



Seroprevalence of Hepatitis C among Pregnant Women Attending Antenatal Care in Specialist Hospital Yola, Adamawa State Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aims: To determine the prevalence of Hepatitis C among pregnant women attending antenatal care in Specialist Hospital Yola.

Study Design: The prevalence of Hepatitis C was ascertained among pregnant women attending antenatal care in specialist hospital Yola, Adamawa State. Anti HcV antibody in the serum of the pregnant women was detected using a sandwich rapid diagnostic chromatographic test strip. Questioner was used to obtain the demographic data of the pregnant women.

Place and Duration of Study: The study was carried out at the Specialist Hospital Yola where the samples were collected. Samples were processed and the analysis carried out at Microbiology Laboratory of Modibbo Adama University Yola. The study was conducted in March to June of 2021.

Methodology: 251 consenting pregnant women of varying age and family background were enrolled in the study, where 15 were randomly selected using a systematic random sampling technique on each antenatal visit.

Results: The prevalence of HcV in this study was 5.18% and the highest prevalence was found among age group 21-25years with 1.59% and the lowest among the age group 36 and above with 0.39%. Base on type of family, HcV was found to be higher in those from monogamous families

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(3.59%). Hcv Prevalence was also found to be high among those women who fall in the group "others" which comprises of school dropped out and non-educated (1.59%). Participants with tribal marks, those no history of blood transfusion and intravenous drug abuse (IVDA) also showed high prevalence of the virus with percentage prevalence of 3.19%, 3.98% and 3.98% respectively. The study revealed that HCV infection is not significantly associated with age and family type (P value $> .05$) but significantly associated with educational status, possession of tribal mark/tattoo, history of blood transfusion, and drug abuse (P value $< .05$).

Conclusion: HCV prevalence is low among pregnant women attending Specialist Hospital in Yola, Adamawa state Nigeria for antenatal care. Also, the percentage prevalence observed worldwide is within the range of 1.0-8.0%. However, there are other local governments areas with a dense population that may produce a major difference with the result obtained in this study.

Keywords: Hepatitis C surface antigen; demographic data; seroprevalence; pregnant women; antenatal care; chromatographic test.

1. INTRODUCTION

Hepatitis C is a liver infection caused by hepatitis C virus (HcV); It is a spherical, enveloped, single stranded RNA virus belonging to the family Flaviviridae, genus Flavivirus. The disease, Hepatitis C, simply referred to as inflammation of the liver [1]. It has emerged as the most important cause of acute hepatitis and jaundice in pregnancy [2]. About 85% of infected individuals become chronic carriers of hepatitis C; in chronic cases, the infection can progress to liver cirrhosis and hepatocellular carcinoma [3]. HcV infection occurs among people of all ages, but the greatest incidence of new infection occurs in those who are in their twenties and thirties [4]. Alcohol worsens the outcome, possibly by increasing viral replication or by increasing the susceptibility of liver cells to further injury from HcV [5].

The vast majority of people infected with HcV are unaware of their infection and this may be due to the lack of clear sign and symptoms that will indicate the presence of the virus, and the viral hepatitis is the most common cause of hepatic dysfunction in pregnancy worldwide [6]. This makes the hepatitis C virus infection a silent epidemic in the population and adequate information on hepatitis C virus in pregnancy is lacking in the society. Pregnant women are at high risk of HcV infection; therefore, the knowledge of the prevalence of HcV is important in pregnancy because it will enable good policy making that will take care of mothers with active HcV, who have a greater chance of transmitting the virus to their neonates.

However, mother to child transmission of HcV is limited to women without detectable HcV RNA during pregnancy [7]. Although some women

without detectable HcV RNA can also have the chance of vertical transmission to their neonates due to fluctuation in the viral load in which the initial negative will later become positive in gestation [8]. Transmission of hepatitis C from HcV RNA positive mother to baby occurs in 3-6% [7]. Most cases occur as a result of perinatal transmission, usually during birth. Giving that most perinatal infections are silent with long term complications presenting later in adulthood, with increased morbidity, mortality, and significant financial burden on the society, there is need for accurate and early detection, prevention and control practices to reduce the risk of vertical transmission from infected mothers to their neonates. However, breast-feeding does not shown to be a route of maternal to infant transmission HcV infected mothers are encouraged to breast-feed if there are no other contraindications, such as HIV co-infection [9].

The center for disease control and prevention (CDC) suggests mothers should interrupt breast-feeding temporarily if there are bleeding or traumatized nipples which could increase infants' HcV exposure. This study was set to determine the prevalence of hepatitis C virus among pregnant women attending antenatal clinic at specialist hospital Jimeta, Yola Adamawa State and the findings are expected to preempt the review of obstetrics policies with respect to testing counseling and follow-up of pregnant women positive for HcV infections as well as their infants.

2. MATERIAL AND METHODS

2.1 Study Design

This study is a hospital based cross-sectional study carried out among pregnant women

attending antenatal clinics at specialist hospital Jimeta, Adamawa state.

2.2 Population of the Study

The population of this study consists of 251 consenting women of child bearing ages (15-36 and above), from different family background, education level, health history and life-style, who are at different gestation period of pregnancy and receiving the normal antenatal care at specialist hospital Yola during the study period.

2.3 Sample Size Determination

The sample size for this study was calculated based on the single sample size estimation as described by Naing et al. [10]. The value of P was taken as (0.206%) from the study conducted by Chinenye et al. [11] on Hepatitis C virus infection among pregnant women in Ibadan, Nigeria.

The simple formula that is used in calculating the sample size is giving by:

$$n = z^2 p (1-p) / d^2$$

Where

n=Sample size

Z =z Statistic for a level of confidence of 95% which is conventional z value =1.96

p =expected prevalence or proportion (p=0.206), and

d=precision (d=0.05),

Therefore, substituting these values in the formula above, we have:

$$\frac{(1.96)^2 \times 0.206(1-0.206)}{(0.05)^2} = 251$$

Hence, going by the formula at confidence level of 95% a sample size of 251 is required for the study.

2.4 Sample Collection

A total of 251 consenting pregnant women were enrolled in the study and 15 pregnant women were randomly selected using a systematic random sampling technique on each antenatal visit. The sampling interval as adopted by Joy et al. [12] was obtained using the formula;

$$N/n = K$$

Where, N is the total number of pregnant women received in the clinic in a day, n is the total number of samples required daily for the purpose of the study and K sampling intervals.

Therefore,

$$150/15 = 10$$

Hence, the first pregnant woman was randomly selected and then every 10th pregnant woman was selected for the study. The participating women information was collected using verbal interview by the health attendant on duty after informed consent and it is recorded. The information collected include the age, type of family (Monogamous/Polygamous), history of blood transfusion, presence of tribal mark/tattoo and history of parenteral drug abuse. The purpose and procedure of the study has been informed in a clear language to each of the participating pregnant woman before they are enrolled into the study.

2.5 Sample Processing

About 5ml of venous blood was collected aseptically via venipuncture and transferred in to a plain specimen bottle; the patient identification number on the specimen container was cross checked with that on the patient requisition form to ensure that the correct specimen was received. The sample was left on the bench for 2hours to clot and retract. Blood was then centrifuged at 2000rpm for 10minutes and serum was harvested and stored at -20⁰C for 15 days before use [13].

2.6 Determination of Anti-HcV

All samples collected from the participants were screened using a rapid diagnostic chromatographic test strip to qualitatively detect the present of HcV surface antigen in the serum of the pregnant women [14].

The test is base on antigen-antibody reaction, were the test strip is impregnated with antibody against HcV, the strip when dipped into the serum sample is allowed to take up the sample and then removed and laid to allow for the reaction to take place, the result is then read from the strip after 5 minutes.

2.7 Interpretation of Result

The result of the analysis was interpreted base on the presence or absence of colored lines on the test and control region on the test strip. In a positive test result, a red colored line appeared in both the test (T) and control (C) region. The test was recorded as negative when there is only one red line in the control region and no red line in the test region. However, the test was considered invalid test, when the red line failed to appear in the control region, but appear in the test region. This may occur as a result of possible errors that can occur during performing the test. Because the intensity of the red color in the test device depends on the concentration of HcV present in the specimen. Therefore, any shade of red color in the test and control region was considered positive.

2.8 Data Analysis

The data generated in this study was analyzed to determine the significant association between prevalence of Hcv and some parameters such as age, educational status, abuse of drugs, history of blood transfusion, and possession of tribal marks using Mac Chi – Square test at 95% level of significance. *P* value ≤ 0.05 was considered as statistically significant.

3. RESULTS

3.1 Prevalence of Hepatitis C Virus among Pregnant Women According Age Distribution

The prevalence of HCV in pregnant women according to the age distribution of the study

participants is presented in Table 1. The prevalence was found to be higher among age group 21-25years with 4(1.59%). However, the lowest prevalence in relation to the age distribution of the pregnant women was found among the age group 36 and above with 1(0.39%). The overall prevalence according to the age distribution of the study participants is 13(5.15%).

3.2 Prevalence of Hepatitis C Virus among Pregnant Women According to Type of Family

The prevalence of hepatitis C virus among pregnant women according to the type of family is shown in Table 2. Out of 251 tested pregnant women, 215(85.66%) have a monogamous type of family while 36(14.34%) live in polygamous family. 9(3.59%) of those from monogamous family were tested positive to anti-HcV antibody, whereas 206(82.07%) were negative. While those that are living polygamous families have prevalence of 4(1.59%).

3.3 Prevalence of Hepatitis C Virus based on the Educational Status of the Pregnant Women

Table 3 depicts the prevalence of HcV base on the educational status of the pregnant women. The educational status was classified in to primary, secondary, tertiary and others; the group others include school dropped out and non-educated. Those in the group others had the highest prevalence of 4(1.59%) while those with primary, secondary and tertiary level of education emerge with the lowest prevalence of 3(1.20%).

Table 1. Prevalence of hepatitis C virus in pregnant women according to age distribution

Age group (years)	Positive%	Negative %	Total %
15-20	2(0.80)	79(31.47)	81(32.27)
21-25	4(1.59)	85(33.87)	89(35.46)
26-30	3(1.20)	54(21.51)	57(22.71)
31-35	3(1.20)	15(5.98)	18(7.17)
36 and above	1(0.39)	5(1.99)	6(2.39)
Total	13(5.18)	238(94.82)	251(100)

$\chi^2 = 7.746$ $P = .10$

Table 2. Prevalence of hepatitis C virus among pregnant women based type of family

Type of Family	Positive %	Negative %	Total %
Monogamy	9(3.59)	206(82.07)	215(85.66)
Polygamy	4(1.59)	32(12.75)	36(14.34)
Total	13(5.18)	238(94.82)	251(100)

$\chi^2 = 3.011$ $P = .08$

Table 3. Prevalence of Hepatitis C Virus based on the Educational Status of the Pregnant Women

Educational Status	Positive %	Negative %	Total %
Primary	3(1.20)	53(21.12)	56(22.31)
Secondary	3(1.20)	122(48.60)	125(49.80)
Tertiary	3(1.20)	50(19.92)	53(21.12)
Others	4(1.59)	13(5.18)	17(6.77)
Total	13(5.18)	238(94.82)	251(100)

$\chi^2 = 13.651$

$P = .00$

Table 4. Prevalence of Hepatitis C virus among pregnant women according to tribal mark

Tribal Mark	Positive %	Negative %	Total %
YES	5(1.99)	24(9.56)	29(11.55)
NO	8(3.19)	214(85.26)	222(88.45)
Total	13(5.18)	238(94.82)	251(100)

$\chi^2 = 9.714.$

$P = .00$

Table 5. Prevalence of hepatitis C virus among pregnant women with history of blood transfusion

Blood Transfusion	Positive %	Negative %	Total %
YES	3(1.20)	18(7.17)	21(8.37)
NO	10(3.98)	220(87.65)	230(91.63)
Total	13(5.18)	238(94.82)	251(100)

$\chi^2 = 3.870$

$P = .04$

3.4 Prevalence of Hepatitis C Virus among Pregnant Women According to Tribal mark/Tattoo

In Table 4 the prevalence of Hepatitis C virus among the pregnant women in relation to tribal mark and tattoo was revealed, the results shows that 5(1.99%) out of 29(11.55%) pregnant women that have tribal mark were tested positive to anti-HcV antibody while 24(9.56%) were negative.

3.5 Prevalence of HCV among Pregnant Women with History of Blood Transfusion

The prevalence of pregnant women that have history of blood transfusion revealed that out of 251 pregnant women used in the study

21(8.37%) have the history of blood transfusion among which 3(1.20%) were tested positive to anti-HCV antibody while 18(7.17%) were tested negative. Also, 230(91.63%) of the pregnant women have no history of blood transfusion as described in Table 5.

3.6 Prevalence of Hepatitis C Virus among Pregnant Women Who Abuse Drug by Injection

The prevalence of intravenous drug users among the pregnant women was also determined. From the 251 pregnant women used in this study, 9(3.59) were found to be involved in intravenous drug abuse (IVDA); out of which 3(1.20%) were tested positive whereas 6(2.39%) were tested negative to anti-HCV antibody as shown in Table 6.

Table 6. Prevalence of hepatitis C virus among pregnant women who abuse drug by injection

IVDU	Positive Number (%)	Negative Number (%)	Total
YES	3(1.20)	6(2.39)	9(3.59)
NO	10(3.98)	232(92.43)	242(96.41)
Total	13(5.18)	238(94.82)	251(100)

$\chi^2 = 15.066$

$P = .00$

IVDU: Intra Venous Drug Users

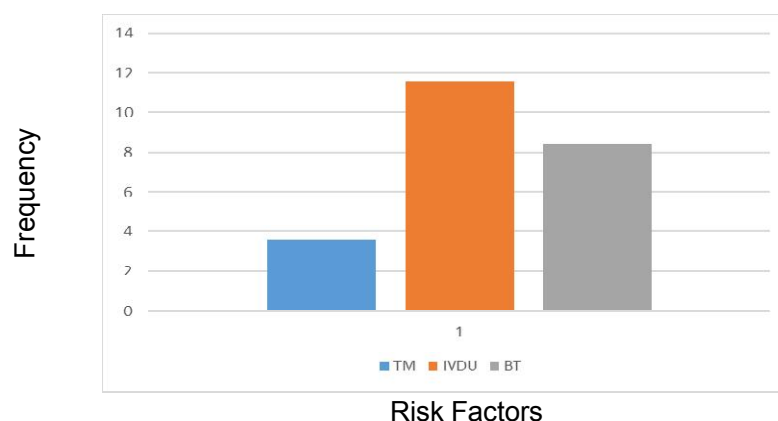


Fig. 1. Relative Frequency of Risk Factors Associated with HCV Infection

Key: TM = Tribal Mark, IVDU = Intravenous Drug Abuse, BT = Blood Transfusion

3.7 Relative Frequency of the Risk Factors Associated with HCV Infection

The relative frequency of risk factors was shown in (Fig. 1), Fifty-one (51) has one or more risk factors among the studied participant twenty-nine (29) has tribal mark which account for the highest number of frequency followed by those with the history of blood transfusion while intravenous drug abuse has the least frequency. The overall relative frequency of the risk factors is 23.50% among the studied population. This is may be because the participants are not aware of the dangers associated with the disease.

4. DISCUSSION

Hepatitis C Viral infection is not rare in the Nigerian obstetric population. However, it has long been suspected that it may become endemic [4]. Nigeria is among the countries with high burden of chronic hepatitis C and hepatocellular carcinoma that is associated with HCV [15]. The rate of HCV infection was estimated to range from 1.9% to 14.5% in the country [16].

The present study revealed a prevalence of (5.18%) out of 251 consenting pregnant women attending antenatal during the study. This prevalence is within the worldwide prevalence range of HCV in pregnancy of 1.0% - 8.0% [17]. However, the result obtained in this study is lower than the prevalence of 10.0% - 50.0% in Egypt [18]. The high prevalence obtained in Egypt may result from the associated with the contaminated needle and syringes used during the mass schistosomiasis treatment campaign in

1960s to 1980s [18]. Also, the prevalence obtained in this study is almost similar to 5% obtained among pregnant women in Pakistan by Tehniyat et al. [19].

However, the value obtained in this study is much lower when it is compared with the result obtained from Kaduna and Enugu with 11.9% [20], and 14.9% [21] respectively. In another study conducted in Benin City by Ugbebor et al. [22], they reported HcV prevalence of 3.6%. The result of the present study is also higher than 4.5% among pregnant women in Kaduna [23]. Much lower prevalence of HcV was recorded in different parts of Nigeria such as 0.5% in Niger Delta and 0.4% among blood donors in Kano. The variation in the prevalence recorded between the different studies may results from the differences in socio-cultural practices, environmental factors and mode of transmission.

In this study, pregnant women aged between 21-25years had the highest prevalence of HcV. These age groups correspond to the pick age of child bearing where there is high risk of exposure to HcV from sexual intercourse and blood transfusion from obstetric complications like postpartum hemorrhage. These finding is in contrast with the observations of Isa et al. [13] where they reported a high HcV prevalence among age group 11-20years, However Sule et al. [3] and Khaled et al. [18] reported a high prevalence of HcV antibody among old age (50years and above).

The seroprevalence distribution of HcV in relation to the educational status of the pregnant women reveals a high sero-positivity among the group others which comprises of school dropped out

and un-educated with this may probably be due to lack of awareness of the means of transmission of the disease and the preventive measures.

Family background of the participants was not significantly associated with HCV prevalence in this study. Other variable observed in this study include, history of blood transfusion, intra venous drug abuse, and tribal mark/tattoo which are all significantly associated with HCV prevalence and these is in line with the findings made by Sule et al. [3] in Kogi state, Nigeria and Tess et al. [24] in north western Tanzania.

5. CONCLUSION

A total of 5.20% sero-positivity was observed in this study, it is our conclusion from this study that HCV prevalence is low among pregnant women in Jimeta and Yola, Adamawa state, Nigeria. However, the percentage prevalence observed is within the world wide prevalence range of 1.0-8.0%. The study also revealed that HCV infection is not significantly associated with age and family type ($P > .05$) but significantly associated with educational status, possession of tribal mark/tattoo, history of blood transfusion, and drug abuse ($P < .05$).

However, there are other local governments areas with a dense population that may produce a major difference with the result obtained in this study.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

CONSENT

All the participants have given their informed consent for the work to be published before the samples were collected by filling and signing the questionnaires

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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