



# Evaluation of Risk Factors for Viral Hepatitis C in Chad

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**Abstract:** *Introduction:* infection with the hepatitis C virus is a public health problem that is often underestimated compared with its alter ego, viral hepatitis B, in developing countries. The aim of this study was to assess the risk factors for viral hepatitis C in Chad. *Patients and methods:* This was a retrospective, descriptive study covering a period of 2 years and 9 months. Patients of all sexes with PCR-confirmed viral hepatitis C were included. The hepatology unit of the day hospital and the gastroenterology department of teaching hospital "Reference Nationale" in N'Djamena served as the setting. *Results:* A total of 203 patients were included. The sex ratio (M/F) was 1.6, with a mean age of  $47 \pm 12$  years, a median of 46 years and extremes of 20 and 76 years. The 40 to 59 age group was the most represented. The mean APRI score was  $0.42 \pm 0.29$ , with extremes of 0.019 and 1.84. Over 80% of the population came from the southern part of the country. In 57.6% of cases, HCV carriage was discovered incidentally during voluntary screening, compared with 42.4% during the course of an illness. In terms of risk factors, mass vaccination was found in 85.7% of cases. Surgery was incriminated in 20.2% of cases. Notification of blood transfusion was found in 14.8% of cases. *Conclusion:* HCV infection tends to affect the elderly, although all age groups can be affected. The risk factors are multiple and dominated in our context by mass vaccination.

**Keywords:** Infection, HCV, Risk Factors, Chad

## 1. Introduction

Viral hepatitis C is an inflammation of the liver parenchyma caused by infection with the hepatitis C virus (HCV). In its chronic form, viral hepatitis C causes fibrosis and progresses to cirrhosis or primary liver cancer. Infection with the hepatitis C virus is considered as a public health problem worldwide, due to its frequency and the severity of its often-fatal complications [1].

Worldwide, there are an estimated 58 million chronic HCV carriers. The number of new infections per year is estimated at 1.5 million, and mortality at 400,000 deaths/year, mainly from cirrhosis and primary liver cancer [2].

In sub-Saharan Africa, prevalence varies from 0.6% to 4.1%. The problem is crucial, as 21 million people are thought to be infected with HCV. In North Africa and South-

East Asia, prevalence is higher [3]. In Chad, prevalence is estimated at 2.5% [4].

The hepatitis C virus is transmitted by the blood. It may be found intermittently in certain biological fluids (saliva, semen, ascites fluid, cerebrospinal fluid), but transmission is mainly blood-borne, rarely sexual or perinatal-maternal-fetal [5, 6].

The problem of viral hepatitis C seems to have long been overshadowed by that of its "alter ego", viral hepatitis B, probably due to the greater prevalence of HBV and the inaccessibility of diagnostic and therapeutic means for HCV.

Despite being a worldwide public health problem, most infected people are unaware of their serological status. HCV infection is now the only curable viral infection since the introduction of Direct-Acting Antivirals (DAA). Prevention depends on reducing the risk of exposure in healthcare

establishments and among at-risk populations [2].

In May 2016, the WHO set the goal of eliminating viral hepatitis as a public health threat by 2030. [3] To achieve this goal, knowledge of risk factors is a major element in infection control. To date, Chad has no data on risk factors for HCV infection. We therefore thought it would be useful to identify the main risk factors in our context.

## 2. Patients and Method

This was a retro-prospective, descriptive study conducted over a period of two years and nine months (October 2019 to July 2022) among chronic Hepatitis C Virus (HCV) carrier patients.

The Gastroenterology/Internal Medicine Department and the hepatology unit of the day hospital of the Teaching Hospital "Reference Nationale" (CHU-RN) provided the setting. Patients aged at least 15 years screened positive for viral hepatitis C by the Rapid Diagnostic Test (TROD), confirmed by an HCV-PCR test and treated with Direct Action Anti-virals were included. Not included were non-consenting patients or those with incomplete records, as well as patients with a positive AcVHC result and a negative PCR-HCV result.

Following verbal consent, a data collection form was used to gather the information. Information was collected by:

- 1) face-to-face interview for patients seen directly in consultations or reviewed for (monthly) post-therapy monitoring;

- 2) telephone call for those declared cured 3 months after the end of treatment and living outside N'Djamena;
- 3) observation of medical record information for those who couldn't be reached by phone.

The variables studied were: age, sex, city of origin, viral load, history of invasive medical care, surgery, transfusion and WHO risk factors.

Data were entered in Excel and Word. SPSS 18.0 was used for data analysis. The Chi-square test<sup>2</sup> was used for correlations.

## 3. Results

A total of 203 patients were included, 124 men (61%) and 79 women (39%). The sex ratio was 1.6. The mean age of the patients was  $47 \pm 12$  years, with extremes of 20 and 76 years and a median of 46 years. The 50-69 age group accounted for over 50% of cases.

Depending on the province of origin, over 90% of our patients came from the south of the country.

Risk factors were dominated by mass vaccination (85.7%), followed by mass or traditional circumcision (51.7%) and ethnic scarification (32.5%). The risk increased with age: in subjects over 60, the risk due to vaccination was 90.9%.

Risk factors varied according to gender. In women after mass vaccination, the next most common factors were excision (67.8%) and surgery (29.1%).

In men, after vaccination, circumcision was performed in 84.7% of cases and scarification in 37.8%.

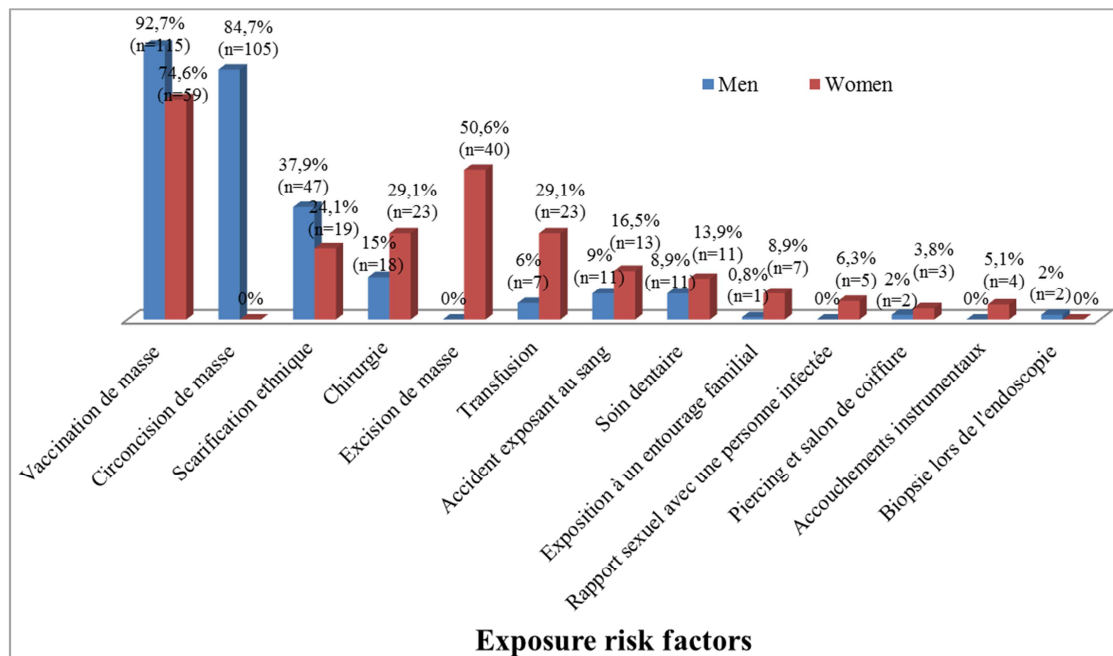


Figure 1. Prevalence of various cumulative risk factors by gender.

Table 1. Prevalence of different cumulative risk factors for hepatitis C according to age.

Exposure risk factors	< 40 years		ns		> 60 years		Total n
	n	%	n	%	n	%	
Mass vaccination	53	81,5	91	86,7	30	90,9	174
Mass circumcision	31	47,6	54	51,4	20	60,6	105

Exposure risk factors	< 40 years		ns		> 60 years		Total
	n	%	n	%	n	%	n
Ethnic scarification	18	27,7	32	30,5	16	48,5	66
Surgery	5	7,7	22	21	14	42,4	41
Mass excision	15	23,1	19	18,1	6	18,2	40
Transfusion	8	12,3	14	13,3	8	24,2	30
Blood Exposure Accident	6	9,2	14	13,3	4	12,1	24
Dental care	8	12,3	12	11,4	2	6,1	22
Exposure to a family environment	2	3,1	1	1	2	6,1	5
Sexual intercourse with an infected person	2	3,1	1	1	2	6,1	5
Piercing and hairdressing	1	1,5	3	2,9	1	3	5
Instrumental deliveries	0	0	2	1,9	2	6,1	4
Endoscopic biopsy	0	0	2	1,9	0	0	2

## 4. Discussion

The mean age in this series was  $47 \pm 12$  years, with extremes of 20 and 76 years and a median of 46 years. This result is in line with data from the African literature, where mean and/or median ages close to fifty or sixty were reported: Diarra in Mali reported a mean age of  $49.5 \pm 17.6$  years [7]. Similarly, Attia in Côte d'Ivoire and Eloumou in Cameroon reported a median age of 55 and 60 respectively [8, 9]. In France, the median age was  $53 \pm 12$  years, according to Dijoux [10]. The 50 to 69 age group accounts for more than half of the study population in this study. The age distribution of patients shows an increasing proportion with age. The same observation was made in Meda's study of the general population in Burkina Faso [11]. This phenomenon is well known and has been reported in numerous studies, including meta-analyses [12-17]. It is due to the accumulation of risk exposure with age. We might also suspect that the incidence of infection decreases over time, as a result of improvements in the safety of care procedures and, above all, transfusion safety.

In terms of gender, 61% of cases were male, 39% female. This male predominance was also found in Burkina Faso and Egypt [18, 19]. Eloumou Bagnaka and Meda, on the other hand, found no significant difference between the sexes [9, 11]. When it comes to the risk of hepatitis c contamination, all genders can be affected.

Most of our patients (over 90%) come from the south of the country. This high prevalence in the southern part of the country can be explained by both environmental and cultural factors. The proximity of this part of the country to southern Sudan, which is also a neighbor of Egypt, one of the countries most affected by HCV in the world, would also explain the high prevalence in this part of the country, which is an extension of the Nile basin.

### *Risk Factors*

Among the suspected risk factors, mass vaccination accounts for 85.7% of cases. Mass vaccination campaigns in the 80s, during the era of multiple-use syringes in developing countries, certainly contributed to the proliferation of blood-borne diseases, including HCV. In Chad, multiple vaccination campaigns against meningitis could be to blame. In Egypt, there was a direct correlation between HCV infection and bilharzia treatment campaigns between 1960 and 1987 [19].

Traditionally-related out-of-hospital invasive procedures

(circumcision, excision, ethnic scarification) are also significant risk factors for HCV transmission, given that the virus is essentially transmitted by blood. In this series, these factors were found in 76.3% of cases (mass circumcision accounted for 51.7%, ethnic scarification 32.5%, and mass excision or female genital mutilation 19.7%).

The attachment of Chadian communities to cultural practices involving the breaking of the skin, often using multi-purpose materials, could explain this, especially as most of our patients come from the south of the country, where such cultural practices are commonplace. It should be noted that the weight of tradition still weighs heavily on the country's communities.

Despite improved aseptic conditions in hospitals and the use of single-use materials in most cases, the risk associated with surgery and dental care remains a reality. In this study, surgical and dental risks accounted for 20.2% and 10.8% of cases respectively. An Italian study carried out between 1994 and 1999 to assess the risk of hepatitis transmission linked to surgery, showed that HCV infection was associated with surgical, gynaeco-obstetrical, abdominal and dental procedures, with a percentage of 7.5%; 2.2%; 2.7% respectively [21].

In our series, the risk associated with blood transfusion represented 14.8% of cases. Other series reported a similar prevalence [18]. This may be partly explained by the advanced age of our patients, most of whom were transfused before the introduction of blood safety measures in 2010. It should also be remembered that there is no such thing as zero risk in blood transfusion, even with safety measures in place.

With regard to Blood Exposure Accidents (BEA), the accidental transmission confounded in our series is 11.8% (4.4% nursing staff and 7.4% others). The others are represented by midwives and people assisting the injured in accidents on the public highway (AVP). By virtue of their profession, healthcare workers are exposed to a high risk of contamination by viral hepatitis C [22, 23]. In the Chadian context, the remoteness of health facilities from users, especially in rural areas, is a major factor in this high rate of infection.

When it comes to transmission of the hepatitis C virus, intra-familial transmission is possible, favored by promiscuity. In the present study, a family history of hepatitis C was found in 6.3% of cases (3.9% in first-degree relatives and 2.4% in spouses or partners). Sexual transmission is rare, except in special cases (MSM). This high rate in Africa may be explained by the sharing of sharp objects in the family. In France, the prevalence of HCV among pregnant women varies from 0.3% to 7.7%,

depending on the study. The risk of maternal-foetal transmission varies in the literature from 0-10%, and is higher if the mother is co-infected with HIV (the risk is then estimated at 15.5%) and if the viremia is high. The exact mode of transmission is unknown, but vaginal delivery is not contraindicated, nor is breast-feeding [24, 25]. Horizontal transmission could be linked to the sharing of grooming or pedicure-manicure objects responsible for small wounds (razors, toothbrushes, nail clippers) within the same family or in a collective dwelling.

Piercing and hairdressing are also risk factors for HCV transmission, although the risk is often low. A case-control study in Ho-Chi-Minh-Ville, Vietnam, on the risk of hepatitis C related to traditional practices found that acupuncture, cupping and tattooing were significantly more frequent in cases than in controls, but no association was found with beauty treatments or the sharing of toiletries, although these practices, particularly piercing, were reported to be common in the study population. However, this mainly concerns ear piercing in women, an act often practised in childhood, which may explain a lower exposure to the risk of HCV even in the absence of hygiene precautions [26]. The cases reported in our study are those performed in adulthood for reasons of beauty. We report 5 cases (2.4%) of piercing in hairdressing salons.

Biopsies taken during endoscopy for histological study and etiological research can be a source of transmission if disinfection conditions are not respected. In this study, biopsies were incriminated in 1% of cases; Medhat *et al.* in Egypt also reported a similar proportion of 1% [27].

## 5. Conclusion

Viral hepatitis C remains a public health problem despite the availability of curative molecules.

Knowledge of the risk factors is essential for the eradication of this disease. In the Chadian context, these risk factors are dominated by mass vaccination using multiple-use syringes in the past, and are also linked to cultural factors.

The blood safety measures introduced in Chad in 2010 have certainly helped to reduce the risk of transmission, but remain limited. Raising public awareness of certain cultural practices likely to transmit HCV, as well as knowledge of other risk factors, is essential if we are to achieve the WHO's goal of eliminating hepatitis by 2030.

## Conflicts of Interest

The authors declare no conflicts of interest.

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