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Hepatitis C Virus Infection in Pregnant Women and its Vertical Transmission in Jeddah, Saudi Arabia

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Abstract. The aim of this study was to evaluate the prevalence of Hepatitis C virus (HCV) infection among pregnant women and the possibility of its transmission through the vertical route and through breast-feeding. Blood samples were collected from 300 pregnant women at the perinatal period and at delivery from the cord blood of their newborns, and from other 300 randomly selected breast-fed infants. Serum transaminases, anti-HCV Ab and HCV-RNA by PCR for only those with positive anti- HCV Ab were investigated. Results revealed that 9 (3%) mothers were positive for anti-HCV Ab and 8 (2.7%) were positive for HCV-RNA (viral load was below 5,000 copies / ml). However, only 5 newborns of HCV-RNA positive mothers showed positive results in (1.6%) for anti- HCV Ab, while all of them were negative by HCV-RNA. Meanwhile, all of the breast-fed infants were negative for anti- HCV Ab. Thus, this study could not reveal HCV transmission from mother to infant during the period of observation, yet a vertical transmission of HCV Ab was noticed. It is felt that it is not necessary to advise against breast-feeding prevention by mothers with HCV infection as long as there is no nipple cracking or bleeding.

Keywords: Hepatitis C Virus (HCV), Vertical transmission, Saudi Arabia.

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Introduction

Hepatitis C virus (HCV) infection is widely distributed throughout the world. Its prevalence in Western European and North American populations varies from 0.1-2%, increasing to 3% in some Mediterranean countries and up to 6% in tropical areas. Chronic HCV infection is especially prevalent in southern Italy, Spain, Central Europe, Japan and the United States, whose carriers total almost 4 million, as well as in Egypt where they represent about 20% of blood donors[1-3]. In a community-based study involving 4,496 Saudi children aged from 1-10 years old, it has been found that anti-HCV antibodies (anti-HCV Ab) positivity varied from 0.0% in the Eastern province to 1.9% in the Southern province, with an overall prevalence of 0.9% in the Kingdom without significant difference in prevalence rates among males (0.9%) and females (0.8%)[3]. However, another study in Gizan showed anti-HCV Ab positivity had increased with age, reaching 3.5% in people over 50-years of age[4].

The mode of transmission of HCV infection is unknown in 40% of infected patients[1]. Reports have indicated that approximately 45% of HCV cases had no obvious risk factors, including parental exposure; leaving unanswered question of virus transmission via - as yet - unidentified routes of exposure, wherein several reports have implicated other routes for HCV infection, such as vertical transmission[5-8], sexual contact and breast-feeding[1,9-11]. Surveillance studies have established that transfusion of contaminated blood has never accounted for more than a minority of cases of HCV infection, and they have reported that specific predictors of vertical HCV infection have not yet been identified[12,13]. The purpose of this work was to estimate the prevalence of HCV infection and anti-HCV Ab in pregnant women, newborns, and breast-fed infants in Jeddah, Saudi Arabia to recognize the prevalence of vertical transmission of HCV infection and anti-HCV Ab and to report any possibility of HCV transmission through breast-feeding.

Subjects and Methods

The study was carried out on 300 pregnant women who were seeking medical advice in different maternity and children's hospitals in Jeddah, Saudi Arabia. Blood samples were collected from them at the perinatal period and at delivery from the cord blood of their newborns and were also collected from 300 randomly selected breast-fed infants, aged 10-12

months (excluding those with a past history of surgery or blood transfusion). Data were collected about age, residence, nationality, type of delivery (vaginal or cesarean section), history of jaundice, diabetes, surgical operations, blood transfusions, drug abuse, and history of breast-feeding and of HCV infection. All blood samples were investigated for serum transaminases[14], and serum anti-HCV Ab by using third generation Biomedical Products Co. enzyme immunoassay[15] and serum HCV-RNA by polymerase chain reaction (PCR) for only those proved to have anti-HCV Ab by using AMPLICOR kit (Roche Diagnostics, Branchburg, USA)[16].

Results

Table 1 shows that the mothers' mean age at the perinatal period was 20.20 ± 4.11. The prevalence of anti-HCV Ab positive mothers was 9/300 (3.0%) and it was positive in 8/300 (2.7%) for HCV-RNA by PCR with mild viral load (less than 5,000 copies/ml). Table 2 shows that all newborns 8 (2.7%) of HCV-RNA positive mothers, were HCV-RNA negative, while 5 (62.5%) of them were anti-HCV Ab positive. Table 3 shows that all breast-fed infants (300) were anti-HCV Ab negative, while 4/300 (1.3%) of their mothers were HCV-RNA positive.

Table 1. Demographic, medical, and laboratory characteristics of the studied mothers.

Characteristics	Studied Mothers (n = 300)
Demographical	
Mean Age (X±S)	20.20 ±4.11
Residence	
- Urban	270 (90.0%)
- Rural	30 (10.0%)
Nationality	
- Saudis	255 (85.0%)
- Non-Saudis (mostly Egyptians)	45 (15.0%)
Medical	
Jaundice	12 (4.0%)
Diabetes	30 (10.0%)
Surgical operations:	54 (18.0%)
Blood transfusion	1 (0.3%)
Laboratory	
Abnormal transaminases	11 (3.7%)
Positive anti-HCV Ab (ELISA)	9 (3.0%)
Positive HCV-RNA (PCR)*	8 (2.7%)

*All have low viral load (less than 5000 copies/ml).

All of the studied mothers had a negative history of drug abuse.

Table 2. Delivery and laboratory characteristics of newborns to HCV-RNA positive mothers.

Characteristics	Newborns to HCV-RNA +ve Mothers (n=8)
Type of Delivery	
Vaginal	6 (75.0%)
Elective Cesarean Section	2 (25.0%)
Laboratory	
Abnormal Transaminases	0 (0.0%)
Anti-HCV Ab positive (ELISA)	5 (62.5%)
HCV-RNA positive (PCR)	0 (0.0%)

None of the studied newborns had abnormal serum transaminases or were HCV-RNA positive.

Table 3. Demographic, medical, and laboratory characteristics of the studied infants.

Characteristics	Studied Infants (n=300)
Demographical	
Sex	
Male	144 (48.0%)
Female	156 (52.0%)
Residence	
Urban	260 (86.7%)
Rural	40 (13.3%)
Nationality	
Saudi	270 (90.7%)
Non-Saudi	30 (10.0%)
Medical	
HCV infection of their mothers by history	4 (1.3%)
History of jaundice (physiological)	30 (10.0%)
Laboratory	
Abnormal Transaminases	9 (3.0%)
Anti HCV Ab positive (ELISA)*	0 (0.0 %)

*Anti-HCV Ab was not detected.

Discussion

Approximately 200 million people worldwide are chronically infected with HCV[1]. Chronic HCV infection may lead to liver cirrhosis and hepatocellular carcinoma; thereby, it represents a global problem in terms of both medical and socioeconomic aspects[1,2,17]. In this study, the prevalence rate of anti-HCV Ab (ELISA) and HCV-RNA (PCR) in pregnant women was 9 (3.0%) of 300 and 8 (2.7%) of 300, respectively. It has been found that the occurrence of anti-HCV Ab in Saudi pregnant women in general ranged from 1% to 1.17%[18,19]. However, it was 0.8%

in pregnant Mexican women[20]. Other studies have reported that the prevalence rate of anti-HCV Ab and HCV-RNA in pregnant Italian women was 1.15% and 0.7%, respectively[21], while in Greece it was 1.95% and 0.87%, respectively[22]. The present study shows a higher frequency rate than that of the other studies; a finding which may be attributed to the fact that this study included pregnant women [45 (15%) of 300] of other nationalities (mostly Egyptians) as shown in Table 1, who are known to have a higher prevalence of HCV infection as reported by Murray *et al.*[2]. They have recorded that almost 20% of Egyptian blood donors were HCV positive, while Abdel-Hamid *et al.*[23] has found that the prevalence rate for anti-HCV Ab and HCV-RNA in pregnant Egyptian women were 16% and 10.7%, respectively. In this study, no obstetric complications were noticed in the pregnant women carrying HCV-RNA or anti-HCV Ab. A similar finding was reported by other authors who cited that HCV infection did not increase the risk of obstetric complications and it did not influence the fetal-neonatal status at delivery. Furthermore, these authors have found no significant differences in birth weights, Apgar scores, or obstetric complications in neonates of mothers with positive anti-HCV Ab or HCV-RNA[21,24].

Several studies have indicated HCV transmission from mother to newborn at rates of 5 – 8.6%[5-8]. In the present study, anti-HCV Ab was detected in 5 (62.5%) of 8 newborns who were born to mothers having HCV-RNA, with mild viral load (less than 5,000 copies/ml), yet all these newborns were HCV-RNA negative (Table 2). In Mexico[20], anti-HCV Ab was detected in 0.5% of newborns who were delivered to mothers who had anti-HCV Ab. However, other authors[25] have found a very low risk of HCV vertical transmission in infants born to HCV viraemic mothers, and they added that the high maternal viral load (more than 5,000 copies/ml) was predictive in vertical transmission. Out of 8 HCV-RNA positive pregnant women, 6 delivered vaginally; their newborns showed 5 (75%) anti-HCV Ab positive, while the other 2 newborns (25%) who were delivered by elective cesarean section were anti-HCV Ab negative, yet all of them were HCV-RNA negative. Similar findings were ascertained by other authors who agreed with the explanation of Ranger-Rogez *et al.*[26] who proved that the risk of vertical transmission was elevated if the duration between membrane rupture and delivery was long. Such duration is very short during elective cesarean section. Gibb

et al.[27] mentioned that in a study of 441 HCV infected pregnant women in the United Kingdom, there were no cases of neonatal HCV infection following elective cesarean delivery in 31 of the patients. Okamoto *et al.*[5] reported that in 18 mothers with a high viral load, vaginal delivery resulted in a vertical transmission rate of 44% while those that underwent cesarean section did not transmit HCV to their neonates. In contrast, other authors have found no evidence of a protective effect of cesarean section and they have reported that HCV transmission was not influenced by the mode of delivery[6,7].

This study has shown that all 300 breast-fed infants, aged 10-12 months were anti-HCV Ab negative. This means that infants who had carried anti-HCV Ab had lost their anti-HCV Ab before the age of 10-12 months. Similar findings were obtained by other authors[8,22] who proved that anti-HCV Ab had disappeared between 2-7 months. However, in Italy it had been demonstrated that infants born to HCV-RNA positive mothers had lost their anti-HCV Ab after 12 months[25]. History has shown that of the anti-HCV Ab negative 300 infants, 4 of their mothers (1.3%) were HCV-RNA positive, and all of them had breast-fed their infants for at least 3 months. This suggests that breast-feeding may have no role in the transmission of HCV infection to infants. Many studies, such as those done by Zanetti *et al.*[28] have found no association between breast-feeding, HCV-RNA positive mothers and HCV transmission to their infants. In addition, in the year 2000, the American College of Obstetricians and Gynecologists (ACOG) did not prohibit breast-feeding to infants of HCV-RNA positive mothers[29]. On the contrary, other studies have mentioned that breast-feeding could transmit HCV infection and they have reported HCV-RNA in colostrum[11,30]. However, other authors[26,31] have not advised breast-feeding of mothers having HCV-RNA positive, but they have noticed that breast-feeding might transmit HCV infection if the mother's nipples were cracked and bled. Consequently, elective cesarean section of pregnant mothers who proved to be HCV-RNA positive is recommended (to minimize the duration elapsed between membrane rupture and delivery), and it is not necessary to prohibit breast-feeding from mothers having HCV-RNA as long as there is no nipple cracking or bleeding.

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عدوى الالتهاب الكبدي الفيروسي ج في الحوامل وانتقاله الرأسي بجدة بالمملكة العربية السعودية

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المستخلص: هدف هذا البحث معرفة نسبة الإصابة بالالتهاب الكبدي الفيروسي ج في الحوامل والمواليد والرضع ومعرفة إمكانية انتقاله من الأم إلى المولود أو الرضيع أثناء الولادة أو الإرضاع .

تم جمع العينات من أقسام الولادة والأطفال ببعض المستشفيات بجدة بسحب عينات دم من ٣٠٠ حامل ومن الحبل السري لمواليدهن قبل وبعد الولادة على التوالي وكذلك عشوائياً من ٣٠٠ رضيع ثدي. أجريت التحاليل اللازمة للحوامل والمواليد والرضع وهي إنزيمات الكبد والأجسام المضادة لفيروس ج والكشف عنه باختبار تفاعل البلمرة المتسلسل (PCR)، وذلك فقط للحالات الإيجابية للأجسام المضادة للفيروس. أسفرت النتائج عن وجود الأجسام المضادة للفيروس في ٣٪ من الأمهات، أما الفيروس فقد وجد فيهن بنسبة ٢,٧٪ باختبار PCR (الحمل الفيروسي أقل من ٥,٠٠٠ نسخة/ملل)، وبالنسبة لمواليد الأمهات اللواتي يحملن الفيروس فقد اكتشفت فيهن الأجسام المضادة للفيروس بنسبة ١,٦٪ ولم تكتشف هذه الأجسام المضادة في الرضع، علماً بأن الفيروس لم يكتشف في المواليد أو الرضع، مما يعني أنه لا يوجد ارتباط وثيق بين العدوى الرأسية للفيروس وانتقاله من الأم إلى المولود، أو الرضيع، وأن الانتقال الرأسي للأجسام المضادة إلى المواليد يعتبر نوعاً من المناعة الطبيعة للمواليد. لذا لا ينصح بعدم رضاعة الثدي طالما أنه لا يوجد بحلمته تشققات أو دم.