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Vertical Transmission In HCV

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Abstract
Introduction- *Vertical transmission in Hepatitis C Virus (HCV) refers to the transmission of the virus from an infected mother to her baby during pregnancy, delivery, or shortly after birth, meaning the baby acquires the infection from the mother at the time of birth; this occurs in approximately 5% of cases where the mother is infected with HCV, with a higher risk for women with high viral load or co-infected with HIV. The detection of HCV infection in newborns requires careful monitoring with PCR testing for HCV RNA, as maternal antibodies can interfere with early antibody tests. Currently, there are no widely recommended interventions to prevent vertical transmission of HCV during pregnancy*
Aims and objectives: *To determine vertical transmission in children born to pregnant patients with confirmed HCV infection.*
Materials & Methods- *It was a prospective study conducted at Medical Gastroenterology in collaboration with Obstetrics & Gynecology, PGIMS, Rohtak over a period of five years. Two hundred (200) pregnant patients who were confirmed to be positive for anti HCV antibody test on Enzyme linked Immunoassay test (ELISA) and HCV RNA on PCR testing were enrolled in the study and followed. Out of these 200 patients, three patients had miscarriage and were excluded from the study. As per guidelines, antiviral treatment for HCV cannot be given during pregnancy or breast feeding, hence treatment of these mothers was started only after six months of breastfeeding. Once, breastfeeding was stopped, then these oral antiviral drugs were started for 12-24 weeks. The remaining, 197 patients were followed throughout pregnancy and all the newborns were followed after delivery. Till date, data of 100 newborns who have attained one and half year of age is available. The anti HCV antibody test and HCV RNA Quantitative test was done in all of these one hundred children.*
Results: *Out of 197 confirmed HCV pregnant patients who were followed, 150 delivered in Government hospitals (118 normal delivery and 32 were caesarean section). Fourty seven patients delivered in private hospitals (28 had normal deliveries and 19 had caesarean section). Till date 100 newborns that have attained one and half year of age and got tested for anti HCV antibody test and HCV RNA Quantitative test for determining vertical transmission. Out of these 100 children, 5 were found to be anti HCV antibody test and HCV RNA Quantitative test positive, thus making 5% vertical transmission in present study pool. The mothers of all of these five were Monoinfected with HCV with high HCV viral load with range from $10^5 – 10^7$ IU/ml with mean of 10^6. Out of these five, three pregnant women underwent caesarean section and two had normal vaginal delivery.*
Conclusion: *Our study has re-confirmed the findings available in literature regarding approximately 5% of vertical transmission in Monoinfected HCV patients which especially occurs in prescence of high HCV viral load and caesarean section cannot be recommended for preventing vertical transmission. The characteristic fact which appeared was that all pregnant patients who showed vertical transmission were young which is further area of research.*
Keywords: *Anti HCV antibody, HCV RNA Quantitative, Vertical transmission. Breast feeding, anti-viral treatment, DAA*

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I. Introduction

Hepatitis B and C are the most common causes of chronic viral hepatitis in children and adults worldwide. In industrialized nations, because of vaccination programs against hepatitis B, hepatitis C virus (HCV) has become the primary cause of chronic viral hepatitis in children, with vertical transmission becoming the leading source of infection. Vertical transmission refers to viral transmission from the mother to the infant during pregnancy, at the time of delivery, or during the first 28 days after birth. With the discovery of direct-acting antivirals to treat hepatitis C virus (HCV), attention is turning to interventions either in pregnancy or in infancy to prevent or treat vertically acquired infection. The World Health Organization's target of HCV elimination by 2030 **[1]** has added further urgency to this issue. According to a 2014 meta-analysis, vertical

transmission (VT) occurs in 5.8% of infants of HCV RNA–positive mothers, and 10.8% if mothers also have HIV **[2]**. A proportion of vertically infected infants clear spontaneously by age 5 years: 20%–40% is cited in reviews and guidelines **[3, 4]**, but a recent analysis reported 66% clearance, with rates initially high then declining over the first 3 years **[5]**. The lack of standardization in testing schedules and in methods for calculating transmission rates has long been a cause for concern **[6,7]**.

II. Aims And Objectives

To determine vertical transmission in children born to pregnant patients with confirmed HCV infection

III. Material And Methods

It was a prospective study conducted at Medical Gastroenterology in collaboration with Obstetrics & Gynecology, PGIMS, Rohtak over a period of five years. Two hundred (200) pregnant patients who were confirmed to be positive for anti HCV antibody test on Enzyme linked Immunoassay test (ELISA) and HCV RNA on PCR testing were enrolled in the study and followed. Out of these 200 patients, three patients had miscarriage and were excluded from the study. As per guidelines, antiviral treatment for HCV cannot be given during pregnancy or breast feeding, hence treatment of these mothers was started only after six months of breastfeeding. Once, breastfeeding was stopped, then these oral antiviral drugs were started for 12-24 weeks. The remaining, 197 patients were followed throughout pregnancy and all the newborns were followed after delivery. Till date, data of 100 newborns who have attained one and half year of age is available. The anti HCV antibody test and HCV RNA Quantitative test was done in all of these one hundred children.

Stastical Analysis

All the data was entered in Microsoft Excel Data and analysed using SPSS 15.0 version.

IV. Observation And Results

Two hundred (200) patients who were confirmed to be positive for anti HCV antibody test on Enzyme linked Immunoassay test (ELISA) and HCV RNA on PCR testing were enrolled in the study and followed. Out of these 200 patients, three patients had miscarriage and were excluded from the study. In the study pool of 197 HCV confirmed pregnant patients, majority belonged to rural areas (73.60%) & were in 21-30 yrs of age group (72.58%). Out of these 197 patients, 150 delivered in Government hospital, 47 patients delivered in private hospital. On analysis of 150 deliveries in Government hospital, 118 patients had normal vaginal delivery and 32 patients underwent caesarean section. On analysis of 47 deliveries in Private hospital, 28 patients had normal vaginal delivery and 19 patients underwent caesarean section. Five patients had premature delivery. At the time of writing this paper, data pertaining to 100 neonates who have reached one and half year of age and got tested for anti HCV antibody test & HCV RNA quantitative test was analysed. Out of these 100, 5 were found to be anti HCV antibody test and HCV RNA Quantitative test positive and rest 95 were negative, thus signifying 5% vertical transmission. The mothers of all of these five were between 20-30 yrs of age group, Monoinfected with HCV with high HCV viral load which ranged from $10^5 – 10^7$ IU/ml with mean of 10^6. Out of these five, three pregnant women underwent caesarean section and two had normal vaginal delivery. All the newborns were breast fed for 6 months and after that breast feeding was stopped and oral directly acting anti-viral treatment was started.

Age Distribution	10-20 yrs	21-30 yrs	31-40 yrs	41-50 yrs
197 Patients	5 (2.53%)	143 (72.58%)	46 (23.35%)	3 (1.54%)

TABLE 1- Showing Age Group Distribution of Pregnant Patients with HCV

Residential Area	Rural	URBAN
197 Patients	145 (73.60%)	52 (26.40%)

TABLE 2- Showing Geographical Distribution of Pregnant Patients with HCV

Total Patients	Term Delivery	Premature Delivery	Miscarriage	Death of Newborn
200	192	5	3	Nil

TABLE 3- Showing Distribution Pattern of Deliveries and Miscarriage of HCV Patients

Total Deliveries	Government Hospital	Private Hospital	Home Delivery
197	150 (Normal-118, C.S.-32)	47 (Normal-28, C.S.-19)	Nil

TABLE 4- Showing Distribution Pattern of Deliveries on Basis of Place of Delivery

Total Number of Patients	On Anti-viral Treatment	Not on Anti-viral Treatment
197 Patients	0 (0%)	197 (100%)

TABLE 5- Showing Distribution of HCV Pregnant Patients on Antiviral Treatment for HCV

Total Newborns Who attained 18 months of Age	Breast Fed	Anti HCV antibody test Positive	HCV RNA Quantitative test Positive
100	**100 (100%)**	**5 (5%)**	**5 (5 %)**

TABLE 6- Showing Vertical Transmission in HCV and Breastfeeding Pattern in Newborn

Patients with Vertical Transmission	HCV RNA Quantitative level	HCV/HIV Co-infection	Caesarean Section	Age Group (20-30yrs)
5	$10^5 – 10^7$ IU/ml with mean of 10^6	0 (0%)	3 (60%)	5 (100%)

TABLE 7- Showing Viral load, Co-infection and Delivery mode in Vertical Transmission Group

V. Discussion

Hepatitis C infection is a leading cause of liver diseases such as cirrhosis and hepatocellular carcinoma. It is a significant cause of morbidity and mortality worldwide, with approximately 71 million people infected, 3.26 million of them being children **[8-9]**. Hepatitis C virus (HCV) can be transmitted vertically from mother to child during the pregnancy or birth **[10-11]**. Viral transmission was not influenced by mother's age, mode of delivery, genotype or type of feeding **[12]**. In our study group the five pregnant females who had vertical transmission were young, between 20-30 yrs of age group. Out of these 5, 3 (60%) underwent caesarean section which reinforces the fact that caesarean section cannot be solely recommended for preventing vertical transmission of HCV and it should be performed only for obstetrical indications. Perinatal risk factors associated with vertical transmission included duration of membrane rupture and internal fetal monitoring **[13]**. In literature, HCV vertical transmission rates have been reported on basis of infection status assessed at different ages, with no consensus on how to take account of spontaneous clearance. We tested our newborns at 18 months of age with anti HCV antibody and HCV RNA Quantitative test for determining vertical transmission. This time period is universally accepted, so that body gets enough period for self-clearance of virus. The most recent meta-analysis of VT rates **[2]** reports 5.8% VT in HIV-negative women and 10.8% in HCV/HIV co-infected pregnant women. Our study is also in alignment with the same, as vertical transmission was 5% and all were Monoinfected with HCV. More recent European cohort studies including HIV/HCV-coinfected women with a high coverage of antiretroviral therapy suggest substantially lower HCV VT rates, in the range of 2.8%–5.9% **[14–16]**. Transmission correlated with the magnitude of maternal HCV RNA, with no transmission observed when the viral load was <3.5 log10 IU/mL and rising to 11% with viral loads >6 log10 IU/mL **[17]**. Our study also re-affirms the above fact, as in our group also all the five females who had vertical transmission were having high viral load, which ranged from $10^5 – 10^7$ IU/ml with mean of $10^{6.}$ Historically, it was thought that vertical transmission occurs at or near the time of delivery; however, recent data suggest that transmission may occur between 25 and 36 weeks of gestation **[18]**. In addition to vertical transmission, maternal HCV infection is associated with adverse obstetric and neonatal outcomes including preterm labor, preterm delivery, low birth weight/small for gestational age, and neonatal intensive care unit admission **[17]**. Our study also showed that three patients had miscarriage and five had pre-term delivery.

Limitation Of Study

The limitation of study is that data pertains to small sample size of 100 newborns only, thus large-scale study is required for verifying the results of our study, regarding vertical transmission of HCV.

Conflict Of Interest

The authors declare that there was no conflict of interest and no financial aid was taken for the same.

VI. Conclusion

Our study has re-confirmed the findings available in literature regarding approximately 5% of vertical transmission in Monoinfected HCV patients which especially occurs in prescence of high HCV viral load and caesarean section cannot be recommended for preventing vertical transmission. The characteristic fact which appeared was that all pregnant patients who showed vertical transmission were young which is further area of research.

Bibliography

[1] World Health Organization. Combating Hepatitis B And C To Reach Elimination By 2030. Geneva, Switzerland: WHO, 2016.
[2] Benova L, Mohamoud YA, Calvert C, Abu-Raddad LJ. Vertical Transmission Of Hepatitis C Virus: Systematic Review And Meta-Analysis. Clin Infect Dis 2014; 59: 765–73.

[3] Ghany MG, Morgan TR; Panel A-IHCG. Hepatitis C Guidance 2019 Update: American Association For The Study Of Liver Diseases–Infectious Diseases. Society Of America Recommendations For Testing, Managing, And Treating Hepatitis C Virus Infection. Hepatology 2020; 71:686–721.

[4] Tovo PA, Calitri C, Scolfaro C, Gabiano C, Garazzino S. Vertically Acquired Hepatitis C Virus Infection: Correlates Of Transmission And Disease Progression. World J Gastroenterol 2016; 22:1382–92.

[5] Ades AE, Gordon F, Scott K, Et Al. Spontaneous Clearance Of Vertically-Acquired Hepatitis C Infection: Implications For Testing And Treatment. Clin Infect Dis 2023; 76:913–9.

[6] Ceci O, Margiotta M, Marello F, Et Al. High Rate Of Spontaneous Viral Clearance In A Cohort Of Vertically Infected Hepatitis C Virus Infants: What Lies Behind? J Hepatol 2001; 35:687–8.

[7] Shebl FM, El-Kamary SS, Saleh DA, Et Al. Prospective Cohort Study Of Mother-To-Infant Infection And Clearance Of Hepatitis C In Rural Egyptian Villages. J Med Virol 2009; 81:1024–31.

[8] Epstein RL, Espinosa C. Hepatitis C Virus In Neonates And Infants. Clin Perinatol. 2021; 48:343–57.

[9] World Health Organization. Global Hepatitis Report 2017. Geneva: World Health Organization; 2017.

[10] Chigbu DI, Loonawat R, Sehgal M, Patel D, Jain P. Hepatitis C Virus Infection: Host¯Virus Interaction And Mechanisms Of Viral Persistence. Cells. 2019;8: E376.

[11] Chen SL, Morgan TR. The Natural History Of Hepatitis C Virus (HCV) Infection. Int J Med Sci. 2006; 3:47–52.

[12] Syriopoulou V, Nikolopoulou G, Daikos GL, Theodoridou M, Pavlopoulou I, Nicolaidou P, Et Al. Mother To Child Transmission Of Hepatitis C Virus: Rate Of Infection And Risk Factors. Scand J Infect Dis. 2005; 37:350–3.

[13] Mast EE, Hwang L-Y, Seto DSY, Nolte FS, Nainan OV, Wurtzel H, Et Al. Risk Factors For Perinatal Transmission Of Hepatitis C Virus (HCV) And The Natural History Of HCV Infection Acquired In Infancy. J Infect Dis. 2005; 192:1880–9.

[14] Aebi-Popp K, Duppenthaler A, Rauch A, De Gottardi A, Kahlert C. Vertical Transmission Of Hepatitis C: Towards Universal Antenatal Screening In The Era Of New Direct Acting Antivirals (Daas)? Short Review And Analysis Of The Situation In Switzerland. J Virus Erad 2016; 2:52–4.

[15] Benhammou V, Tubiana R, Matheron S, Et Al. HBV Or HCV Coinfection In HIV-1-Infected Pregnant Women In France: Prevalence And Pregnancy Outcomes. J Acquir Immune Defic Syndr 2018; 77:439–50.

[16] Snijdewind IJ, Smit C, Schutten M, Et Al. Low Mother-To-Child-Transmission Rate Of Hepatitis C Virus In C ART Treated HIV-1 Infected Mothers. J Clin Virol 2015; 68:11–5.

[17] Kushner T, Djerboua M, Biondi MJ, Feld JJ, Terrault N, Flemming JA. Influence Of Hepatitis C Viral Parameters On Pregnancy Complications And Risk Of Mother-To-Child Transmission. J Hepatol 2022; 77:1256–64.

[18] Fauteux-Daniel S, Larouche A, Calderon V, Et Al. Vertical Transmission Of Hepatitis C Virus: Variable Transmission Bottleneck And Evidence Of Mid Gestation In Utero Infection. J Virol 2017; 91: E01372-17.