# HCV TRANSMISSION BETWEEN SERODISCORDANT COUPLES THROUGH SEXUAL ROUTE

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## ABSTRACT

***Objective:*** To determine the rate of transmission of HCV between spouses through sexual route.

***Study Design:*** Descriptive study.

***Place and Duration of Study:*** This study was carried out at Military Hospital, Rawalpindi, Pakistan. It was conducted over a period of 4 years from June 2009 to June 2013.

***Patients and Methods:*** One hundred and sixty eight consecutive patients confirmed to have HCV infection by PCR for HCV RNA were enrolled in the study. Their spouses were also included in the study, and it was established through PCR for HCV RNA that the spouses were not suffering from HCV infection. All couples were inducted in the study within the first two months of starting the study. Therefore, the maximum and minimum follow-up time was 48 months and 46 months, respectively. The spouses were questioned for HCV risk factors and were tested for HCV antibodies six monthly. Once spouses were found to be anti-HCV positive, their HCV status was confirmed with PCR for HCV RNA.

***Results:*** Out of 168 patients, 90 (53.57%) were males and 78 (46.43%) were females. PCR for HCV RNA was found to be positive in 4 of 168 (2.38%) spouses. All these 4 couples in whom HCV transmission was found had genotype 3a. Out of the 4 spouses who tested positive for HCV RNA PCR, 3 (75%) were females and 1 (25%) was male. So HCV infection was transmitted in 3 out of 90 (3.33 %) and 1 out of 78 (1.28%) female and male spouses, respectively. In PCR for HCV RNA positive and negative spouses, the duration of marriage was 202 ± 53 and 199 ± 49 weeks; and the number of total sexual intercourses was 171 ± 93 and 169 ± 89, respectively.

***Conclusion:*** HCV transmission among serodiscordant couples in our setup did occur. The overall rate of transmission was 2.38%. The rate of transmission from male to female (3.33%) was higher than female to male (1.28%). However, a large scale study conducted over a longer duration of time is needed to recommend protected sex in serodiscordant couples if either partner is suffering from HCV infection.

**Keywords:** Hepatitis C virus, Sexual transmission.

## INTRODUCTION

The hepatitis C virus (HCV) is an important cause of chronic liver disease and a major public health issue[1]. Approximately 180 million people are infected with this virus worldwide. In Asia the sero-prevalence of Hepatitis C is 2.5%[2].

Certain means of spread of hepatitis C virus are well recognized and widely acknowledged; others are less well defined and need further study. Blood transfusion and injection drug use are the two most common exposures associated with spread of HCV. However, since universal blood screening for HCV was started, this method of transmission is now less common. It is vibrant that HCV is most often transmitted through large or repeated direct percutaneous exposures to infected blood[3,5].

It was revealed in early case-control studies of patients with newly acquired, symptomatic hepatitis C infection that there is a noteworthy link between disease acquisition and a history six months prior to illness of injection drug use, blood transfusions, multiple sexual partners, personal contact with others who had hepatitis, health care employment with frequent exposure to blood or low socioeconomic status[3-6]. Currently, the principle mode of transmission of HCV is injection drug use. HCV is more rapidly acquired after initiation of intravenous drug use compared to other viral infections[7-10].

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Transmission of HCV through sexual route has been controversial. It is believed that HCV can be transmitted sexually, but that such transmission is inefficient. The number of lifetime sexual partners increases the likelihood of HCV infection. A history of sexual intercourse with a commercial sex worker, multiple sexual partners, sexually transmitted disease, or a combination of these has been independently associated with positive HCV serology[11]. Distinction appears to exist between the specific sexual behaviors listed above, and stable, monogamous sexual activity, which is rarely associated with HCV transmission. According to most studies the frequency of HCV transmission between monogamous sexual partners is very low[12,13].

As the spread of the virus cannot be observed directly or experimentally manipulated through sexual interaction, to establish sex as the mode of transmission requires the determination of new infection in a vulnerable partner following sexual contact, the validation of the identical viral strains in the sexual partner, and the elimination of nonsexual modes of HCV acquisition. There has been convincing indication, authenticated through numerous comprehensive case reports that have provided considerable support that HCV can be spread through sexual contact[14,15].

Patients who acquire HCV infection are apprehensive about the transmission of virus to their spouses. The aim of this study was to determine the rate of transmission of virus through sexual route.

## PATIENTS AND METHODS

This study was carried out at Military Hospital, Rawalpindi. It was conducted over a period of 4 years from June 2009 to June 2013. It included married patients of both genders and all age groups suffering from hepatitis C virus infection, reporting in medical outpatient departments and admitted in medical wards.

One hundred and sixty eight patients having HCV infection confirmed by PCR for HCV RNA were enrolled in the study. Their spouses were also included in the study and were confirmed to be HCV negative by PCR for HCV RNA. All couples were inducted in the study within the first two months of starting the study. Therefore, the maximum and minimum follow-up time was 48 months and 46 months, respectively. Sexual activity without barrier methods was reported by all spouses with the index cases during study period. The index cases and their spouses filled in questionnaire forms and the couples were followed up on six monthly basis. Special inquiry regarding different risk factors for acquiring hepatitis C was part of the questionnaire. Risk factors studied included surgical and gynecologic procedures, dental extractions, tattoos made on the skin, blood transfusions, sharing of blades with the partners, use of intravenous drugs, sharing of tooth brushes with the partners and needle stick injuries.

Laboratory tests of these 168 patients and their spouses were requested and performed after every 6 months. These tests included the serum alanine aminotransferase (ALT), bilirubin, alkaline phosphatase, HCV antibody and qualitative PCR for hepatitis C virus RNA. All tests were carried out from the same laboratory (Armed Forces Institute of Pathology, Rawalpindi), and identical kits were used for all patients and their spouses. All reports were verified by consultant pathologist.

Data was analyzed using SPSS version 16. Percentages, means and standard deviations were calculated.

## RESULTS

Out of 168 patients, 90 (53.57%) were males and 78 (46.43%) were females. The average age of male patients was 41.4 years and that of female patients was 36.5 years. Minimum level of education of all patients was matric. Major risk factors other than sexual activity were excluded. HCV RNA positivity was found in 4 out of 168 (2.38%) spouses by the end of 4 years' study period. All these 4 couples in whom HCV transmission was found had genotype 3a. Out of the 4 spouses who tested positive for HCV RNA, 3 (75%) were females and 1 (25%) was male. So

HCV infection was transmitted to 3 out of 90 (3.33 %) and 1 out of 78 (1.28%) female and male spouses, respectively. The ratio of male-to-female versus female-to-male couples was 3 versus 1 (3.33% versus 1.28%) respectively. HCV infection was found to be transmitted to 2 female spouses after 3½ years of study period and by the end of 4 years' study period HCV was further transmitted to 1 more female and one male spouse. Out of 168 couples 116 (69.05%) belonged to the province of Punjab, 31 (18.45%) were from Khyber Pakhtun Khawah, 12 (7.14%) from Sindh and 9 (5.36%) from Balochistan. Frequency of HCV transmission to spouses through sexual route is shown in table-1.

The duration of marriage was 202 ± 53 and 199 ± 49 weeks; and the number of total sexual intercourse was 171 ± 93 and 169 ± 89, respectively.

Liver disease was not reported by any spouse prior to the marriage. Twenty three (13.69%) spouses had undergone various surgical procedures, 11 (6.55%) female spouses had gynecologic procedures, 37 (22.02%) spouses had dental extractions, 4 (2.38%) male spouses got tattoos made on their skins, 17 (10.12%) spouses had received blood transfusions, 7 (4.17%) spouses had shared blades with their partners. None of the spouses had used intravenous drugs, shared tooth brushes with their partners, or had needle stick injuries. However, all of the above mentioned spouses who had any risk factor other than sex for HCV transmission were anti-HCV negative and this was confirmed by PCR for HCV RNA. The above mentioned risk factors were noted during the study period.

## DISCUSSION

The role of sexual route in the transmission of the virus is debatable. The prevalence of HCV infection is greater among male homosexuals[16], commercial sex workers[17], and sex partners of patients infected with both HIV and HCV[18], suggesting a route of sexual transmission[16,17]. Fifteen percent of persons who recently acquired hepatitis C reported sexual exposures for a period of 6 months prior to the onset of illness, and two thirds of them had a sexual contact with an anti-HCV positive partner[18].

**Table-1: Frequency of HCV transmission to spouses through sexual route (n=168)**

| HCV transmission to spouses through sexual route | n (%) |
|---|---|
| Spouses infected | 4 (2.38%) |
| Male to female transmission | 3 (3.33%) |
| Female to male transmission | 1 (1.28%) |

Anti-HCV prevalence among the spouses of chronic Hepatitis C patients ranges between 0-27%[19]. Our study showed a relatively lower sero-prevalence rate of 2.38% between the spouses of hepatitis C infected patients, the probable reason could be that all couples in our study were monogamous. Another evidence in favor of low probability of HCV transmission via sexual route is the low viral load detected in semen[20].

The duration of marriage has also been linked with the rate of HCV infection. Guadagnino et al[21] revealed that the spouses of index cases who had been married to them for over 20 years had a 7.5 time risk of HCV sero-positivity compared to those married for less than 20 years. They, therefore, concluded that in the family setting sexual contact plays an independent role in the spread of HCV infection. Caporaso et al[22] stated in their studies an incidence of 15.6% of anti-HCV sero-positivity assessing the spread of HCV between spouses in HCV positive subjects; however, after adjusting for various confounders, the authors established that sexual transmission does not seem to play a role in the intrafamilial spread of HCV infection. However, a Japnese study revealed spouses with anti-HCV positive partners to be twice as likely to have anti-HCV positivity than spouses with anti-HCV negative partners; although, 50% of the couples contained dissimilar HCV genotypes[24]. A lower risk of sexual transmission in this group was demonstrated in studies in monogamous couples[24]. Analysis from Asian countries

indicates that interspousal transmission becomes critical with lengthier period of a partnership[23]; though, such results from western countries are rare[25]. In our study the duration of marriage and the total number of sexual intercourses did not affect the rate of transmission of HCV infection. The reason for this could be that our study was conducted over a shorter duration of time.

It is uncertain whether the hazard of HCV transmission differs between sexes[19]. Although our study showed that the percentage of male-to-female transmission was 3.33% and female-to-male was 1.28%, this could be due to larger mucosal surface area of female exposed to the secretions containing HCV.

## CONCLUSION

HCV transmission among serodiscordant couples through sexual route in our setup did occur with an overall rate of transmission of 2.38%. The rate of transmission from male to female (3.33%) was higher than female to male (1.28%). A large scale study conducted over a longer duration of time is needed to recommend protected sexual intercourse in serodiscordant couples if either partner is suffering from HCV infection.

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