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Current Situation and the Challenge of Eliminating Hepatitis B in Sub-Saharan Africa

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Abstract. Chronic hepatitis B (CHB) belongs to chronic inflammatory disease. It is primarily transmitted through blood, mother to child, and sexual contact. In clinical practice, it is necessary to improve the examination as soon as possible. Only by early treatment can people delay and control the development of the disease and stabilize the disease. Otherwise, it will cause cirrhosis and lead to complications, such as ascites, bleeding, liver cancer, and so on. Antiviral therapy is the first choice for chronic hepatitis B virus infection. There are many drugs related to antiviral treatment in clinics, and different drugs have different effects. Vaccination can reduce the occurrence of diseases to a certain extent. However, despite hepatitis B having very effective vaccinations and excellent vaccinations available, there are still lots of patients that with the chronic hepatitis B in the sub-Saharan Africa. Due to the low HBV birth rate and limited resources in the sub-Saharan Africa, an effective and trustworthy strategy need to be built to achieve the goal of HBV elimination in sub-Saharan Africa. This article analyzes the current situation of prevention of the hepatitis B in the sub-Saharan region, and puts forward some intervention and prevention measures in order to provide some theoretical basis for the prevention and treatment of hepatitis B.

Keywords: hepatitis B, sub-Saharan Africa, prevention

1. Introduction

Chronic hepatitis B is highly infectious and has many ways of transmission, which has a great adverse impact on human health and life[1].According to the Globe Health Organization's (WHO), 296 million people were with the chronic hepatitis B in the world in 2019[2], with the Western Pacific and sub-Saharan Africa areas contributing the most (68 percent) [3]. 887,000 deaths worldwide have been attributed to liver sequelae associated with HBV, such as the acute hepatitis, the liver cirrhosis, and liver cancer[2]. In sub-Saharan Africa, where 60 million people suffer from the chronic hepatitis B infection, the disease is endemic in this area.

In May 2016, the WHO has approved a global health sector strategy on viral hepatitis that aims to eradicate viral hepatitis by 2030. Recognizing the devastating impact of viral hepatitis on global health, the strategy aims to achieve a 90% reduction in new cases and a 65% reduction in mortality due to HBV

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and HCV infections[4]. Transmission of HBV is very common in children, and with transmission, infected children develop chronic hepatitis B and are at high risk of fatal risks, such as cirrhosis or liver cancer, within 30 to 50 years of infection[5].

Hepatitis B infection prevention, treatment, and control continue to be significant public health challenges. Despite being completely preventable by vaccination and having excellent vaccinations available since 1982, the burden of chronic hepatitis B is rising[6]. Regarding the severity of the illness, it is alarming that only 10 percent of all births in Africa are vaccinated against hepatitis B at birth, and more significantly, that only 76% of people have received the full course of the HBV vaccine[7]. Many sub-Saharan African nations are currently formulating strategic plans and standards for viral hepatitis management, intensifying both preventive and treatment efforts will be needful to achieve the aim of the elimination of the HBV in sub-Saharan Africa. These initiatives should focus on mother-to-child transmission (MTCT) prevention, the widespread vaccination, identify and provide care to contact persons with HBV infection.

The objective of this review is to: (i) Further clarify the epidemiological characteristics of hepatitis B virus; (ii) demonstrate the primary secondary and tertiary interventions with regard to hepatitis B virus; (iii) explain the challenges that make the interventions difficult to be successful in sub-Saharan Africa.

2. Transmission, intervention, prevention method in the sub-Saharan Africa

2.1. Epidemiological characteristics

Because chronic hepatitis B infection will eventually lead to chronic liver disease, liver cancer, and other adverse consequences, hepatitis B infection is one of the main reasons for global incidence rate and mortality. Because of this situation, vaccination can prevent hepatitis B to a certain extent, but it cannot fundamentally solve the problem. According to a statistical report in 2015, nearly 257 million people in the world suffer from hepatitis B disease. According to the WHO, hepatitis B has caused nearly 900,000 deaths worldwide. In the sub–Saharan Africa, 90000 people have died of cirrhosis or cancer. WHO Central Africa and the Western Pacific region are the hardest hit by hepatitis B, with an infection rate of 68%. If converted, this ratio equals approximately 60 million of the patients with the chronic hepatitis B in the sub-Saharan Africa or 6.1% of the prevalence rate. Among them, West and Central African countries are most affected by CHB[8].

In the sub-Saharan Africa, of which about 38,800 are at high risk of developing the deadly HCC each year. Chronic hepatitis B has an aggressive clinical course when it turns into HCC. More importantly, about 93% of patients with HCC will die in no more than one year if they can't receive timely treatment and medical intervention. Surprisingly, male is most likely infected with HCC than female. Research has found that the sex ratio of having HCC in sub-Saharan is 2:1, and the age of patients is mostly between 38-67 in sub-Saharan, in comparison with the 50-70 age group in resource-rich countries. Most of these young patients in sub-Saharan Africa are the age to the reproductive and working years. Such a huge number of HCC patients can increase the burden on sub-Saharan Africa's economic, societal, and health systems. In resource-rich countries, the age of the HCC infectors is mostly 50-70. Although the diagnosis of pediatric HCC is more frequent in other countries in the sub-Saharan Africa than in Europe and the Americas, it remains infrequent relative to the incidence of HCC in adult populations[5].

2.2. Transmission of the hepatitis B virus

Hepatitis B is transmitted in three ways. There are the mother-to-child transmission, horizontal transmission, and the sexual transmission. Inadequate disinfection of medical devices or the use of contaminated blood products is one of the main routes of the transmission, especially in some countries with low income and poverty.

Mother-to-child transmission is the most common mode of the transmission in the area where hepatitis B is spared widely[9]. In the sub-Saharan Africa, the risk of mother-to-child transmission is lower than in Asia, and it isn't the main reason for the spread of hepatitis. But researches show that the

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number of infant infections from their mother is twice the number of child infections, and pregnant women infected with the HIV-HBV have an increased risk of mother-to-child transmission [6, 10].

Horizontal transmission is usually transmitted by infected blood. If people use an unclean needle and get tattooing using unclean tools, they will have the chance of exposure to infected blood and infected hepatitis B virus. Hepatitis B can also be spread by body fluids[9]. In the sub-Saharan Africa, the risk of the horizontal transmission is the most common. Early childhood transmission is very common because children always play together intimately regardless of whether they are infected with hepatitis B[6].

Sexual transmission prevails in low vaccination rate areas, and people who have multiply sexual partners have a higher risk of infecting hepatitis B[9]. There are few reports about sexual transmission in the sub-Saharan Africa area,. Though sexual transmission prevails in some western countries, HBV transmits early through the mother-to-child transmission and the horizontal transmission in the sub-Saharan Africa[11].

2.3. Current intervention situation

For people who infect with acute hepatitis B, there is no clear treatment to cure them. Nutritional balance is important in clinical treatment. Some treatment methods will be used to replenish fluids if they lose too much body fluids. The most important things are to decrease drug use as far as possible and avoid unnecessary drug use because most of the medicine will aggravate the burden on the liver[9].

At present, there are many therapeutic methods for chronic hepatitis B, but no matter which method is used, all of them are effective to prevent virus replication, reducing inflammatory necrosis of hepatocytes and liver fibrosis, so as to delay and reduce complications. Oral antiviral agents can be used to slow down the speed of the liver cirrhosis, decrease the incidence of the liver cancer. Also, it can help chronic hepatitis B patients to survive longer[9].

Peginterferon (PEG-IFN) and nucleoside analogs (NAs) are two major medicines to treat CHB. In global, most countries choose NAs to cure CHB patients. Oral antivirals with strong resistance barriers are preferred, such as entecavir, TDF, or TA. The recommendation of NAs treatment is 1-3 years. Compared with NAs, PEG-IFN has a series of limitations because of its poor efficacy and survivability, but PEG-IFN has a much shorter treatment period. For people with the high rate of the HBeAg seroconversion, 48weeks of the PEG-IFN treatment is recommended, which is much shorter than NAs treatment. The short-term treatment period improves the cost-effectiveness[1].

In sub-Saharan Africa, about 99% of people with chronic hepatitis B don't know themselves infective HBV, and less than 1% of people who can get treatment truly receive antiviral therapy. Besides the poor condition of treatment, many sub-Saharan countries don't have enough budget to establish a trustworthy surveillance system, which means people in sub-Saharan Africa can't receive the benefit from the clinical care, the treatment, and the interventions unless they are aware of their infection[6, 11].

A 1-year clinical trial in Ethiopia included 328 patients who are with the chronic hepatitis B, and they were treated with the tenofovir fumarate. Liver function, the viral markers, and transient elastography (Fibro scan) were used to evaluate the treatment effect. The results showed that the transient elastic imaging value decreased significantly with statistical differences. The viral load of nearly 90% of patients was controlled, which confirmed that the antiviral treatment an be achieved in the Ethiopia with the good effect. At the same time, it was emphasized that in sub–Saharan Africa, before irreversible complications, hepatitis B virus infection should be detected as early as possible and treatment should be started in time[12].

2.4. Current prevention situation

Both prevention and treatment strategies are essential in eliminating HBV in sub-Saharan Africa. Generally speaking, the best prevention method is universal HBV birth-dose vaccination. Other methods, such as using antiviral prophylaxis to block the transmission of the hepatitis B through the mother-to-child transmission, establishing an effective surveillance system to identify HBV infected individuals,

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and ensuring the safety of blood supply, can help us decrease the hepatitis B transmission ratio in sub-Saharan Africa[6].

The limited resources of the sub-Saharan Africa make it hard to build a trustworthy surveillance system or to import hepatitis B vaccine national-wise. Because sub-Saharan Africa doesn't have an effective surveillance system, the data on vaccination response and success of immunization can't be collected. The limited access to laboratories also makes HBV testing difficult to promote throughout the region and makes HBV cure roll-out impossible[11]. In many sub-Saharan African countries, it isn't compulsory to screen expectant mothers for HBsAg, which means we can't estimate whether a pregnant woman is hepatitis B positive and give both pregnant women and newborn infants timely prevention and treatment[6]. In sub-Saharan Africa, there are about 1% of newborn babies are infected with HBV[10].

Vaccination is the most effective way to prevent the hepatitis B virus. The WHO recommends that all babies should be vaccinated against hepatitis B as soon as possible after the birth. Infants are best vaccinated within 24 hours. To complete the vaccination series, 2 or 3 doses should be followed in at least 4 weeks[9]. In sub-Saharan Africa, most countries neither offer free birth-does HBV vaccine to an infant nor put birth-does HBV vaccine into national vaccination strategy, even though the rate of HBV infection in pregnant women is very high[13]. The rate of vaccination amount health workers is also low in sub-Saharan Africa. An important reason why health workers don't get the vaccine is cost, and most of the health workers in sub-Saharan are lack the awareness of vaccines available[14].

In addition to immunization, WHO recommends the use of antiviral prophylaxis to prevent the transmission of the hepatitis B from mother to child, Hepatitis B immune globulin can prevent the spread of more than 90% of HBV infections from mother to children. It is not necessary if the mother isn't a hepatitis B carrier[9]. But in sub-Saharan Africa, HBIG for antiviral prophylaxis is expensive and most resource-limited setting countries can't afford it[13].

In sub-Saharan Africa, transfusion-transmitted infection is higher than in other high-income countries. For decades, the U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and the Global Fund often provide support for blood safety programs. It helped many sub-Saharan Africa to reduce the risk that be infected with the transfusion-transmitted HBV [15].

Because adult infection always has visual symptomatic and HBV in sub-Saharan Africa is typically acquired in childhood before age 5. The prevention of sexual transmission is not urgent. But if we want to eliminate HBV in worldwide, we need to enhance our surveillance system and promote HBV vaccines universally in sub-Saharan Africa[6].

Despite the morbidity and mortality of hepatitis B are more than other diseases, people still put little attention and little resources into eliminating the hepatitis B virus[11].

3. Future prospects and challenges

Based on the current situation, some effective measures must be taken to reduce the health burden caused by the hepatitis B. It is necessary to expand primary prevention in this region in the future[5].

Improving vaccine coverage remains the focus of future work. The main role of the vaccine is to block mother-to-child transmission[16]. This shows that pregnant women in most areas cannot guarantee timely vaccination. However, to a large extent, it is not that pregnant women are unwilling to accept this beneficial medical measure. More importantly, they do not have the conditions to go to the facilities with injection conditions to give birth. Therefore, it is necessary to promote community-based vaccination services and personnel training[8, 16]. This is also a public health facility construction strategy, not only beneficial to hepatitis B. It should be emphasized that although it is not cost-effective to vaccinate adults generally, it is still necessary to vaccinate high-risk groups, for example, the medical personnel and men that have sex with men to block transmission. Considering the economic burden, since the transmission route of hepatitis B is similar to other infectious diseases, the triple elimination strategy of eliminating AIDS, syphilis, and hepatitis B can be adopted. This strategy can be cost-effective[8].

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In addition, there is an urgent need for some large-scale, population-wide epidemiological studies in sub–Saharan Africa to understand the infection situation, so that more effective elimination strategies can be formulated. For example, HBsAg testing is carried out for the general population to understand the distribution and transmission characteristics of the disease, or a special long-term cohort study[17]. At the same time, we should strengthen prenatal testing for pregnant women to allocate limited public health resources more targeted. Although this kind of research needs more cost, it is still beneficial for eliminating the disease.

Health education is also an important measure. Its effect is manifested in two aspects: improving people's understanding of the disease and reducing fear and vaccine hesitation. The key opportunity of prenatal examination can be seized to promote the vaccination of HepB BD in pregnant women[6]. The second is to cultivate the political will to eliminate HBV and promote the introduction of more powerful policies[16]. Sub-Saharan African countries must be made aware of the need to eliminate the disease and show their determination to have more hope.

4. Discussion

Although sub-Saharan Africa has made some achievements in controlling the prevalence of hepatitis B, it still lags behind the who's goals. Much more needs to be done to bridge this gap.

Hepatitis B is an infectious disease with a known pathogen, transmission route, and susceptible population. It can be said that the research on hepatitis B has been very clear. However, the reasons why sub-Saharan African countries are still out of control are complex. Including economic factors, natural factors, political factors, and social and cultural factors.

From an economic perspective, sub-Saharan Africa is the least developed region in the world. This situation has directly led to the local inability to establish adequate health facilities and equip sufficient medical service workers. At the same time, the government's financial expenditure on medical care and public health is insufficient. As a result, routine disease surveillance, immunization planning, and infectious disease prevention and control cannot be guaranteed. This may be the most important reason why hepatitis B and many infectious diseases cannot be eliminated in this region. To solve this problem, other countries and non-governmental organizations in the world need to develop and provide more inexpensive and effective tools based on existing technologies to detect, treat and prevent hepatitis B.

Sub-Saharan Africa is in the tropics, which creates good conditions for the spread of many infectious diseases. The disease burden faced by this region far exceeds that of other parts of the world. However, this does not mean that hepatitis B as an infectious disease can be taken seriously. On the contrary, local governments and non-governmental organizations put more energy into the control of more serious diseases such as malaria, hemorrhagic fever, and AIDS. People ignore the potential harm caused by hepatitis B to the population because cirrhosis and liver cancer caused by hepatitis B often appear after many years.

The political systems of sub-Saharan African countries may be fragile. Many countries are governed by tribes and implement the clan system. Tribal conflicts and some terrorist attacks have caused social unrest. Therefore, managers often have no time to take care of medical and health work. Many public health strategies, including hepatitis B vaccination, have been put on hold. In addition, in some emergencies, such as covid-19, the already fragile governance system faces more serious challenges. Scarce medical resources were used to deal with covid-19, which caused many newly established routine immunization programs to be disrupted. It will take a long time for these countries to recover from this situation.

Social culture in sub-Saharan Africa is also a problem. Although the local has a very unique cultural heritage, the inheritance of backward ideas such as polygamy is not conducive to the control of hepatitis B. In addition, the level of science and technology and the education level of citizens in the region are generally low. In other words, the local people may not know the relevant knowledge about hepatitis B and other infectious diseases, let alone take measures to treat and prevent them. Therefore, improving the education level is very necessary to the prevention and the control of the hepatitis B.

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In short, sub-Saharan Africa needs to allocate its limited resources reasonably in the short term. In the long run, it is necessary to innovate the social aspects including economy, politics, and culture to promote the local public health system and the establishment of social consensus. In addition, it is necessary to integrate more available resources, such as government departments, international non-governmental organizations, public welfare foundations, and scientific research institutions. The elimination of hepatitis B depends on the cooperation of multiple departments and staff. Only with more support and cooperation can we achieve the goal of eliminating hepatitis B in sub-Saharan Africa.

5. Conclusion

To sum up, the prevalence of hepatitis B in sub–Saharan Africa is not optimistic, and has caused a large health burden. Eliminating hepatitis B requires countries in the region to establish reliable, comprehensive and affordable detection systems to understand the specific situation. According to these monitoring data, hepatitis B elimination strategies need to be formulated to suit the local economic and social conditions. Such as vaccination, health education and timely treatment for children and high-risk groups. However, solving this problem is complex. Success depends on the support of other countries and organizations in the world and the attention and determination of local governments. We hope to see the cooperation and contribution of the international community and the local people in a few years to reduce or eliminate the prevalence of hepatitis B in sub–Saharan Africa.

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