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CONTROL OF HEPATITIS B INFECTION

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Hepatitis B infection remains a public health problem word-wide because of its high endemicity in most countries of the world and the presence of the virus in many body fluids/secretions, which is responsible for several alterative modes of transmissions. Also, the fact that most of the hepatitis B virus (HBV) infections occur in infancy or early childhood where over 70% of the infections is asymptomatic and nearly over half of the primary infection results in chronic infection/ carrier is another reason. Most of the HBV related chronic liver diseases are associated with the chronic infection, which manifestations occur in adulthood. This article examined the various measures that can be used in the control of the disease taking into consideration the epidemiological factors responsible for the occurrence and distribution of the disease.

INTRODUCTION

Hepatitis B virus (HBV) infection is a major public health problem world wide. About 2 billion people have serological evidence of infection with HBV (1), and it is estimated that 350 million of them have chronic HBV infection, while about a million die each year from chronic liver diseases, including cirrhosis and cancer of the liver (2). Man is the only reservoir of the infection, and infected person can have both short-term and long-term outcomes. When infected, a person can have either symptomatic disease (acute hepatitis B) or symptomatic infection with no signs or symptoms of the disease (2,3). In either case, the individual may either recover from the infection and develop life long immunity or develop a chronic infection that usually last throughout life. In persons with acute hepatitis B the incubation period after becoming infected is usually 3-4 months, with a range of 6 weeks to 6 months. About 1-2% of those with acute infection die from fulminating hepatitis (2), while about 5% will become chronic carriers (3). Most of the disease burden associated with HBV infection is related to the chronic condition of the disease (2).

THE EPIDEMIOLOGY OF HEPATITIS B INFECTION

Although most HBV related chronic liver disease manifest themselves in adulthood, the infection usually begins in infancy or early childhood in hyper endemic areas. Several factors including

initial age of infection, immunization status of the host and viral factors are known to affect the natural course of the disease (4). The age at which infection occurs is an important determinant factor of the outcome of the disease (2,4,5). Only about 10% of infections occurring among children under the age of 5 years are symptomatic, while 80-90% of infants infected during the first year of life and 30-50% of children infected between 1-4 years of age develop the chronic condition (5,6). However, 30-50% of adults are symptomatic when first infected but only 2-5% become chronically infected (2).

About 45% of the world's population live in areas where chronic HBV infection is highly endemic (i.e. 8% or more of the population are HBsAg positive), 43% are in areas of intermediate endemicity (2-7% are HBsAg-postive) and 12% live in areas of low endemicity (<2% are HBsAg positive) (2). The infection is transmitted by either skin puncture or mucous membrane contact with infected blood or other body fluids. The virus is found in most body fluids / secretions such as blood, wound secretion, vaginal fluid, semen, saliva and urine in varying concentrations. The highest concentration of the virus occurs in blood and wound secretions. Moderate concentrations of HBV are found in semen and vaginal fluid and lower concentration in saliva and urine (7). The presence of the virus in several body fluid / secretion justify many alternative modes of spread of the disease like perinatal transmission, spread through close personal contact, unsafe injection or use of sharps, sexual contact and blood transfusion.

Perinatal transmission from mothers infected with HBV (i.e. positive for hepatitis B Surface Antigen HBsAg) to their newborn infants is a major source of HBV infection in many countries (4,6) and this usually occurs at the time of birth. Transmission in utero is very low, less than 2% (2) and there is no evidence to support claims of transmission through breast milk (8). Any mother who is a carrier for HBV (i.e. HBsAg positive) can transmit the infection to the newborn; however, the risk of perinatal transmission is higher if such mother has hepatitis B e antigen (HBeAg) in her blood. The risk of transmission is in the range of 70-90% in mothers who are HBeAg positive and about 5-20% among those who are HBeAg negative (7).

The spread from child to child account for most HBV infection occurring in household settings (9,10), but may also occur in child day care centers and pre-nursery

school (11). The most probable mechanisms of child-to-child transmission involve contact of skin sores, breaks in skin or mucous membranes with blood or skin sore secretions (7). The disease may also spread because of contact with saliva through bites or other breaks in the skin (12,13). Also, the virus may spread from inanimate objects such as shared towels or tooth brushes and other formites since the virus can survive for at least 7 days out side the body and can be found in high titres on objects, even in the absence of visible blood (14).

Transmission associated with unsafe injection practices is a major mode of transmission of the infection in adults in many countries (15,16), while transmission through blood transfusion is a major source of HBV infection in countries where blood is not screened for HBsAg especially in developing countries (2). Sexual transmission of HBV accounts for a high proportion of new hepatitis B infection among adolescents and adults in countries with low and intermediate endemicity of chronic HBV infection (17). In countries where the infection is highly endemic, sexual transmission does not account for a significant percentage of cases because most people are already infected during childhood. In these high endemic areas the lifetime risk of HBV infection is more than 60% and most infection are acquired from perinatal and child-to-child transmission (2), when the risk of the developing chronic infection is greatest. The implication here is that the prevalence of acute hepatitis B infection in these areas would be very low since most perinatal and early childhood infections are asymptomatic. However, rate of liver cirrhosis and cancer in adults would be very high. In areas of intermediate endemicity, the lifetime risk of infection is 20-60%, and infections occur in all age groups. Whereas, in low endemicity, the lifetime risk of infection is less than 20%, but most of the HBV infections occur in adults in relatively defined risk groups (2).

CONTROL OF HEPATITIS B INFECTION

Most of the burden associated with HBV infection is related to the chronic condition of the disease resulting from carrier state, and the highest carrier rate occurs in children. These children are not only at risk themselves for the long term complications of HBV but also constitute an important reservoir and source of hepatitis B infection within the community at large. Therefore they constitute important target group that must be focused in any HBV control

programme. The following levels of disease prevention and control measures will be useful in reducing the public health problem associated with the disease.

1. Health promotion through health education is an important strategy in the control of HBV infection (particularly in children). The general public, especially the parents, and the health workers should be targeted in order to create awareness on the disease and solicit necessary support and cooperation required for intervention. The key message of the health education should highlight the mode of transmission, people at risk of infection, the burden of the disease on individual and the nation and the importance of safe injection and blood transfusion practices and use of sterile Sharps. This would go a long way to help parents understand the disease and take measure to protect their children against HBV infection (2).

The role of health education in the control of this disease is evident by the result of a study conducted in Poland where hepatitis B prevention through health education programme was evaluated. The study showed that health education has impact in the reduction of the incidence of HBV infection (18).

2. Specific protection of children and other at risk groups through vaccination is the most useful strategy. Vaccination against HBV has been well documented to be cost-effective in the prevention and control of the disease (2,19,20). Routine infant hepatitis B vaccination should be a high priority for all countries regardless of the degree of endemicity of the disease, while vaccination for other groups at risk of infection will depend on the epidemiological patterns, economic factors, cultural and sexual practices of each country (2). Infant immunization prevents chronic infections acquired during early childhood, thus preventing the serious consequences of HBV infection. Strategies targeting adolescents and adults risk groups have failed to control HBV adequately because of the difficulty of immunizing people in many risk groups before they initiate high risk behaviours and also due to the fact that infections can occur among people with no identified high risk factor (2). Therefore, routine immunization of infants is most desirable in the control of the disease.

The World Health Organization (WHO) has recommended that hepatitis B vaccine be included in routine immunization schedules for all children in all countries of the world (21), and many countries

have complied by incorporating, through policy and or practice, the vaccine in to their routine immunization programmes (2, 22-24). However, an acceptable universal coverage is yet to be achieved (2,24,25). Hepatitis B vaccines are available in monovalent formulation that protect only against hepatitis B and in combination formulations that protect against hepatitis B and other diseases (e.g. DPT-Hep B, DPT-Hep B+Hib, Hib-Hep B). The movovalent hepatitis B vaccine has an advantage over the combination vaccines because it can be used for birth dose unlike the combination vaccines that have other components that cannot be administered at birth.

In pre-exposure immunization, a course of 3 doses of hepatitis B vaccine induces protective levels of antibody to HBsAg (Anti-HBs) in over 95% of healthy infants and children when given in a variety of schedules (26,27). Children who respond to the vaccine are protected against acute hepatitis B and chronic infection. Studies have shown that those who respond to a 3-dose hepatitis B immunization series are protected for as long as 15 years (28). Long-time protection relies on immunological memory that allows a protective anamnestic antibody response after exposure to HBV (29). Therefore, booster doses are not recommended (2, 30). Post-exposure immunization, beginning at birth with either hepatitis B vaccine alone or combine with hepatitis B immune globuline (HBIG) can prevent the spread of more than 90% of HBV infections from mother to baby. However, the efficacy of giving recombinant hepatitis B vaccine alone is similar to that of giving hepatitis B vaccine with HBIG. (28). Hence, the use of HBIG may not be necessary. Optimum efficacy in preventing perinatal HBV infections in newborn can be achieved when the vaccine is given within 24hours after birth /exposure. There is no evidence of protection against perinatal transmission if the first dose of vaccine is given more than 7 days after birth (2). Administration of HBIG confers protection to individual accidentally exposed following needle stick injuries or sexual partners of acute cases.

3. Early diagnosis/case detection: Prenatal screening of all pregnant women for HBsAg and HBeAg is useful in identifying mothers at risk of transmitting the infection to the newborn. This requires a lot of resources to screen these women and track infants of ected mothers in order to ensure completion of the vaccine series, especially in developing countries where some pregnant women do not go for antenatal care or where many

deliveries are conducted by unskilled person or take place out side the health facility. Prenatal screening should therefore be used to supplement routine childhood immunization (2). Every country should also adopt policy of safe blood transfusion by ensuring that all blood are screened for HBsAg before transfusion. All blood bank services should be strengthened in this area.

4. Treatment of acute hepatitis B infection is mainly supportive. Since chronic infection accounts for the burden associated with the disease, treatment of chronic hepatitis B infection using interferon or antiviral analogues would be an important control measure. Many studies have reported some degree of safety of the interferon when use in the treatment of chronic condition. The effectiveness, however, is in the range of 33-43% when use in the treatment of chronic hepatitis infection in children (31-33). However, when you consider the large number of infected people worldwide, vaccination remained the most cost-effective option in the disease (2,31).

5. Surveillance system in HBV infection involves an exercise of continuous scrutiny over the occurrence and spread of the disease and related consequences with such accuracy and completeness to provide basis for effective control. It involves systematic data collection and consolidation, analysis and evaluation in order to discern long term trends and epidemiological patterns resulting from the control measures put in place. Reporting of acute hepatitis B infection can be integrated into the existing notification and surveillance system for easy data generation since children do not usually show symptoms on acquiring the infection, but tend to develop chronic infection, data on occurrence of chronic liver diseases (cirrhosis and liver cancer) must also be collected to be able to estimate the magnitude and burden of the disease over time. However, the interpretation of the data generated must take into consideration other aetiological factors that can lead to chronic liver diseases (2).

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