ORIGINAL ARTICLE

The Prevalence of Hepatitis C Virus Infection Among Pregnant Women in Egypt

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Abstract

Background: ***Viral hepatitis is a significant global public health challenge, with approximately 160 million individuals infected with the hepatitis C virus (HCV) worldwide.***

Aim: ***To assess the occurrence of hepatitis C virus infection among pregnant females attending the antenatal care clinic at Bab El-Shaariya University Hospital.***

Patients and Methods: ***This cross-sectional study was conducted at Bab El-Shaariya Hospital on 1200 pregnant females of varying gestational ages attending the antenatal healthcare units for regular monitoring from June 2023 to June 2024.***

Results: ***Among the participants, 7% tested positive for HCV-Ab, of whom 43% were confirmed positive by PCR testing. Educational level was associated with PCR-confirmed HCV infection: 50% of the PCR-positive group were non-educated, compared to 23% of the PCR-negative group. Other educational distributions among the PCR-positive group were Primary (8.4%), Middle (8.4%), Secondary (27.7%), and University (5.5%). For the PCR-negative group, the distribution was Primary (6.3%), Middle (20.8%), Secondary (29.1%), and University (20.8%).***

Conclusion: ***The occurrence of HCV among pregnant females in this study was 7%, based on HCV-Ab testing, with 43% confirmed by PCR. Risk factors for transmission, including occupation, age, and dental procedures, were associated with HCV-Ab positivity. PCR-confirmed HCV infection was significantly more common among women with lower educational levels.***

Keywords: Pregnant women; HCV; Prevalence

1. Introduction

Viral hepatitis is a major public health issue on a global scale. Approximately 160 million individuals worldwide are infected with the hepatitis C virus, which is equivalent to three percent of the global population.[1]

Despite the fact that the occurrence of hepatitis C virus infection in pregnant females varies considerably among investigations, with estimates ranging from 0.1 to 4.5 percent worldwide, the estimated occurrence in Egypt is approximately 15.8 percent.[2]

The clinical course of chronic or acute hepatitis C is not influenced by pregnancy, despite the fact that multiple investigations have demonstrated an enhancement in biochemical markers of liver injury in hepatitis C virus-positive females throughout gestation.[3]

The possibility of hepatitis C virus transmission from mother to baby varies between three and ten percent. Nevertheless, the timing and mechanism of hepatitis C virus transmission from mother to baby are still largely unknown. [4]

The primary cause of pediatric chronic hepatitis C virus infection is the vertical transmission of the hepatitis C virus from mother to baby, which happens in three to ten percent of pregnancies complicated by maternal hepatitis C virus infection. It seems that the possibility of vertical transmission of the hepatitis C virus is correlated with the viremia level in the pregnant mother, rather than the infection route.[5]

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The primary objective of the prevention and control of hepatitis C virus infection is the eradication of the virus in pregnant females as well as females of childbearing age. The demand for hepatitis C virus screening and PMTCT interventions will increase as a result of the increased awareness of the risks associated with hepatitis C virus infection throughout pregnancy.[6]

The goal of this investigation was to evaluate the occurrence of hepatitis C virus infection among pregnant females who attended the antenatal care clinic at Bab EL– Shaariya University Hospital.

2. Patients and methods

This was a cross sectional investigation that has been carried out at Bab EL –Shaariya hospital on 1200 Pregnant females visiting the antenatal healthcare units in the selected hospital for regular follow-up at a period extending from June 2023 to June 2024.

Inclusion Criteria: Pregnant females visiting the antenatal healthcare units in Bab El-Shaariya hospital for follow-up, Age: 20:35 yrs and viable intrauterine pregnancy proved by U/S.

Exclusion Criteria: Known to be hepatitis C virus infected, history of chronic liver disease, and Concomitant infection by HBV or HIV.

Ethical Considerations: The investigation protocol received ethical approval from the Research Ethics Committee, Faculty of Medicine, Al-Azhar University, Cairo. Informed consent has been acquired from every cases participating in the investigation before the start.

Methods

All patients were subjected to the following:

Full history taking (age, potential risk factors medical history, such as dental procedures, blood transfusions, tattoos, intravenous medications, and invasive procedures) hepatitis C virus +ve husband, family history, clinical examination, laboratory investigations, contact with a jaundiced case, contact with a diagnosed HCV or HBV case, and clinical examination: Liver and kidney functions, as well as a complete blood count, Total and direct bilirubin and HCV-Ab utilizing a 3rd generation ELISA test: HCV-Ab: A five milliliter blood sample has been obtained by utilizing universal sterile precautions. The sera have been separated and preserved at -20 degrees Celsius. The outcomes of the investigation have been communicated to all participants. Only those who were +ve for hepatitis C virus Ab have been invited to submit blood samples for the subsequent test: PCR test (real-time cobas ampliprep cobas Taqman).

Statistical Analysis: The information has been gathered, revised, coded, and entered into a personal computer. SPSS (Statistical Package for Social Science) program version 20 has been utilized to conduct statistical analysis using the appropriate statistical tests.

3. Results

Age (years) in the study population varied from 20 to 36 with mean ± SD = 27.09 ± 2.77. (Table 1)

Table 1. Baseline characteristics among the study population

	STUDY POPULATION (N = 1200)
AGE (YEARS)	
MEAN ± SD.	27.09 ± 2.77
MEDIAN (IQR)	27 (25 - 29)
RANGE (MIN-MAX)	16 (20 - 36)

SD: standard deviation, IQR: interquartile range

HCV-Ab test results among the study population. Number of participants with positive HCV-Ab test in the study population was 84 (7%). (Table 2)

Table 2. HCV-Ab test results among the study population

	STUDY POPULATION (N = 1200)	
	n	%
HCV-AB TEST RESULTS		
- POSITIVE		
N (%)	84	7%
- NEGATIVE		
N (%)	1116	93%

PCR test results among the positive HCV-Ab test population. Number of participants with positive PCR test among the positive HCV-Ab test population was 36 (43%). (Table 3)

Table 3. PCR test results among the positive HCV-Ab test population

	POSITIVE HCV-AB TEST POPULATION (N = 84)	
	n	%
PCR TEST RESULTS		
- POSITIVE		
N (%)	36	43%
- NEGATIVE		
N (%)	48	57%

Dental maneuvers among HCV-Ab test groups. Regarding Dental maneuvers, a significant distinction has been observed among both examined groups (p= 0.049). (Table 4)

Table 4. Dental maneuvers among HCV-Ab test groups

	POSITIVE HCV-AB TEST GROUP (N = 84)		NEGATIVE HCV-AB TEST GROUP (N = 1116)		TEST OF SIG.	P
	n	%	n	%		
DENTAL MANEUVERS					X2 = 3.878	0.049
- YES						
N (%)	53	63%	580	52%		
- NO						
N (%)	31	37%	536	48%		

The education level distribution among PCR test groups, with " non-educated " forming the largest

proportion in the Positive PCR test group (50%) compared to 23% in the Negative PCR test group. Other levels in the Positive group include Primary (8.4%), Middle (8.4%), secondary (27.7%) and University (5.5%). In the Negative PCR group, the distribution is Primary (6.3%), Middle (20.8%), secondary (29.1%) and University (20.8%). Statistical test (p = 0.04) suggesting a potential association between educational attainment and PCR test. (Table 5)

Table 5. Education level among PCR test groups

EDUCATION LEVEL	POSITIVE PCR TEST GROUP (N = 36)	%	NEGATIVE PCR TEST GROUP (N = 48)	%	TEST OF SIG.	P
NON-EDUCATED	18	50%	11	23%	χ^2 = 9.94	0.04
PRIMARY	3	8.4%	3	6.3%		
MIDDLE	3	8.4%	10	20.8%		
SECONDARY	10	27.7%	14	29.1%		
UNIVERSITY	2	5.5%	10	20.8%		

IV drug abuse among HCV-Ab test groups. Regarding IV drug use, an insignificant distinction has been observed among both examined groups (p= 0.198). (Table 6)

Table 6. IV drug abuse among HCV-Ab test groups

	POSITIVE HCV-AB TEST GROUP (N = 84)		NEGATIVE HCV-AB TEST GROUP (N = 1116)		TEST OF SIG.	P
	n	%	n	%		
IV DRUG ABUSE					X2 = 1.656	0.198
- YES						
N (%)	29	35%	312	28%		
- NO						
N (%)	55	65%	804	72%		

The distribution of surgical operations among HCV-Ab test groups, with the Positive HCV-Ab group showing a significantly higher percentage (58%) of individuals with a history of surgical procedures compared to the Negative group (37%). Specific types of procedures with notable representation in the Positive group include Perineal Stitches (29.8%), Tattoos (17.9%), and Chinese Acupuncture (8.3%). (Table 7)

Table 7. Surgical operation among HCV-Ab test groups

SURGICAL OPERATION	POSITIVE HCV-AB TEST GROUP (N = 84)	%	NEGATIVE HCV-AB TEST GROUP (N = 1116)	%	TEST OF SIG.	P
YES	49	58%	418	37%	χ^2 = 14.199	0.027
- UMBILICAL RINGS	4	4.80%	5	0.40%		
- NOSE RINGS	5	6.00%	13	1.20%		
- EAR RINGS	5	6.00%	13	1.20%		
- TATTOOS	15	17.90%	75	6.70%		
- FEMALE CIRCUMCISION	3	3.60%	6	0.50%		
- PERINEAL STITCHES	25	29.80%	189	16.90%		
- CHINESE ACUPUNCTURE	7	8.30%	37	3.30%		
NO	35	42%	698	63%		

The types of previous pregnancies (Cesarean vs. Normal delivery) between PCR test groups, highlighting a statistically significant distinction (p = 0.040). In the Positive PCR test group, 66.7% reported having a Cesarean section, compared to 41.7% in the Negative group, while Normal delivery was more frequent in the Negative PCR group (58.3%) compared to the Positive group (33.3%). (Table 8)

Table 8. Comparison of Previous Pregnancies (Cesarean vs. Normal Delivery) among PCR Test Groups

PREVIOUS PREGNANCY TYPE	POSITIVE PCR TEST GROUP (N = 36)	%	NEGATIVE PCR TEST GROUP (N = 48)	%	TEST OF SIG.	P
CESAREAN SECTION (CS)	24	66.7%	20	41.7%	χ^2 = 4.200	0.04
NORMAL DELIVERY	12	33.3%	28	58.3%		

4. Discussion

The most significant sector of the population in any given country is pregnant women, who must be screened for all preventable and non-preventable illnesses that have an impact on the well-being of both the mother and the infant. Hepatitis C virus infection is one of these illnesses that may result in a variety of chronic diseases like cirrhosis, chronic active hepatitis, and hepatocellular carcinoma. Hepatitis C virus has been identified as an important etiology of non-A, non-B hepatitis that is transmitted parenterally.[7]

The main results of this study were as follows:

The present study enrolled 1200 pregnant women with age varied from 20 to 36 with mean ± SD = 27.09 ± 2.77.

The comparison between patients with positive and negative HCV-Ab test showed that the cases with positive HCV-Ab test were significantly older than those with negative HCV-Ab test.

However, according to PCR test results, the comparison between patients with positive and negative PCR test results showed that a statistically insignificant distinction regarding age was observed among the examined groups.

In agreement with the present investigation, Khamis et al.,[8] enrolled 360 Egyptian pregnant women; a total of 6.1 percent (22/360) of pregnant females were hepatitis C virus seropositive. Of them 9/22 have positive PCR test. The study showed that the women with positive HCV-ab were significantly older than those with negative result. While there was a statistically insignificant distinction among the negative and positive PCR groups as regard age.

Also, Edessy et al.,[9] assessed 3000 pregnant women from upper Egypt, and revealed that 44 (1. 46%) showed HCV positive antibodies, which was lower than our results, and this may be due to the reduced rate of antenatal care in upper Egypt. In agreement with our results, the study

showed that patients with HCV-positive antibodies were significantly older than those with negative results. There was a statistically insignificant distinction between the negative and positive PCR groups with regard to age.

The present study showed that there were 633 (53%) in the study population have dental maneuvers. The investigation also demonstrated that the positive HCV-ab group have significantly higher prevalence of dental maneuvers compared to negative group. But there was no significant relationship between PCR test results with dental maneuvers.

Agreeing with the current study, Khamis et al.,[8] showed that there was an insignificant distinction between negative and positive PCR tests regarding dental maneuvers. However, in contrast to our results, the study also demonstrated that there was an insignificant distinction between negative and positive HCV-ab results with regard to dental maneuvers. The disagreement may be because of the difference in sample size. The investigation also showed that the percentage of hepatitis C virus +ve females whose husbands underwent dental procedures was greater than that of those who denied a similar history; however, it didn't reach a statistically significant level (P-value equals 0.067).

The current study showed that 341 (28%) of the study population had a history of intravenous drug use.

In this study, we also revealed that an insignificant association has been observed between intravenous drug use and HCV positivity assessed by HCV-ab or PCT tests.

Agreeing with the current investigation, Khamis et al.,[8] showed that an insignificant association has been observed between intravenous drug use and HCV infection.

In the current study there were 449 (37.42%) of the study population have history of surgical operation.

Agreeing with the current investigation Khamis et al.,[8] showed that an insignificant association has been observed among history of surgical operation and hepatitis C virus infection.

In our investigation, we found that regarding hepatitis C virus Ab test results among the study population, the number of participants with positive HCV-Ab test results was 84 (7%).

Agreeing with our outcomes, El-Kamary et al.,[10] who aimed to detect the reliability of risk-based vs. universal hepatitis C virus screening for pregnant females in Egypt, a country with the highest hepatitis C virus occurrence globally, also relied on risk-based screening. Their objective was to identify additional characteristics that might elevate the reliability of risk-based screening. They found that the number of participants who were hepatitis C virus antibody positive in the study population was 104 (8.32%).

Additionally, Abdelkader et al.,[11] who aimed to detect the seroprevalence of hepatitis B virus and hepatitis C virus infection among pregnant females inin Sharkia governorate, Egypt. They discovered that ten cases had anti hepatitis C virus positivity with ELISA (sero prevalence of 1.7 percent).

In our study, according to PCR test results among the positive HCV-Ab test population, the number of participants with positive PCR test results was 36 (43%).

In consistent with our results, Khamis et al.,[8] they found that as regard the presence of hepatitis C virus viraemia as detected by real-time PCR, just twenty of twenty-two pregnant females who were HCV positive provided consent for this test. Viraemia was present in below fifty percent of the them (9/20; 45 percent).

This variation in incidence of hepatitis C virus infection may be attributed to distinctions in the administration of intravenous medications, exposure to blood transfusions, the efficacy of the diagnostic kits utilized, and the increased introduction of direct antiviral and mass hepatitis C virus management. In reality, Egypt is making a significant effort to eradicate the hepatitis C virus. The Egyptian Ministry of Health has implemented the largest mass screening program for the identification and management of the hepatitis C virus. This led to a reduction in the number of infected individuals and the hepatitis C virus reservoir within the community.

The present findings compared the types of previous pregnancies (Cesarean vs. Normal delivery) between PCR test groups, highlighting a statistically significant distinction ($p = 0.040$). In the Positive PCR test group, 66.7% reported having a Cesarean section, compared to 41.7% in the Negative group, while Normal delivery was more frequent in the Negative PCR group (58.3%) compared to the Positive group (33.3%).

Additionally, Conte et al. (12) aimed to assess the occurrence and natural course of chronic hepatitis C virus infection in 15,250 consecutive pregnant females, as well as determine the rate of hepatitis C virus vertical transmission. Stated that the modes of delivery among the anti-hepatitis C virus +ve females. In 259 cases, the delivery was vaginal (seventy-one percent), while in 106 cases, it was performed via Cesarean section (twenty-one percent). The corresponding figures for the anti-hepatitis C virus -ve females were eighty percent and twenty, respectively.

Limitations: The present investigation was limited by small sample size, being a single center

investigation and relatively short monitoring duration. Additional national based investigations are needed to confirm our outcomes and to identify more risk factors of hepatitis C virus transmission.

4. Conclusion

The occurrence of hepatitis C virus in pregnant women in the studied population was 7% according to the HCV-Ab test; of those were 43% confirmed by the PCR test. Risk factors for transmission suggest that there is an association among the age, occupation, and dental maneuvers of the examined females and the frequency of hepatitis C infection assessed by the HCV-ab test. Hepatitis C virus infection, confirmed by PCR test, was found more among those women with a lower educational level.

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