Hepatitis C Virus Inter-Spousal Transmission Could be a Gate to Reduce Intrafamilial Spread and High Prevalence of HCV in Egypt

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Abstract

Background: It is generally agreed that HCV can be efficiently transmitted parenterally, although data on HCV transmission by non-parenteral routes such as sexual and non-sexual household contacts are conflicting. HCV is highly prevalent in Egypt.

Aim: To investigate HCV transmission between spouses, the burden and the potential risk factors of sexual and non-sexual transmission to prevent intrafamilial spread.

Patients and Methods: A cross-sectional study after a questionnaire, 100 male and 100 female HCV patients having confirmed HCV infection constitute the index cases. The spouses of 200 index cases and respectively 100 healthy volunteers with their spouses of matched age were included as control. They were tested for serum anti-HCV ELISA and confirmed by PCR test for HCV RNA.

Results: High rate of interspousal infection were detected, female spouses of male index cases were 42% positive and of females were 34%, male control 11% and their female spouses 6%. Age, duration of marriage, less educated spouses, risky sexual behavior and community risk factors showed a significant increase of HCV infection but insignificant increase with low socioeconomic levels and without significant difference between male-to-female and female-to-male transmission of HCV in spouses.

Conclusions: The study revealed high intra-spousal transmission of HCV. It increases with age, duration of marriage, less educated, non skilled and in invasive sex behavior. Interspousal transmission is considered to be the main gate for intrafamilial spread and essential for strategic prevention of HCV and reduction of its complications in Egypt.

Key Words: HCV – Reduce – Intrafamilial spread – Egypt.

Introduction

HEPATITIS C Virus infection appears to be endemic in most parts of the world [1] and is highly prevalent in Egypt. It is the main cause of chronic liver diseases and hepatocellular carcinoma especially in Nile Delta rural areas [2]. HCV disease burden focusing solely on injection risks are overly limited in scope to prevent HCV transmission in the high-risk population [3].

It is generally agreed that HCV can be efficiently transmitted parenterally, although data on viral transmission by sexual or non-sexual intrafamilial contact are conflicting. The overall rates vary from zero to 27% [4].

The risk for sexual partners was significantly higher when the risk factor for the index case was intravenous drug use. Sexual co-transmission of HCV is not completely understood and sexual behavior may enhance sexual transmission [5]. The reasons for high inter-spousal transmission need to be studied further [6].

The study was designed to evaluate HCV transmission burden and determinants between spouses for prevention and safe practices to prevent intrafamilial spread.

Material and Methods

Study area/setting:

This study was carried out in Tanta University Hospitals from Jan. to Sep. 2009 as a model for Nile Delta population, in the Department of Tropical Medicine and Infectious Diseases. It is a pooling center for cases of hepatitis (in a high endemic area) in Gharbia Governorate & surroundings.

The study included 100 male and 100 female patients diagnosed as having HCV infection will constitute the index cases and their 200 spouses.
Healthy volunteers (100 individuals and their spouses) matched for age and standard of life were included as control.

Sample size:
The study included a total of 600 individuals.

Data collection:
A predesigned questionnaire sheet was used for data collection through direct personal interviewing of index cases in Tropical Medicine Dept. and their spouses. The questionnaire sheet included the following data:
- Sociodemographic data of the patients and their spouses.
- Data related to knowledge, awareness and behaviors of patients and their spouses related to HCV infection.
- Data related to risky behaviors that may contribute to infection with HCV.
- Data regarding sexual history and sex behaviors among spouses.
- Obstetric and gynaecologic history of the female spouses.
- Data regarding family history of HCV and/or drug abuse.

Clinical examination: Full general and specific clinical examination stressing on abdominal examination and gynaecological examination in female spouses.

Investigations: Blood sample will be taken from the selected subject and the followings will be done:
- For patients: (Confirmed HCV cases).
- For spouses of patients and control: complete blood picture, liver function tests and detection of anti HCV antibodies by enzyme immunoassay method using (The INNOTEST® HCV Ab IV) as screening tests for diagnosis. Positive cases will be subjected to PCR testing for confirmation. Extraction was done by QIAamp viral RNA kit, then adding master mix and amplification was done by Applied Biosystem step one. Detection of product by running on agarose gel 1.5%

Testing validity and reliability of study tools (sheet):
Content validity of the questionnaire was tested.

Study definitions:
- Infected case of HCV: positive antiHCV antibodies and positive PCR.
- Patient spouse

Data management and analysis plan:
The collected data will be organized and statistically analyzed using SPSS software statistical computer package (version 13). The mean and standard deviation will be used for quantitative data and appropriate parametric tests for statistical analysis of differences between means (student test or ANOVA). For qualitative data the number and percent distribution was calculated and Chi square and other non parametric tests used for analysis according to appropriateness to data analyzed. Other tests. The 5% level of significance will be adopted for interpretation of results of tests of significance.

Ethical considerations:
1- All the study subjects (index cases and their spouses) was informed about the objectives of the study and were free to participate.
2- A verbal witnessed consent was obtained from each study subject.

Results
Table (1) showed the prevalence of positive female wives was 42/100 of male index cases, and that of positive male husbands was 34/100 of female index cases and the difference in between was not statistically significant. Out of 100 control males, 11 of them were discovered to be positive for HCV, 6 of their wives were positive also. There was no statistical significant difference between total cases and control.

<table>
<thead>
<tr>
<th>Status of HCV</th>
<th>Cases</th>
<th>Control</th>
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<tbody>
<tr>
<td></td>
<td>Females</td>
<td>Males</td>
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<tr>
<td>No.</td>
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<td>34</td>
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<td>-ve</td>
<td>58</td>
<td>66</td>
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<tr>
<td>Total</td>
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X² between F& M cases = 1.040  \( p = 0.308 \)  
X² between total cases and control = 1  \( p = 0.273 \).
<table>
<thead>
<tr>
<th>Items</th>
<th>Positive</th>
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<th>Negative</th>
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<th>Positive</th>
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<th>Negative</th>
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<th>Positive</th>
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<td>26.1</td>
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<td>53.4</td>
<td>8</td>
<td>23.5</td>
<td>34</td>
<td>51.5</td>
<td>19</td>
<td>25</td>
<td>65</td>
<td>52.4</td>
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<tr>
<td>One</td>
<td>22</td>
<td>52.4</td>
<td>21</td>
<td>36.2</td>
<td>12</td>
<td>35.3</td>
<td>26</td>
<td>39.4</td>
<td>34</td>
<td>44.7</td>
<td>47</td>
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<tr>
<td>More</td>
<td>9</td>
<td>21.4</td>
<td>6</td>
<td>10.3</td>
<td>14</td>
<td>41.2</td>
<td>6</td>
<td>9.1</td>
<td>23</td>
<td>30.3</td>
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<td>9.7</td>
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<tr>
<td>Total</td>
<td>42</td>
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<td>34</td>
<td>66</td>
<td>76</td>
<td>124</td>
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\[ X = 7.786^* \quad p = 0.020 \]
\[ X = 15.835^* \quad p = 0.0004 \]
\[ X = 20.388^* \quad p = 0.000 \]

# E.g. Blood transfusion, previous surgery or wound dressing or dental manipulations, common syringes or birth outside hospital (females).
Regarding age, it was found that 40.5% of positive female cases were aged 50 years or more compared to 15.5% of negative female cases, with statistical significant difference in between. Also, there was a statistical significant difference between different age groups of positive male cases and between total positive and negative cases. These results reflect the role of long age for more chance for accepting hepatitis C virus through interfamilial relationship. Regarding duration of marriage, there were significant higher percentages of hepatitis C cases with increased duration of marriage among different groups of male and female cases and total cases compared to negative ones (35.7%, 38.2%, 36.8% versus 13.8%, 15.1%, 14.5%). Hepatitis C virus infection was recorded significantly more among unskilled worker female cases including housewives than other types of occupations. There was also statistical significant difference between different types of occupation regarding hepatitis C virus infection among total positive and negative cases, where unskilled workers recorded more among positive cases (Table 2).

Higher percentages of low and illiterate female cases were positive to HCV virus infection (76.2%) compared to 43.1% of negative ones with statistical significant difference in between. There was also statistical significant difference between total cases regarding different educational levels in acquiring hepatitis C virus infection. Hepatitis C virus infection recorded more among low income female and male cases and their total but with no statistical significant difference in between.

The role of community risk factors (as blood transfusion, previous surgery, needle pricks; wound dressing, dental manipulations, common barbers (M) and hair dressers (F) etc) for acquiring hepatitis C virus infection, where 41.2% of positive male cases have more than one risk, compared to 9.1% among negative cases. Also more than have of female positive cases have at least one risk factor, with statistical significant difference between different groups of male and female positive and negative cases. Also there was statistical significant difference between total positive and negative cases regarding community risk factors (Table 3).

Regarding interfamilial risk behaviors, there were high percentages of individuals having at least one Interfamilial risk factor (common use of scissors, shaving machines, razors, combs, tooth brushes, foments Poor WCs hygiene etc) and the others have more than one risk factors, but with no statistical significant difference in between (Table 4).

Table (5) showed that among all different groups, those have history of abnormal sexual intercourses (anal, oral, or during menses) and those practiced other risky sexual behaviors (mouth
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between spouses were reported in countries with prevalence in endemic areas because of religious and social factors. This may that sexual transmission may not be the main route remains a subject of debate the risk of transmission for households of infected the main role in interspousal transmission but sex cannot be neglected which is possible to increase the risk of transmission for households of infected subjects [17,18]. Sex as a mode of HCV transmission remains a subject of debate [19] and were mentioned that sexual transmission may not be the main route of transmission [20].

It is not conclusive by different lab studies to differentiate HCV interspousal transmission to be due to household contact or sexual contact. Probably sexual transmission, like other forms of human contact can play a significant role within this group of patients [21].

In the current study, the percentage difference between male and female spouses of index cases and sometimes absence of other risks for transmission could be attributed partially to sexual transmission which could suggest a role for sexual contact in spread of infection. This was mentioned in many reports [22]. Multiple partner's anal intercourse or sex with trauma to genital mucosa [23], extramarital sex for vulvar and vaginal lichen planus involvement [24] and sexual behavior is also strongly considered [4,25].

The present results are consistent with the results reported that no significant difference was noticed between the prevalence of male-to-female and female-to-male transmission. They mentioned that 23% of husbands who presented wives as an index case, and 29% in wives who presented husbands as an index case [18].

In control group, male partners in the present study were noticed to have more ratios of infection than females which could be explained by exposure to additional risks in the community and also male to female transmission may be more than female to male transmission according to other reports. This could reinforce the hypothesis that infection from woman to man is much less likely than the contrary [26] also; promiscuous sexual activities may be risk factors among them.

As regard sociodemographic characteristics of the studied sample, Table (2) showed higher rates of HCV infection with significant difference with the increased age and duration of marriage in agreement with previous results [17]. This could be explained by more chance for infection by prolonged time and the chance to more frequent exposure to risks [9,12].

Educated couples have significant lower transmission rates as compared to low educated and illiterate spouses; this could be explained by less education and awareness in between such peoples which is important for HCV transmission.

In the current study, it was interesting to detect an insignificant increase in the rate of HCV infection with lower socioeconomic level. This could suggest that education, awareness of infection and intrafamilial hygiene are more important than socioeconomic level.

Discussion

Inter spousal transmission of HCV has been documented as the most important route of intrafamilial spreading of HCV [7,8,9]. But, there has been controversy in many previous studies as being due to house hold contact or sexual contact [1,10,11].

In the current study, Table (1) showed high rates of inter spousal transmission as compared to other studies [10,12,13] which is consistent with the high prevalence of HCV in Egyptian Nile Delta.

The higher rates of inter spouse HCV prevalence (42% in females of male indexes, 34 of males of female index cases, and 6/11 of control) without significant difference between both spouses of index cases and that of control which could be explained by presence of risks of inter spouse weather house hold or sexual contact in both groups, whether they soughted medical care (study group) or not (control group) as has been documented in previous reports [11] W.H.O. mentioned that spouses of patients with chronic hepatitis C have a higher risk of acquiring HCV that increases with longer duration of marriage and period of exposure [17]. The overall, anti-HCV was detected in 14% [10], 17% [12], 23% [14], 25% [13] and 34% [7] of spouses of infected patients in many different areas of the world and spouses had the highest prevalence in endemic areas [9]. These results denote that inter spousal transmission is linked to the prevalence of the disease in the general community in agreement of the current results while low incidence of hepatitis C virus transmission between spouses were reported in countries with lower HCV prevalence [15,16].

Household contact is considered in many reports the main role in interspousal transmission but sex cannot be neglected which is possible to increase the risk of transmission for households of infected subjects [17,18]. Sex as a mode of HCV transmission remains a subject of debate [19] and were mentioned that sexual transmission may not be the main route of transmission [20].

kissing, bite, or licking, body fluid exposure) have higher percentages of hepatitis C virus infection than those have no risky behavior, with statistical significant difference in between. The information about extra marital sex was difficult to obtain because of religious and social factors. This may mimic the sequel of such risk.
Regarding risk factors for interspousal transmission of HCV infection, the community risk factors in the current study. Table (3) showed a statistical significant difference between total HCV positive and negative cases and this could reflect high HCV prevalence and be the source for intrafamilial entry.

HCV infection has been detected in persons in whom no clear risk factor has been defined which was reported in about 40%-45% of cases [27]. The household contacts of hepatitis C virus patients have been shown to have an elevated risk of HCV infection [28].

Regarding interfamilial risk behaviors (Table 4), there were high percentages of individuals have at least one interfamilial risk factor (common use of scissors, shaving machines, razors, combs, tooth brushes, foments, Poor WC’s hygiene etc.) and the others have more than one risk factor, but with no statistical significant difference in between which could reflect nearly the same habits in the community with the possibility of sexual transmission.

Intrafamilial potential transmission is important for HCV control in an endemic area [17]. There is an increased risk for households of infected subjects and identification of the means of transmission to prevent dissemination of HCV infection is of value [10]. Intrafamilial spread of hepatitis C virus may occur [29]. Parents are the main source of infection to their children [30]. Blood contact is considered the main source of infection [7].

In the present work Table (5) showed that spouses with history of abnormal sexual intercourses (anal, oral, or during menses) and those practiced other risky sexual behaviors (mouth kissing, bite, or licking, body fluid exposure) have higher percentages of hepatitis C virus infection than those have no risky behavior, with statistical significant difference in between. This was in agreement with previous studies mentioned that HCV infection may be enhanced by other concomitant risky sexual behavior as bleeding caused by intimate partner violence [31], types of sexual practices as anal intercourse or sex with trauma to genital mucosa and/or during menses [11]. Sexually transmitted infections were enhanced by genital erosive lesions [32]. Long duration of contact and promiscuous sexual activities were major risk factors.

Conclusion and recommendations: Interspousal transmission is high in couples having HCV patient. Multiple risks weather house hold direct or indirect contact with blood through common use of utensils or body discharges and partially invasive sex are responsible for this high rate. Low socio-economic, less educated spouses and those with abnormal sexual habits are more exposed to infection.

These findings call for the following recommendations:

- Screening of special groups for HCV infection. It is better obtaining a marriage certificate.
- Screening of other partner of newly diagnosed cases for early detection and treatment.
- Health education for risk reduction and healthy life style.

References


