSYM microparticle enzyme immunoassay (Abbott Laboratories); it is a technique in which the solid-phase support consists of very small microparticles in liquid suspension. (Mondofacto, 2010)

The research shows that 213 mothers out of 313 have detected with HBV DNA which 91 HBeAg were positive. Out of the 213 mothers there were 115 who have low viral load, 29 with high viral load and 69 had very high viral load. (Wiseman et al. 2009).

Conclusion

To conclude hepatitis B are the most common infectious diseases in the world and is a serious problem for people who has it and that we need to be careful for it. It is a virus that can cause inflammation to the liver which can be found in blood and body fluids. There are acute hepatitis and chronic hepatitis