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A Cross Sectional Study of Efficacy of Hepatitis B Vaccine among the Residents of Town Charthawal, Muzaffar Nagar, U. P. India

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Abstract: ***Background and Objectives: Chronic HB is a common disease with an estimated global prevalence of more than 300 million carriers, or approximately 5% of the world's population. The present study was a cross - sectional survey, embarked upon to know the prevalence of HBV carriers in patients residing town Charthawal. Dist. Muzaffarnagar U. P. Methods: A cross - sectional study was carried out to know the prevalence of Hepatitis - B virus carriers among the individuals of town charthawal, Muzaffarnagar, to evaluate the awareness in people about the vaccination, and to create the awareness in the individuals. A total of 337 patients of any age and sex were included in the study. Results: The overall prevalence of HBV infection in the study population was 3.24%. The prevalence of HBV infection in the age group 1 - 19, 20 - 29, 30 - 39, 40 - 49, 50 - 59, 60 - 69, 70 & above was as 9%, 24%, 33%, 13%, 10%, 6% and 4% respectively. The prevalence of HBV infection in volunteers of habit of addiction was as 38% in smokers, as 4% in alcoholics, 11% in both smokers and alcoholics. The persons found positive for HBV infection were all non - vaccinated. Interpretation and Conclusion: The present study showed that overall, 3.24% of the patients of the town Charthawal were positive. WHO divided regions of the world according to prevalence rate into areas of low (<2%) prevalence, intermediate (2 - 8%) and high (>8%) prevalence. Therefore, according to WHO criteria Bangalore city comes under the intermediate prevalence zone. So, in Charthawal Muzaffarnagar HB is found to be a health problem. Along with vaccination campaign in adults and childhood, awareness and educational programmes should be initiated in the community. Efficacy of Hepatitis B was very effective in the prevention of Hepatitis B Infection.***

Keywords: Hepatitis - B; Prevalence; HBsAg; HBV infection; HBV Carriers.

1. Introduction

In Unani system of medicine Liver is known as Kabid or Jigar. The position of liver in the body is as the situation of sun in solar system. It is one of the most vital organs of the body which happens to be the second largest organ in the body next to skin. Liver plays an significant role in preserving body's metabolic homeostasis which includes processing of dietary amino acids, carbohydrates, lipids and vitamins, removal of microbes and toxins from splanchnic blood, enrooted to systemic circulation, detoxification and excretion into bile of endogenous waste products.1[1, 2, 3, 4]

WHO estimates that 296 million people were living with chronic hepatitis B infection in 2019, with 1.5 million new infections each year. In 2019, hepatitis B resulted in an estimated 820 000 deaths, mostly from cirrhosis and hepatocellular carcinoma (primary liver cancer). Hepatitis B virus (HBV) is the leading cause of viral hepatitis in humans. About 2 billion people worldwide have been infected with HBV and over 50 million new cases are diagnosed annually. Over 350 million have become chronic carriers of the virus, 60 million of them residing in Africa. According to World Health Organisation, 600, 000 persons die each year due to the acute or chronic consequences of hepatitis B [1–4]. Transmission in highly endemic areas is primarily horizontal between young children [5]. and less frequently from mother to child [6] whereas in low endemic areas transmission is either through sexual contact or through the use of contaminated needles [7, 8]. HBV is a major cause of liver disease and is strongly associated with the development of hepatocellular carcinoma (HCC) [9]. The majority of children infected perinatally become chronic carriers [10] as do 15–20% of persons infected in early childhood [5, 11]. Approximately one third of HBV carriers will progress to cirrhosis and 25% will develop HCC which is the leading cause of cancer in males in The Gambian and causes between 10–15% of adult male deaths [12]. HBV immunization has been available since 1982 and in 1992, the WHO recommended that childhood HBV vaccination be included in national immunization programs [13]. This is the first vaccine against a major human cancer and has been proved to be effective in preventing HBV infection and its chronic consequences [11, 13–15].

Prevention of Hepatitis B Infection

Successful vaccination not only is effective in preventing hepatitis B infection but also prevents the sequelae of chronic hepatitis B infection, and this is the first example that cancer can be prevented by vaccination. The development of hepatitis B vaccines is considered one of the major achievements of modern medicine. Currently available vaccines are both safe and effective, with seroconversion rates of more than 90% in healthy adults and children. The cost of the vaccination is the true major obstacle to the universal vaccination in the developing nations and failure to convince recipients in developed nations that vaccines are necessary even outside traditional high - risk groups.1[6, 17, 18, 19]

Active Immunization

Both plasma - derived and recombinant forms of vaccine are available. Both are comparable in terms of efficacy and durability. Plasma - derived vaccine was developed first and is no longer available in North America and Europe but is still widely used in parts of Asia and India. Because anti - HBs alone is sufficient to confer protective immunity, most recombinant vaccines have expressed HBsAg only. Two vaccines that express HBsAg (Engerix - B and Recombivax HB) are widely available. These vaccines are approved for use in all age groups. A combination vaccine (Twinrix), which expresses both HBsAg and hepatitis A virus, is also available and is approved for use in adults in the United States and Europe. This vaccine is typically used for convenience when protection against both viruses is needed.

Indications for Vaccination

All persons at high risk for acquiring hepatitis B should be offered vaccination if non - immune. Targeting of high - risk groups alone, however, failed to attain acceptable rates of immunization and decline in the incidence of hepatitis B. Therefore, many countries have now moved to universal vaccination of all infants and incorporation of hepatitis B vaccines into routine childhood immunization programs. Universal vaccination of all neonates with catch - up vaccination of older children began in 1991 in the United States. Countries that adopted universal vaccination programs in the 1980s have already begun to see declines in the rate of chronic HBV infection and subsequent Hepato cellular carcinoma[20, 21]

Prevention of Perinatal Transmission

The current recommendation is to provide passive - active immunization to newborns of carrier mothers. Infants should receive both HBIG (0.06 mL/kg) and vaccine, and the first dose of vaccine should be given within 12 hours of birth and the second and third doses at 1 and 6 to 12 months, respectively. This regimen has a protective efficacy of 95%.4, [6, 21]Hepatitis B is a public health problem and more than 350 million peoples are said to be infected with the hepatitis B virus worldwide[22] (Kim et. al., 2016). Hepatitis B virus infection is mainly associated with an acute liver disease which includes liver failure and also chronicity which can lead to cirrhosis and liver cancer [23] (Liang et. al., 2009). Hepatitis B virus (HBV) is a major bloodborne and sexually transmitted infectious agent that is a significant global public health issue Currently, eight HBV genotypes (A - H) have been described and diverge by at least more than eight per cent in their nucleotide sequences[24] (Kramvis et. al., 2005). The occult hepatitis B virus infection is defi ned as "the presence of HBV DNA in the liver (with detectable or undetectable HBV DNA in serum) in individuals testing HBsAg negative by currently available assays" [25] (Raimondo 2008; Hollinger 2010 and Metaferia et. al., 2016). Earlier, naturally occurring deletions in the pre - S2/S promoter region were observed in several cases of occult HBV infection [8926] (Chaudhuri 2004; Mu 2009), chronic HBV infection[27] (Fan et al., 2001), and patients with progressive liver diseases [28] (Chen et. al., 2006). In a subsequent study, it was demonstrated that these deletions can cause altered surface protein expression, and an increased largeHBsAg (L - HBsAg) to major/small - HBsAg (S - HBsAg) ratio leading to reduced HBsAg secretion [29] (Sengupta et al., 2007).

The risk for chronic HBV infection decreases to 30% of children infected between ages 1 and 4 years and to less than 5% of persons infected as adults [30, 38] (McQuillan 1999; Wasley 2010).

2. Discussion

The hereditary liver disease can be passed genetically from generation to generation. Examples include Wilson's disease (copper metabolism abnormalities) and hemochromatosis (iron overload). Chemical exposure may damage the liver by irritating the liver cells resulting in inflammation (hepatitis), reducing bile fl ow through the liver (cholestasis) and accumulation of triglycerides (steatosis). Obesity/overweight increases the risk for liver disease. Obesity often results in the accumulation of fat cells in the liver. Acids that are secreted by these fat cells (called fatty acids) can cause a reaction in the body that destroys healthy liver cells and results in scarring (sclerosis) and liver damage. From previous studies in Ethiopia have demonstrated that the important factors of HBV transmission include blood transfusion; tattooing; a history of surgery, unsafe injections, or abortions; multiple sexual partners; and traditional practices such as scarification, circumcision, and also ear piercing [31, 32, 33, 34, 35, 36] Although the association between HIV and HBV has become less prominent in Africans, evidence has been found indicating that HIV makes HBVrelated liver disease develop more quickly [37] (Metaferia et. al., 2007) and HIV/HBV co - infection has serious effects on both pregnant women and infants. A previous study among pregnant women in Bahir Dar city showed an HIV/HBV co - infection rate of 1.3% [28] (Chen et. al., 2006).

3. Conclusion

The various action taken by world health organization in this regard on May 2016, the World Health Assembly adopted the first *Global health sector strategy on viral hepatitis, 2016 - 2020*. The strategy highlights the critical role of universal health coverage and sets targets that align with those of the Sustainable Development Goals. The 74th World Health Assembly in 2021 adopted a previous decision of the Executive Board to request that Global Health Sector Strategies on HIV, viral hepatitis and sexually transmitted infections are developed for the period 2022 - 2030.

To support countries in achieving the global hepatitis elimination targets under the sustainable Development Agenda 2030, it is necessary and mandatory to raise awareness, promote partnerships and mobilize resources; formulate evidence - based policy and data for action; increase health equities within the hepatitis response; prevent transmission; and scale up screening, care and treatment services. More and more study should be projected to control such deadly diseases. It can be concluded from above discussion that our study however is small study but the efficacy of vaccine was found 98% that reflects very good control to such epidemics. Further studies needed with a large sample size and long study duration with some more specific and sensitive screening tests to measure the prevalence of HBV infection in general population.

4. Results and Observations

Tables and Graphs

Table 1: Distribution of Individuals according to Vaccination Status (n=337)

Vaccination Status	No. of Individuals	Percentage
Vaccinated	15	4
Non – vaccinated	322	96
Total	337	100

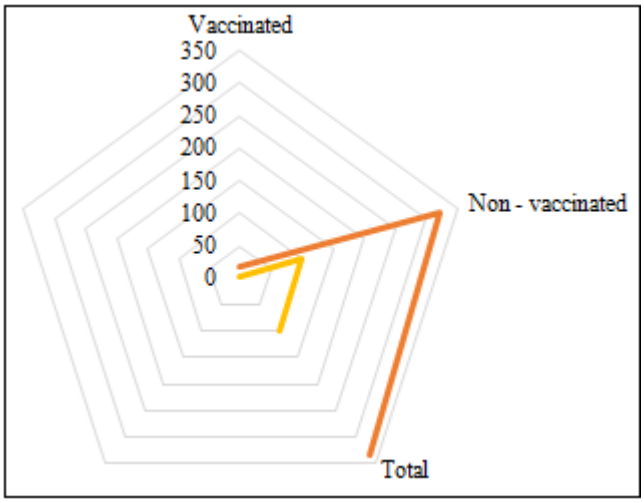

Figure 1: Distribution of Individuals according to Vaccination Status

Table 2: Distribution of individuals according to Outcome of Screening Test (n=337)

Outcome of Screening Test	No. of P Individuals	Percentage
+ve	11	3
- ve	326	97
Total	337	100

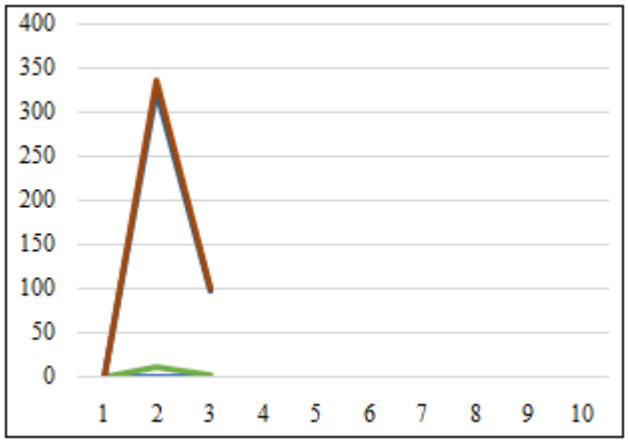

Figure 2: Distribution of Individuals according to Outcome of Screening Test

Table 3: Distribution of +ve Patients according to Vaccination Status before Infection (n=11)

Vaccination Status	No. of Patients	Percentage (%)
Vaccinated	0	0
Non - Vaccinated	11	100
Total	11	100

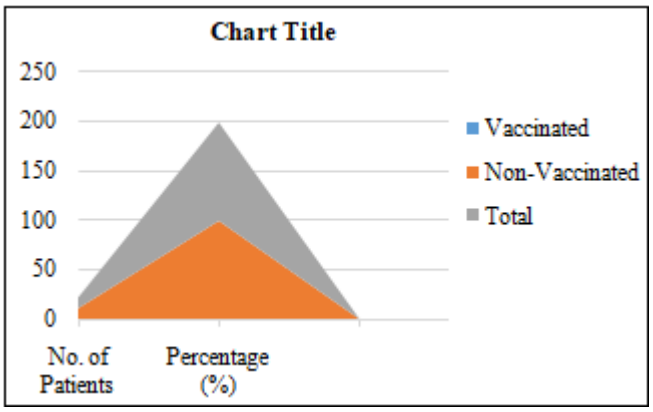

Figure 3: Distribution of +ve Patients according to Vaccination Status before Infection

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