

Seroprevalence of hepatitis C in a group of patients tattooed within the last 2 years: A cross-sectional study in Risaralda, Colombia

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Abstract

Introduction: In several studies of factors associated with the spread of hepatitis C, tattooing has gained importance. Studies that link tattooing with a risk of hepatitis C have not controlled for conditions under which it was done nor considered biosecurity measures. This makes it difficult to establish a causal relationship. **Objective:** This study assessed the seroprevalence of hepatitis C in adult patients who were tattooed within the last two years in the department of Risaralda, Colombia. **Materials and Methods:** This is a cross-sectional study of a convenience sample of 65 individuals with one or more tattoos that had been done 8 weeks to 2 years prior to the study and who had no other risk factors for hepatitis C. A rapid antibody immunochromatography test was used. **Results:** Out of 86 subjects, 57 met the selection criteria. The rapid hepatitis C antibody test was negative for all participants. Most were women (59.6%), their average age was 25 years, 30 were university students, 46 came from Pereira, and 40 were from economic stratum 3 or higher. Forty-six had had only one tattoo session. Most had two to three tattoos. Fifty-two had been done in authorized establishments. Fifty participants reported that their tattoo artists met biosafety standards. **Conclusion:** Tattoos made under biosafety conditions in authorized establishments do not seem to increase the risk of hepatitis C infections in people without other risk factors, especially when there have only been a few sessions. Additional studies are required to confirm this hypothesis.

Keywords

Hepatitis c, tattoo, transmission.

INTRODUCTION

Several studies have tried to evaluate whether tattoos are a risk factor for the spread of the hepatitis C virus (HCV). (1-17) In Colombia there have been only two studies of these risks. One, conducted in two Atlantic Coast cities, found that tattoos were associated with higher prevalences of HCV but those differences were not statistically significant. (18). Another, in the city of Cali, found that 6.07% of HCV patients had tattoos. (19) To date, the risks of con-

tracting the infection due to tattoos in the city of Risaralda and the whole country of Colombia are unknown.

MATERIALS AND METHODS

Type of study

This cross-sectional study was conducted with a convenience sample of 65 adult individuals who had one or more tattoos done, regardless of the technique used, in a period

of more than 8 weeks but less than 2 years at the time of the interview. People with other risk factors for hepatitis C including transfusions, health workers, piercings, acupuncture were excluded. After receiving informed consent and verification of the inclusion and exclusion criteria, a capillary blood sample was taken from each participant. Samples were taken by puncturing the contralateral index finger of the dominant hand for the application of HCV Ab Plus Rapid Test from CTK Biotech, Inc.. This immunochromatographic assay has a sensitivity of 99% and specificity of 99.5% with respect to the Abbott EIA reference test recommended by the World Health Organization (WHO). (20)

The authors performed a detailed physical examination and took detailed medical histories including patients' ages, sexes, races, ethnicities, occupations, places of origin, levels of education, socioeconomic statuses, evidence of liver manifestations including any known liver disease or cirrhosis and clinical stigmata of liver cirrhosis, extrahepatic histories of hypothyroidism, diabetes mellitus, cryoglobulinemia, idiopathic thrombocytopenic purpura, glomerulonephritis or chronic kidney disease, cutaneous porphyria, lichen planus red, erythema nodosum, erythema multiforme, malakoplakia, Behcet's syndrome, urticaria, necrotizing cutaneous vasculitis, psoriasis, Sjögren's syndrome, corneal ulcers, uveitis, polyarteritis nodosa as well as conditions related to the process and characteristics of the tattooing including type of tattoo establishment, number of tattoos, tattoo location, compliance with biosafety norms by tattoo artists, verification of the type of needle used, verification of the type of ink used, ink color, number of sessions and tattooing technique.

The results were delivered to the participants 15 minutes after the test was conducted by means of a verbal and written report. Participants were given post-test advice.

Ethical Considerations

The study had the approval of the bioethics committee of the Universidad Tecnológica de Pereira which evaluated the questionnaire supplied to the participants. The study was conducted following good clinical practice and the 2005 version of the Declaration of Helsinki. The tests were donated by Bristol-Myers-Squibb, but that company had no part in the design, conduct or analysis of this study. None of the authors had conflicts of interest to declare.

RESULTS

Of the 86 eligible subjects evaluated, 57 met the inclusion criteria. Twenty-nine were excluded because they had other

risk factors for hepatitis C infection. There were three protocol deviations of participants who withheld information during selection: one was a health worker, one was promiscuous, and one had undergone acupuncture. Nevertheless, all were included in the analysis since these conditions did not modify the results.

All participants had negative results from the rapid hepatitis C antibody test. The majority were female (59.6%), participants average age was 25, thirty were university students, forty-six came from the city of Pereira, and 40 were from economic stratum 3 or higher (**Table 1**).

Table 1. Patients' Sociodemographic Characteristics

Variable	N = 57
Sex	
- Male	23 (40,3 %)
- Female	34 (59,7 %)
Age	25,3 ± 7,7
Race	
- Mixed race	56 (98,2 %)
- Afro-descendant	1 (1,8 %)
Occupation	
- Student	32 (56,2 %)
- Employee	15 (26,3 %)
- Independent	8 (14,0 %)
- Unemployed	2 (3,5 %)
Level of Education	
- High school	9 (15,8 %)
- College student	30 (52,6 %)
- Technical	3 (5,3 %)
- Technology	4 (7,0 %)
- Undergraduate	11 (19,3 %)
Socioeconomic stratum*	
- 1	1 (1,8 %)
- 2	16 (28,1 %)
- 3	22 (38,6 %)
- 4	11 (19,3 %)
- 5	4 (7,0 %)
- 6	3 (5,2 %)

*Translator's note: Colombia has a system of subsidies based on geographical zones roughly defined by income and wealth. Stratum one is the poorest, and stratum 6 is the richest.

Characteristics of tattoos are shown in **Table 2**. We found that most of the subjects had two or three tattoos: 14 were on the thorax, 25 were on various parts of the body, and 23 were black. Fifty-two tattoos were done in licensed establishments. Fifty participants reported that their tattoo artists complied with biosafety standards, 55 reported that a new

needle was used, 40 indicated that the ink was new, and 46 had the tattoo done in a single session.

Table 2. Tattoo Characteristics

Variable	N = 57
Number of tattoos	3,19 ± 2,73
Tattoo location	
- Neck	2 (3,5 %)
- Forearm	8 (14,0 %)
- Arm	8 (14,0 %)
- Chest	14 (24,6 %)
- Leg	9 (15,8 %)
- Foot	1 (1,8 %)
- Multiple	15 (26,3 %)
Tattoo color	
- Black	23 (40,3 %)
- Color	15 (26,3 %)
- Multicolored	19 (33,4 %)
Type of Tattoo Establishment	
- Clandestine	5 (8,8 %)
- Authorized	52 (91,2 %)
Biosecurity compliance	
- No	7 (12,3 %)
- Yes	50 (87,7 %)
Type of needle used:	
- Unknown	2 (3,5 %)
- New	55 (96,5 %)
Type of ink used	
- Unknown	15 (26,3 %)
- New	40 (70,2 %)
- Reused	2 (3,5 %)
Number of tattoo sessions	
- 1	46 (80,7 %)
- 2	2 (3,5 %)
- 3 or more	9 (15,8 %)

DISCUSSION

The use of tattoos has recently gained relevance in various studies attempting to determine risk factors associated with HCV infections. (1, 2, 7, 18, 19, 21-24) People with more than one tattoo have significantly great risks of contracting HCV infections than those with only one tattoo (Odds ratio [OR]: 5.17; 95% confidence interval [CI]: 3.75 to 7.11; $p < 0.001$). (23) The size of the tattoo and the colors yellow, orange, red and white are also risk factors. White ink has a relative risk (RR) of 14.3 (95% CI: 5.7 to 35.8). (10) However, many of the studies in which the risk of hepatitis

C has been linked to tattoos have not controlled for variables such as exposure to other risk factors, tattoo location, and biosafety conditions of the tattoo parlor. (19, 22)

One study that included 626 people with tattoos that used multivariate analysis of attributable risk found a risk of HCV infection (41%) more than twice that of intravenous drug use (17%) and higher than that of other risk factors such as drinking beer in excess or being a male health care worker. (10)

In Colombia there have been only two studies of risk factors associated with HCV infections. One, conducted in two cities on the Atlantic Coast, found a non-significant increase in the prevalence of HCV infections. (18) In addition, a descriptive study in the city of Cali found that 6.07% of patients with HCV infections had a tattoo in their medical history. (19) However, it did not specify whether patients had additional risk factors nor did it evaluate the type of tattoo establishments or their biosafety conditions, conclusions in these regards cannot be drawn.

We conducted this study among adults from Risaralda who had no other risk factors associated with HCV infections. Tattoos had been performed under optimal biosafety conditions defined as a tattooist using new needles and ink on each person in authorized establishments and in a small number of sessions (3 on average). Under these conditions, tattooing does not seem to represent a risk factor for transmission of hepatitis C. Larger studies are required at the national level to confirm this hypothesis. This is the first study in Colombia that evaluates the association of tattoos with hepatitis C in the population without other associated risk factors.

This study has limitations regarding the size of the sample, because it is not statistically representative of the population of Risaralda, and its design does not allow statistical associations. Although the antibody test used has high sensitivity, it is not the one recommended by the WHO. Also, the possibility of false negatives due to the immunological window period is not ruled out. Nevertheless, the restriction of the study sample to people who had the last tattoo done at least 8 weeks before testing reduces this possible bias.

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