

Prevalence of Hepatitis C Virus Infection and Risk Factors among Pregnant Women in Pointe Noire, Republic of Congo

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Abstract

Background: Hepatitis C virus (HCV) is a public health problem and is highly endemic in Sub-Saharan Africa. This study was carried out to determine the prevalence and potential risk factors of hepatitis C virus in pregnant women. **Methods:** This was a cross-sectional study involving pregnant women who attended at seven antenatal clinics in Pointe Noire, from June to November 2018. Structured questionnaires were used to obtain participants data. Samples were screened for HCV infection by using 4th ELISA methods and data analysis was done by Epi-info version 7.0 statistical software. **Results:** A total of 150 pregnant women were included, out of which 11 (7.3%) were positive for HCV. The high proportion of HCV was found in age group 25 - 34 years (45.4%), educated (81.1%), professional (36.4%) and 54.6% were in second trimester gestational stage. Moreover, 54.6% of HCV positive patients had scarification and 45.5% had a history of surgery. There was not a statistically significant association between demographics characteristics, risks factors and HCV seropositivity ($p > 0.05$). **Conclusion:** This study showed a high prevalence of HCV infection and confirmed that this infection is a public health problem in pregnant women in Pointe Noire.

Keywords

Pregnancy, HCV, Risk Factors

1. Introduction

Hepatitis C virus (HCV) infection is a worldwide health problem and is highly endemic in Sub-Saharan Africa [1] [2]. HCV can cause serious life long illness such as cirrhosis, hepatocellular carcinoma and death [2] [3]. World Health Organization (WHO) estimated that every year 4 million people are newly infected and about 170 million are chronically infected with HCV [4] [5]. More than 350,000 deaths are occurring every year due to related complications of HCV, including liver cancer and liver cirrhosis [2] [6]. HCV is transmitted readily by transfusion of infected blood products, dental and surgical procedures, piercings and tattoos, use of injectable substances, sexual contact and vertical transmission [1] [7]. Viral hepatitis has increased the risk of maternal complications during pregnancy and it has been reported as the foremost reason for maternal mortality [8] [9]. Maternal-fetal transmission is critical to predict the burden of HCV infection in future generations [9] [10]. The prevalence of serum HCV antibodies among pregnant women has been estimated between 1% and 8% worldwide [8] [11]. The reported rate of children acquired through vertical transmission is approximately 0.2% - 0.4% in the US and Europe and as high as 12% - 14% in certain regions in Africa [9] [12] [13] [14]. Central Africa is considered to be an area of high endemic hepatitis C infection, with anti-HCV antibodies in 5% - 15% [15] [16]. The studies on HCV prevalence have been previously done and indicated as it is endemic in republic of Congo with variation between 3.2% - 14.6% [17] [18] [19]. No data about the prevalence of hepatitis C virus among pregnant women are available in Pointe Noire. The present study was conducted to determine the prevalence and to identify risk factors associated with hepatitis C virus infection among pregnant women.

2. Methods

2.1. Study Design and Population

This was a cross-sectional study involving pregnant women who attended at antenatal clinics in Pointe Noire, from June to November 2018. The participants included came from seven localities at Pointe Noire: Lumumba (n = 15), Mvoumvou (n = 11), Tié-tié (n = 11), Loandjili (n = 46), Mongo-Poukou (n = 46) and Ngoyo (n = 21).

The purpose of the study was explained to the participants in their preferred language prior to the study and an informed consent was obtained from them. Their socio-demographic characteristics, present and past health, and potential risk factors for exposure to HCV were documented in a structured questionnaire for each participant.

Pregnant women who could not give consent were excluded from the study.

2.2. Sample Collection

After the questionnaire was filled out, 5 mL of blood was obtained from the arm by venepuncture after disinfection with 70% alcohol. The sera were separated

out into pre-labelled vials and were stored at -20°C until tested for detection of HCV markers while rests of samples were aliquoted for subsequent manipulation.

2.3. Serological Screening

The serum samples were screened for the presence of HCV by using commercial fourth generation Enzyme-linked immunosorbent assay (ELISA) technique according to the manufacturer's recommendations (Monolisa™ HCV Ag-Ab Ultra, Bio-Rad, Marne-La-Coquette, France). The results of the assay were expressed quantitatively as the ratio (R) of the optical density of the test sample to the calculated cutoff absorbance, as recommended by the manufacturer. Sera with ratios >1.1 were considered to be positive, sera with R values of $0.9 - 1.1$ were recorded as indeterminate and re-tested, whereas those with R values < 0.9 were considered negative.

2.4. Statistical Analysis

All data were statistically analyzed using the statistical program Epi-info, version 6 (Centers for Disease Control and Prevention, Atlanta, GA). Binary logistic regression was done to determine the presence of a statistically significant association between explanatory variables and the outcome variables. Odds ratio (OR) and their 95% confidence intervals (CI) were calculated. The P-values less than 0.05 were considered as significant.

3. Results

3.1. General Characteristics of the Pregnant Women

A total of 150 pregnant women were included in this study. The age varied from 15 to 43 years, a means of 27.22 years with standard deviation ± 6.10 (SD). The age group of 25 - 34 years (48.7%) was the most represented, 78.7% of participants secondary level of education and 48.7% were Household. The majority of the study participants were married or cohabitating (56.9%), 50.7% were in their second trimester of pregnancy and 30.7% lived in the localities of Loandjili and Mongo-poukou (**Table 1**).

3.2. Prevalence and Risk Factors for HCV Infection

The prevalence of HCV-screened positive was 7.33% (95% CI: 3.72 - 12.74). The highest prevalence of 45.4% (5/11) was found in age group 25 - 34 and the lower of 18.2% was found in age groups 35 - 43 (**Table 1**). HCV prevalence was higher in pregnant women with high education level 81.8% (9/11) while low proportions were observed in illiterates and university education level with 9.1% (1/11). Regarding employment, HCV prevalence was high among professional pregnant women (36.4%) while Household (27.3%) and low proportions were found among Tradewomen and employee with (18.2%). HCV positive samples were found only among married or cohabitating pregnant women (100%).

Table 1. Prevalence of HCV in relation to characteristics of pregnant women attending ante-natal clinics in pointe noire, republic of Congo.

Characteristics	Total (N = 150)	HCV positive (%) (n = 11)	OR (95% CI)	P value
Age groups (year)				
15 - 24	55	4 (36.4)	0.78 (0.13 - 4.62)	0.788
25 - 34	73	5 (45.4)	0.73 (0.13 - 4.08)	0.725
35 - 45	22	2 (18.2)	1	
Education				
Primary	18	1 (9.1)	0.76 (0.04 - 13.41)	0.854
Secondary	118	9 (81.8)	1.07 (0.13 - 9.17)	0.948
University	14	1 (9.1)	1	
Employment				
Household	73	3 (27.3)	0.54 (0.08 - 3.39)	0.508
Tradewomen	33	2 (18.2)	0.80 (0.10 - 6.13)	0.835
Professional	17	4 (36.4)	3.84 (0.62 - 23.85)	0.148
Employee	27	2 (18.2)	1	
Marital status				
Single	11	0	0.49 (0.03 - 8.78)	0.625
Married/Cohabiting	139	11 (100)	1	
Gestational stage				
1 st trimester	26	3 (27.3)	3.00 (0.47 - 19.23)	0.247
2 nd trimester	76	6 (54.6)	1.97 (0.38 - 10.19)	0.418
3 rd trimester	48	2 (18.2)	1	
Residence				
Lumumba	15	1 (9.1)	0.32 (0.02 - 4.08)	0.381
Mvoumvou	11	2 (18.2)	1	
Tié-Tié	11	1 (9.1)	0.45 (0.03 - 5.84)	0.542
Loandjili	46	4 (36.4)	0.42 (0.06 - 2.71)	0.367
Mongo-Poukou	46	3 (27.3)	0.32 (0.05 - 2.21)	0.248
Ngoyo	21	0 (0.0)	0.08 (0.01 - 2.02)	0.128

OR: odds ratio; CI: confidence Interval; 1: referent.

Majority of the patient HCV positive were in second trimester gestational stage 54.6% (6/11) and the highest proportion was observed among participants from Loandjili while the lowest proportions were observed in Lumumba and Tié-tié with 9.1% (1/11) as shown in **Table 1**. However, despite the highest prevalence of HCV observed in socio-demographics variables, there was no significant statistical association ($P > 0.05$).

The distribution of risk factor among the patients of HCV positive is shown in **Table 2**. Among the risk factors associated sought, a high frequency of carriage of HCV in pregnant women with a history of scarification in 54.6% (6/11), 45.5% (5/11) in patients who have undergone surgery and 27.3% (3/11) among

Table 2. Risk factors associated with HCV positivity among pregnant women attending ante-natal clinics in Pointe Noire, republic of Congo.

Risks factors	Total (N = 150)	HCV Positive (%) (n = 11)	OR (95% CI)	P-value
Scarification				
Yes	78	6 (54.6)	1.11 (0.32 - 3.83)	0.860
No	72	5 (45.5)	1	
Surgical operation				
Yes	49	5 (45.5)	1.79 (0.52 - 6.21)	0.353
No	101	6 (54.6)	1	
Tattooing				
Yes	21	3 (27.3)	2.52 (0.61 - 10.39)	0.201
No	129	8 (72.7)	1	
Ear piercing				
Yes	29	2 (18.2)	0.92 (0.19 - 4.52)	0.920
No	121	9 (81.8)	1	
Drug use				
Yes	3	1 (9.1)	6.85 (0.57 - 82.19)	0.129
No	147	10 (90.9)	1	
Multiple sexual exposure				
Yes	12	1 (9.1)	1.16 (0.14 - 9.95)	0.889
No	138	10 (90.9)	1	

women with tattoos. However, there was no statistically significant relationship was found despite the odds ratio value greater than 1.00, but the $P < 0.05$. On the other hand, HCV was found in patients with multiple sexual exposure and those who Drug abuses in equal proportions with 9.1% (1/11), while 18.2% (2/11) with HCV have been found in patients with piercing. None of the expected risk factors had significant outcome.

4. Discussion

Viral hepatitis caused by HCV is life-threatening liver disease and major public health problem worldwide [1]. WHO revealed that the prevalence of HCV is categorized and graded as high ($>3.5\%$), moderate (1.5% - 3.5%) and low ($<1.5\%$) [20]. In our study, 7.33% of the pregnant women were found positive for HCV which is comparable with the findings of other such epidemiologic studies. This proportion was higher than the HCV prevalence among pregnant women in Ethiopia, Rwanda, Nigeria and Gabon of 0.6%, 2.6%, 3.6% and 2.1%, respectively [21] [22] [23] [24]. Our finding was low when compared with that described previously in a study conducted Pakistan which showed high HCV prevalence rate of 10.84%, 8.6% in a report from Egypt and that of 8.5% in a study at Yemen [25] [26] [27]. This difference may be attributable to the variation in population studied, genetic factors, socioeconomic status, cultural practices, detection me-

thod used, regional differences in risk factors to viral hepatitis and the size of the population studied.

In our study the highest prevalence of HCV was in the age group of 25 - 35 years which is comparable to the study by Zobia *et al.*, in Pakistan (25 - 35 years) [28]. Almost similar age group is reported by Nadire *et al.*, who reported the high prevalence of HCV at women in the age group of 26 - 30 years [29]. In agreement with our results, Khamis *et al.*, in Egypt reported the highest prevalence among pregnant women who were aged above 35 years [30]. Indeed, age is a known risk factor for hepatitis C infection and seropositivity has been reported to increase until the age of 40 and then declines over time. This can be explained by the greater probability of exposure of these women to risk factors.

Number of weeks of pregnancy (trimester) in our study also had no statistical significant of HCV positive, though the highest prevalence observed in pregnant women in their second trimester with 54.5%. Furthermore, in a study conducted from Ethiopia, all of the HCV positive pregnant women were among secondary trimesters [21]. Indeed, vertical transmission can occur during third trimester in mothers infected only with hepatitis C [31]. The studies performed by Gibb *et al.*, and Mok *et al.*, reported that because postpartum transmission of the virus is rare, transmission likely occurs during the intrapartum period or in utero, respectively [32].

In current study majority of the patient having anti-HCV antibodies were found in educated participants (81.8%), salaried (36.4%), married (100%) and these findings are similar to the studies conducted by Ramarokoto *et al.*, in Madagascar and Elsheikh *et al.*, in Sudan among pregnant women [33] [34]. However, the sociodemographics analyses in this study were found no significant relationship with the prevalence of HCV. This result does not agree with the result in other studies which showed an increase in HCV infection with an increase in older age, education below secondary level and low parity [30] [35] [26]. This might be due to the small sample size we used.

Regarding the risk factors for HCV transmission in this study, 54.6% patients had scarification while surgeries and tattooing were also found as risk factor seen 45.5% and 27.3%, respectively. None of the expected risk factors for seropositivity of HCV had been identified in the study. Our finding is parallel to the reports from Ethiopia, Soudan and Indian which showed no significant relationship between risks factors with prevalence of HCV [22] [34] [36]. In contrast, the data reported from Egypt by Khaled *et al.*, HCV infection among Egyptian pregnant women was associated with older age, blood transfusion, and HCV infection of the husband or other household members [25]. Another study conducted from Pakistan by Jaffery *et al.*, in 2002 and Shaikh *et al.*, in 2009, found that past history of surgical procedures was the most significant risk factor for transmission of hepatitis C virus infection independent of the other characteristics [37] [38]. Results from the study of Abdul *et al.*, in Pakistan showed that tattoo on the body, comb sharing and razor sharing were the most significant risk factors for HCV infection [27]. Thus, this situation suggests that urgent efforts are needed

to increase awareness about hepatitis C prevention and early treatment among pregnant women.

5. Conclusion

In conclusion, the prevalence of Hepatitis C virus among pregnant women in Pointe Noire is almost as high as that in other African countries. None risk factors for HCV infection were identified. There is a need for further study on large sample size. Moreover, this high prevalence justifies the establishment of a national program for regular screening of all pregnant women.

Conflicts of Interest

The authors declare that they have no competing interests.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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