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Routes of transmission of hepatitis C virus

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ABSTRACT

Hepatitis C is one of the most common causes of chronic liver disease in Latin America. It is essential to understand the different mechanisms of transmission of the infection in order to design control measures. The pattern of transmission of the infection in our region suggests that the peak of the infection occurred 30 to 50 years ago. While most infections in Latin America seem to be the result of blood transfusion and unsafe therapeutic injection practices in the past, there is still a need to identify and notify infected blood donors. Intravenous drug use and sexually transmitted hepatitis C virus among human immunodeficiency virus-positive patients are current problems that need to be addressed.

Key words. Hepatitis C virus. HCV. Transmission, Epidemiology.

INTRODUCTION

Hepatitis C virus (HCV) infection is one of the leading causes of chronic liver disease and hepatocellular carcinoma in Latin America.[1] This disease may spread by several routes, with blood transfusion and intravenous drug use being considered the most significant methods of transmission,[2] although the means of transmission vary between specific geographic areas. It is important, therefore, to consider epidemiological data from a particular region when planning recommendations regarding prevention of this disease.

EPIDEMIOLOGICAL PATTERNS OF TRANSMISSION

There is considerable variation in incidence and prevalence of HCV infection, but age-specific prevalence is a good way of estimating the time of infection and hence the probable route of infection.

There are three well-recognized patterns of HCV transmission.[3] In the first pattern, typical in the United States and in Australia, infected patients are predominantly 40 to 49 years old.[4] They acquired the infection as young adults, mainly through intravenous drug use, and to a lesser extent from blood transfusions. In the second pattern, found in countries like Japan and Italy, infected patients are older and acquired the infection in the distant past. Unsafe injection techniques and blood transfusions are the most important means of transmission in these regions. A third epidemiological pattern can be identified, where the prevalence of HCV infection is high in all age groups, with an ongoing risk of infection. This is best exemplified by Egypt.

The available epidemiological data in Latin America is consistent with the second pattern of transmission.[5] The evidence to support this statement comes from several observations:

- The described age-specific prevalence is consistent with an increasing prevalence at older age (Figure 1).[6]
- Blood transfusion is the most common risk factor among infected patients,[7,8] but a significant proportion of infected patients do not have a history of blood transfusion or intravenous drug use,[9] suggesting that unsafe therapeutic injection practices are an important route of transmission.
- The study of some specific towns in Argentina with high prevalence of HCV infection has shown that infection may be related to the use of inadequately sterilized glass syringes.[10] Based on

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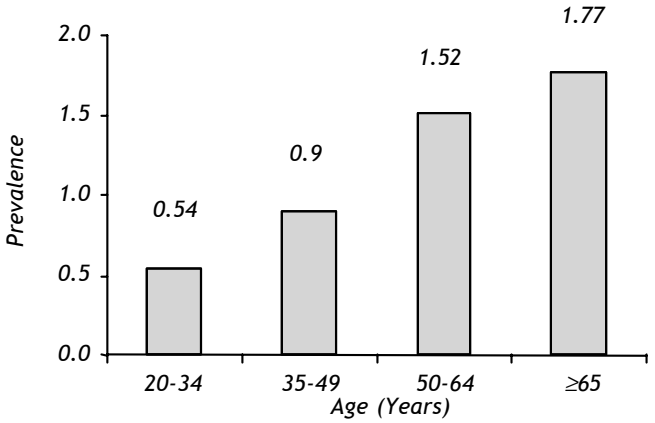

Figure 1. *Seroprevalence of HCV infection in a representative sample of the general population of Santiago older than 20 years. N = 1115. Adapted from.[6] This pattern of age-specific prevalence is suggestive of infection in the distant past, mainly by unsafe injection practices and blood transfusion.*

molecular clock analysis, the peak of infection in one of these towns was estimated to occur 50 years ago.[11]

BLOOD TRANSFUSION

Transfusion of blood products is a well-recognized method of transmission of HCV and resulted in up to a 10% risk of acquiring the infection before screening of blood donors was instituted.[12] Mandatory screening for HCV infection was gradually adopted in Latin America during the 1990s, leading to a currently very low risk of transmission. Improved antibody assays have reduced the risk of infection to a calculated frequency of 1:100 000 units. New technologies, such as nucleic acid testing (NAT) may yield a 10-fold reduction of the residual risk.[13] The high prevalence still seen in hemophiliacs and patients heavily exposed to blood products is explained by infection prior to the institution of universal screening. One of the pending issues in Latin America is follow-up of the infected; while in most countries, screening is mandatory, notification of positive blood donors is not.

INTRAVENOUS AND INTRANASAL DRUG USE

The use of contaminated needles and paraphernalia is one of the most efficient ways of transmission of HCV. It has been shown that 65% of injecting drug users acquire HCV infection during the first year of use.[14] There is a trend of increasing intravenous drug use in the region, but there is great variation in prevalence among countries in Latin America.[15] Intranasal drug use, specifically cocaine snorting, may be a risk factor for acquiring this infection,[16] and drug users who declare that they do not inject still have a higher risk of HCV infection, either because of underreporting or because they are infected by a different route, such as sexual or household transmission.[17]

SEXUAL AND HOUSEHOLD TRANSMISSION

HCV infection is not transmitted efficiently by the sexual route.[18] In effect, the risk of transmission among monogamous stable sexual partners is negligible, so no special recommendation for condom use is given in this situation.[15-19] The risk increases more than two fold for partners of HCV–HIV coinfected patients.[20] For intrafamilial or household transmission of HCV, the risk is relatively low.[21] Mucosal exposure or percutaneous exposure through personal hygiene items such as toothbrushes and razors is a possible mechanism of transmission, so precautions are recommended in this setting.

In the last five to 10 years, there have been several reports of outbreaks of acute HCV among HIV infected men who have sex with men.[22] Most of these patients are not intravenous drug users and they have stable and controlled HIV infection; most are being treated with highly active anti-retroviral therapy and have normal CD4 counts. These outbreaks seem to correspond to transmission through sexual networks that rapidly spread the infection and are not associated with specific strains of the virus.[23]

PERINATAL TRANSMISSION

Vertical transmission of HCV infection takes place at the time of birth in approximately 5% of children born to an infected mother.[24] This risk doubles for babies born to HIV–HCV coinfected mothers.[25] There is insufficient evidence for recommending a particular method of delivery, either vaginal or by cesarean section.[26]

HEMODIALYSIS

Patients on hemodialysis have an increased risk of being infected with HCV compared with the general population. The prevalence of HCV infection among patients on dialysis varies greatly between

different centers and countries. Prevalence in Latin America has been reported from 6.7% in Mexico[27] to 71% in Venezuela.[28] Factors associated with infection in this setting include duration of dialysis, type of dialysis (hemodialysis carries a higher risk than peritoneodialysis), number of blood transfusions and the prevalence of HCV infection in the unit.[29] There is ample evidence suggesting that the risk of transmission in the setting of hemodialysis units is nowadays most related to breakdowns in universal precautions, hence current guidelines do not support isolation of HCV-infected patients or the use of a dedicated dialysis machine for this group.[30,31]

HEALTHCARE WORKERS

HCV infection may be transmitted via needlestick or other percutaneous injuries and rarely by mucosal exposure in healthcare workers. Most accidents occur with disposable syringes, followed by suture needles and scalpels.[32] The risk of acquiring HCV infection after a needlestick accident is 1.8%.[33]

ORGAN TRANSPLANTATION

Patients receiving organs from HCV-positive donors have a very high risk of becoming infected.[34] Thus, the rationale for screening potential donors and not accepting organs from infected patients seems justified.

CONCLUSION

HCV infection in Latin America was principally transmitted by blood transfusion and unsafe therapeutic practices in the distant past (30 to 50 years ago). This translates to an older population of infected patients, with more advanced liver disease and a greater risk of developing hepatocellular carcinoma. The biggest challenges today for our region are to secure a 100% HCV screening policy for blood products and mandatory notification of positive blood donors, and address the increasing risk of ongoing transmission of HCV among intravenous drug users and sexually transmitted HCV infection in HIV–HCV coinfected partners.

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