Prevention Of Acute Hepatitis In Infants

Abstract

This paper will discuss how hepatitis in pregnant women is passed to their developing infant during gestation by looking at three different research articles. There are several types of Hepatitis such as A, B, C, D, & E, however, only hepatitis B can be transmitted from mother to fetus. Hepatitis B has three types of antigens present such as the hepatitis surface antigen (HBsAg) found in almost all body fluids which promote easy transmission. Other types of antigens that are present are hepatitis core antigen (HBcAg) along with the e antigen (HBeAg). Acute hepatitis in infants can progress to acute hepatic failure, and if left untreated can result in death. The following content lead to the development of a research question: is there any way to prevent the transfer of hepatitis B from mother to infant and when not possible, in what ways can medical staff prevent a newborn infant from developing Fulminant Hepatic Failure (FHF). The conclusion was made that with proper medical treatment and monitoring for the transmission of hepatitis B from mother to infant the risk was greatly reduced.

Ways to Prevent Hepatitis in Infants

Every expectant mother wonders how their child is going to turn out. What personality will they have, what will they look like, but most importantly, will they be healthy? A new mother never wants to think that their child is going to be born with an illness. A mother unknowingly carrying hepatitis B would never expect that the hepatitis virus she contracted before or during pregnancy would cross the placenta barrier and infect her unborn child. In the developing infant, hepatitis B can cause them to develop an acute hepatitis infection which occurs right after birth or in utero. This virus can place both the mother and infants lives in danger if no medical treatment is given. Treatment depends on the severity of hepatic damage that occurred and may range from simple drug administration to a possible liver transplant.

Acute Hepatitis

Acute hepatitis is most commonly caused by a viral infection such as hepatitis A, B, C, D, & E but can also be caused by drug & alcohol abuse, or an autoimmune disease. There is, however, only one type of Hepatitis that can cross the placenta to the fetus and this is Hepatitis B. Hepatitis B is commonly contracted by having unprotected sex with an infected person or sharing needles among intravenous drug users. An infected person will have the hepatitis surface antigen (HBsAg) in almost all body fluids which promotes easy transmission and it can stay active on surfaces for up to 7 days. In the newborn, acute hepatitis can occur with transmission while in utero or during the delivery as this infant passes through the vaginal canal. While Hepatitis B is present in all body fluids, transmission of hepatitis B has not been found to occur through breast milk, feces, urine, tears or sweat (Hockenberry, Wilson, & Rogers p.80, 2018).

Hepatitis B causes widespread edema followed by inflammation in the liver that is mediated by cytokines and natural kill cells. This will eventually lead to liver cell degeneration, necrosis, and

fibrosis. With time, the cells should regenerate if the damage is limited, but if severe the liver will develop several different forms of complications such as Fulminant Hepatic Failure, chronic hepatitis, cirrhosis of the liver, and hepatocellular carcinoma. The most common type of complication that results in severe, acute hepatitis B with massive destruction of liver tissue then eventually leading to fulminant hepatic failure with progressive liver destruction and a high risk of mortality (Lewis, p.1059-1061, 2016).

Fulminant Hepatic Failure

Fulminant Hepatic Failure (FHF), also known as acute liver failure (ALF), is commonly associated with acetaminophen overdose which causes toxic metabolic particles to accumulate in healthy liver cells. However, this can also occur with hepatitis B. FHF is characterized by a rapid onset of severe liver dysfunction. A pregnant mother who has hepatitis B can transfer the disease through the umbilical cord which then infects the baby with acute hepatitis B. Since infants do not have a developed immune system, acute hepatitis B causes acute liver failure in infants which presents at birth (Lewis, p.1085, 2016).

For most newborn infants, they start to cry within the first few seconds of life and generally pink up. However, infants that are suffering from hepatitis B do not present with the normal presentation of a healthy baby. Generally they appear more fatigued, can be un-responsive, under weight, and sometimes with jaundice, a build-up of bilirubin that causes a yellowish appearance. Ultrasound can often detect the smaller sized liver in the infant, which is a key sign of Hepatitis B. Other diagnostic studies that would be done are a liver biopsy and computerized tomography (CT). Labs would show high white blood cell count, elevated aspartate transaminase (AST) and alanine aminotransferase (ALT), and elevated bilirubin levels. Many discussions would be held with both parents about possible liver infections occurring with their child, until finally a diagnosis of hepatitis B was transferred from mom to baby which caused acute hepatitis that progressed to acute liver failure.

Research Question

As explained earlier, hepatitis B is transferred to infants via blood transfer through the umbilical cord or through the passage of the infant through the vaginal canal resulting in exposure to vaginal fluids. In infants, acute hepatitis B can progress to FHF, or also known as acute liver failure, which often can result in death. This issue leads to the development of the following research question: is there any way to prevent the transfer of hepatitis B from mother to infant, and if not, what ways can medical staff prevent a newborn infant from developing Fulminant Hepatic Failure?

Population

The population in the research articles discussed below include pregnant women with a diagnosis of hepatitis B. The research that should be considered must discuss ways to stop transmission of hepatitis B from mother to infant during gestation, or research that addresses the infant after birth with acute hepatitis B, and outcome comparisons between both the mother and infant. By addressing these research topics the expectation would be that improvement in the length and quality of life for the infant would occur.

Intervention

Interventions would be ways to stop the transmission of hepatitis B from mothers to infants and if that is not possible, it will be necessary to look for ways to prevent infants with acute hepatitis B progressing to Fulminant Hepatic Failure. For these patients, there needs to be regularly scheduled testing and screening to monitor the progression of the disease. Also, intervention and various treatments for FHF need to be assessed to determine the best quality of life for the child.

Comparison

Having regular screening and blood testing will help the mother's provider determine their progression with hepatitis B along with determining if the mother is either HBsAg positive or HBeAg positive. Regular screening will also help to determine how well the infant's liver is handling acute hepatitis B and if any ongoing deterioration is occurring. If the disease were progressing in the infant, an intervention would be necessary after birth. If regular screening and monitoring of both the mother and infant were not done, potentially the infant could develop Fulminant Hepatic Failure which could further progress to chronic liver failure and eventual death.

Outcome

The overall goal is to reduce the occurrence of infants being born to mothers with hepatitis B from developing acute hepatitis B and progressing to Fulminant Hepatic Failure. This would ultimately reduce the chances of having lifelong issues and possible ongoing medical care, which possibly could include liver transplantation. As stated earlier, stopping the progression of acute hepatitis B in infants would improve the overall health of many infants' lives that are born to mothers that have hepatitis B.

Articles to be Discussed

The articles that were selected for answering the research question are based upon preventative treatment, outcomes when no preventative treatment has been done, and ways to stop the transmission of hepatitis B from mother to infant. Each article examined qualifies for discussion by falling into the five year limit and pertains to aspects of the research question being proposed.

The first article chosen by Fan, Edusei Jr., Schillie, and Murphy (2014) goes over the use of different anti-virals to decrease transmission from mother to fetus. They begin by going over known statistics of the chances of the mother passing Hepatitis B to her infant. According to said article, 25% of infants that obtain Hepatitis B diagnosis will die from chirrosis, liver failure, and/or liver cancer (Fan et al. (2014). Therefore it is important to get on top of the problem by trying to prevent it if at all possible.

This study utilized ICD-9 codes through private insurance to see what pregnant women were taking anti-virals. They determined who was pregnant by whether or not they had a delivery ICD-9 code in their profile. If the women did not have an identifiable delivery date, they were

excluded from the research data. This study concluded that pregnant women are less likely than non-pregnant women to receive antiviral prophylaxis, as some experts do not recommend use of antivirals unless they have active or advanced liver disease as these are not considered the safest drugs to be taken during pregnancy. This was not a point brought up in other articles examined but it also did not cover alternative choices to decrease the transmission of the Hepatitis B Virus to the infant other than anti-virals. It also did not follow up with mothers to see what could the reasoning was, what their viral load was, or what other type of treatment was chosen to be given to their infant instead.

The second article chosen by Yang, Qin, Fang, Jiang, and Nie (2017) followed 9906 pregnant women in China, as one third of all Hepatitis B cases world-wide reside in China. They used a meta-analysis study to find out if cesarean sections in pregnant women will decrease the rate of Transmission to the infant. Since screening began to test for Hepatitis B in all pregnant women as well as providing passive and active prophylaxis to the newborn, the rate of Hepatitis B has significantly dropped, although in 10-20% of infected mothers, transmission still occurs. Studies have shown that Cesarean sections have greatly reduced the chance of transmission of HIV and the Herpes Virus to newborns, so is it possible that this, too, could decrease the transmission of the Hepatitis B virus?

In the end, the results of this study concluded that of the 9906 pregnant women, 6.76% of the infants contracted Hepatitis B from the mother. Of that percentage 4.37% mothers underwent a cesarean section and the other 9.31% had a vaginal birth. It came to the conclusion that Cesarean section did in fact reduce the rate of transmission but was not clear enough on the controls of each study conducted as far as whether or not the mother had received any antiviral prophylaxis during her pregnancy. So, it is hard to say that the cesarean section was the ultimate cause of decrease in the transmission.

The third article chosen by Han, Jiang, Yue Ding, & Wang (2015) evaluates the effectiveness of the use of Telbivudine (LdT), an antiviral drug used in Hepatitis B, to prevent vertical transmission of Hepatitis B Virus to the infant. They followed pregnant women at the Second Affiliated Hospital of Southeast University in China that were either in their second or third trimester. The article at hand listed clear control groups in their study, following 455 mothers with 362 to receive treatment and the other 92 in the control group. They continued to follow the subjects for at least a year following giving birth. They were able to come up with a clear conclusion as to whether or not this drug safely and effectively helped the mother and infant prevent vertical transmission of the Hepatits B Virus.

Analyzing One Article

The third article by Yue Ding, & Wang (2015) touched on the aspect that chronic hepatitis in adults is a lifelong infection that has a high rate of causing cirrhosis, hepatitis decompensation, and hepatocellular carcinoma. The transmission of hepatitis B from mothers, who are hepatitis B e antigen positive (HBeAg), to infant is more than a 90 percent chance in development of chronic hepatitis B where infants born to mothers with hepatitis B surface antigen (HBsAg) are most likely to develop acute hepatitis B. Also discussed was the available treatment, Telbivudine, to prevent the transmission of hepatitis B and how the infant’s body handles the invasion of this virus. In looking at the components of prevention, the transmission, what happens in the host’s body, and the treatment this complies best with answering the research

question that was implied and was the only article that properly explained clear controls used.

Targeted sample size

The inquiry by Han et al. (2015) looks at pregnant women who are chronically infected with hepatitis B. They focused their research on 455 mothers from the age of 20-40 years old with gestational weeks of 20-32 weeks that were positive for serum HBsAg for more than six months and HBeAg as well as Hepatitis B Virus DNA. 362 of the mothers were to receive LdT while the other 92 women were in the control group. In the LT group, 257 women were in their 2nd Trimester and 105 were in their 3rd Trimester.

Potential Bias

Potential Bias during this study could include whether or not the mothers were 100% compliant with their antiviral treatment. It was not listed in the research article whether or not they visualized the patients receiving their medications. In a further study in this area, that could likely impact the results of this type of study.

Conclusion and Implications of Further Study

The research done in this article concluded that giving expectant mothers Telbivudine can greatly or altogether reduce the chance of transmission, especially when comparing to the mothers who were given no treatment at all. The report stated the Vertical transmission was 0% in LdT treated mothers and 9.3% in the control groups. It did not appear to make a difference whether or not they started to receive treatment during the second or third trimester. They did not list any known harm done to the fetus and in fact go on to state, “LdT treatment was safe for mothers and infants, and no congenital deformities were reported” (Han et al., 2015)

Application to Nursing Practice

It is important to develop an understanding of different research articles and looking at their implications of study to modern medicine and the prevention of continual pathways of various diseases. The information that was given throughout this research will be beneficial in monitoring mothers who have chronic hepatitis B and are pregnant. It will help prevent the transmission of hepatitis B from mother to infant with continual monitoring of organ functions, viral load throughout each trimester, and continual medication monitoring and adjustment. This would be a valuable tool in preventing acute hepatitis B in infants and reducing the continual damage to the liver which could lead to the development of acute liver failure.

Being able to look at different research articles as a nurse provides methods of identifying causes of disease which can aid nurses in monitoring their patient to prevent the continual pathway of their disease course. With evaluation of this research, the main prevention of development of acute hepatitis B in infants is continual monitoring and medication use in mothers. Overall, using the practice of research and application of practical guidelines drawn from several areas of study will benefit the future practice of nursing and continual protection to patients throughout their illness.

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