
H. Ansari, H. Kamani and A. Arbabi Sarjo

The purpose of this study was to assess of hepatitis C and related factors among beta-thalassemia patients. In 2005-2006 a cross sectional study was conducted in Dastgheib hospital, Shiraz, Iran. Participants were all beta-thalassemia major patients (806 cases). Blood samples were taken from patients and HCVAb was determined using commercial Kit. The data collected using a questionnaire consists on demographic and treatment related variables. Data were analyzed using chi-square test. The subjects were 400 (49.6%) females and 406 (50.4%) males. Thirty-two patients (3.9%) were more than 30 years old and 372 (46.1%) were less than 15 years old. Prevalence of this infection among males and females was 12.8 and 16%, respectively. No significant difference was seen between males and females regarding prevalence of hepatitis C (p = 0.15). The prevalence of hepatitis C was statistically correlated with type of transfused blood and blood group of patients (p = 0.05). The findings showed that despite blood screening to prevent hepatitis C, prevalence of this infection was higher among Beta-thalassemia major patients. Thus, careful screening and healthy blood transfusion is too important. It must be mentioned that packed red blood cell should be inspected with greater attention and probably O blood group predispose the patients to HCV infection.

Key words: Prevalence, hepatitis C, beta-thalassemia major

1Department of Epidemiology and Statistic, Faculty of Health, Zahedan University of Medical Sciences, Zahedan, Iran
2Department of Environmental health, Faculty of Health, Zahedan University of Medical Sciences, Zahedan, Iran
3Department of Nursing, Faculty of Nursing, Zahedan University of Medical Sciences, Zahedan, Iran
INTRODUCTION

Thalassemia major is one of the most prevalence hereditary diseases around the world. In Iran, it is more prevalent in the northern and southern provinces (Karimi et al., 2002). This disorder is one of the sever hemoglobinopathies which is presently observed in the center of Africa, Asia, the south of Pacific Ocean and some districts of India (Ghotbi and Tsukatani, 2005). Among 18000 beta-thalassemia major patients who live in Iran, 2000 live in Fars province, which is more than those who live in all over the USA (Karamifard et al., 2003). This disorder has different complications because of inappropriate treatment and other demographic factors related to the treatment. Some of these complications are cardiac disease, endocrinologic disease and viral disease transmittable through blood such as hepatitis B and C and AIDS. Infections are the second prevalent cause of death among thalassemic patients (Karimi et al., 2002; Ghotbi and Tsukatani, 2005; Karamifard et al., 2003; Tamaddoni et al., 2007; Mirmomen et al., 2006). The most prevalent infection which is transmittable through blood transfusion among these patients is hepatitis C. From each 1000 blood receivers almost 5-10 people get hepatitis C (Hajiani et al., 2006). Lack of control and accurate screening of blood caused a remarkable number of thalassemic patients, who were in need to regular blood transfusion and leads to get hepatitis C (Hajiani et al., 2006; Abram and Benenson, 1995; Jules et al., 1999, Melody et al., 2004). Using screening methods, specially advanced methods like ELIZA generation I and II, decreased the risk of both hepatitis C and HIV (Hajiani et al., 2006). Nevertheless for some reasons, hepatitis C is observed among these patients that is necessitates more attention. Since it is not only affects the life of thalassemic patients and their families but also other especially their relatives are at risk of transmission (Tamaddoni et al., 2007; Mirmomen et al., 2006; Melody et al., 2004).

HCV is transmittable through platelets, plasma, packed cells and specialty coagulating factors (Hajiani et al., 2006). This virus is also transmittable through sexual intercourse and organ transplantation and also transmittable through contaminated needles and syringes especially among addicts and thalassemic patients. The transfer of disease among the family members of the hepatitis C patients has been observed (Abram and Benenson, 1995; Bastie et al., 1995). Therefore special attention is necessary to prevent the transfer of infection among the patient’s family members.

There are about 100,000,000 hepatitis C virus carriers through the world (Tamaddoni et al., 2007; Hajiani et al., 2006; Peter and Hepatitis, 1997). This virus is the main cause of liver cirrhosis in Japan and the US. In the US hepatitis C is the main cause which leads to liver Transplantation (Peter and Hepatitis, 1997; Sheila and James, 1999). In Iran, prevalence of this infection is less than hepatitis B, so that only 0.3% of Tehran’s volunteer blood donors have HCV in their blood serum (Mirmomen et al., 2006; Hajiani et al., 2006) while it has been reported that the prevalence of HCV was 4.2 and 1.4% among Egyptians, Japanese and Africans respectively (Bastie et al., 1995; El-Ghohara et al., 1995; WHO, 1998). There are noticeable geographical differences in the prevalence of this infection. For example the epidemiological studies show that the prevalence of this infection is 0.4-1.1% in North America, 0.9-1.4% in New York and 9.6-13.6% in North Africa (Jules and Dienstag, 1999; Bastie et al., 1995; Peter and Hepatitis, 1997). Among thalassemia patients, because of repetitive blood transfusion, the prevalence of HCV is reported between 10-50%. In Iran the prevalence of this infection among syringes using addicts, hemophiliac and thalassemic patients are 40, 60 and 15-20%, respectively (Tamaddoni et al., 2007; Mirmomen et al., 2006; Jules et al., 1999; Bastie et al., 1995).

Hepatitis C is the most common and important cause of chronic Hepatitis among Iranian thalassemic, hemophilic and hemodialysis patients (Tamaddoni et al., 2007; Mirmomen et al., 2006). Nowadays among blood transfusion transmittable infections hepatitis C is the most important prevalent reason for acute hepatitis and cirrhosis of liver among thalassemic and hemophilic patients (Tamaddoni et al., 2007; Mirmomen et al., 2006; Sheila and James, 1999). The main reasons of these infectious are transmission through blood transfusion and change of body immunity because of spleen hyperactivity. The standard blood transfusion to keep hemoglobin rate higher than 10 mg dl⁻¹ causes thalassemic patients to be recipient of blood from 4 or 5 donors (Karimi et al., 2002; Ghotbi and Tsukatani, 2005; Tamaddoni et al., 2007; Mirmomen et al., 2006; Melody et al., 2004; WHO, 1998).

Epidemiological studies findings regarding the methods of transmission of infection is not enough; however the most important method of transmission is through blood transfusion, specially its components. Among susceptible people to infection such as addicts, hemophilic patients and thalassemic patients, thalasemic ones are the most ready to be infected (Hajiani et al., 2006; Jules et al., 1999; Bastie et al., 1995; Peter and Hepatitis, 1997).

Infection by HCV has a high inclination to turn to be chronic. We hypothesized that blood group, type of
transfused blood and sex would relate to Hepatitis C infection. The purpose of this study was to assess prevalence of hepatitis C among Beta-thalassemia major patients and to determine distribution of this infection based on sex, age, type of transfused blood and blood group.

MATERIALS AND METHODS

In 2005-2006 a cross sectional study was conducted in Dastgheib hospital, Shiraz, Iran. Participants were all Beta-thalassemia major patients (806 cases). Blood samples were taken from patients and HCVAb was determined using commercial Kit. The data collected using a questionnaire consists on demographic and treatment related variables. The patients were referred to the hospital for blood transfusion and chelating therapy and check up periodically and they were from boushehr, kouhikolye and boyer ahmad and Fars provinces. The patients were age ranging from 1-43 years and all of them had files in the center. After informed consent was taken, the data collected using a questionnaire. In addition to interview with patients and their companions to complementation of information we also used from files and consulted with physicians in the center. The accuracy of information was increased by the patient's regular visits in previously set times, necessary in treatment of the cases with complications, doctors roles in prescribing medicine and the family roles in dealing with the complications. The data analysis was performed by descriptive statistic (mean, standard deviation and percentage) and analytical statistic (chi-square and independent t-test) using SPSS version13 software. The level of significance was set at p<0.05.

RESULTS

The subjects were 400 (49.6%) females and 406 (50.4%) males. Thirty-two patients (3.9%) were more than 30 years old and 372 (46.1%) were less than 15 years old. The mean age of the patients was 15.3±6.82 years. The mean age of the females' was 15.7±5.7 and of the males were 14.9±5.8 years. There was no statistically significant difference between them (p=0.05). The mean age of the first blood transfusion and chelating therapy were 19.1±2.01 months and 5.8±3.9 years, respectively. Twenty-four old of patients (75%) who have delayed chelating therapy were older than 30 years old (75%). Five hundred and thirty four of patients (69%) that were younger than 30 years old started chelating therapy on time. Four hundred and sixty five of patients (57.7%) used deferoxamin through pumping and 317 (39.3%) through injection together with blood and pumping. Twenty four of patients (3%) never injected deferoxamine. The amount of injected blood in accordance with the patient's level of hemoglobin differed between 70-780cc in different patients. Six hundred and forty six of patients (80.1%) used packed red blood cell and 160(19.9%) used washed red blood cell. Only 209 (26%) of patient's mothers had university education. The distribution of BG among these patients was concordance with population (using chi-square test, p>0.05) and 38% of patients had O blood group.

The prevalence of hepatitis C was 14.4%. Prevalence of this infection among males and females was 12.8 and 16%, respectively. No significant difference was seen between males and females regarding prevalence of hepatitis C (p = 0.15). The results are shown in Table 1.

According to the findings, the highest prevalence is observed among 1991-2005 peer groups (24.7%) and the lowest prevalence is observed among 1976-1990 peer groups (4.2%) (Table 2).

As the results show, in Table 3 the prevalence of this infection among patients who used packed red blood cell (15.9%) was more than patients who used washed red blood cell (8%). Chi square test was also approved the finding at statistically significant level of 0.05 (p<0.05).

The results suggest that the highest prevalence of hepatitis C existed among the patients with O blood group patients (20.6%). Therefore, it seems that they are at higher risk of infection than other patients. On the other hand the least prevalence of hepatitis C was observed among the patients with AB blood group (7.4%). However, the difference was statistically significant at level of 0.05 (p<0.05) (Table 4).

The mean age at onset of hepatitis C and age in patients with complication were 17.13±5.4 and 19.1±5.05 respectively and mean of years with hepatitis C was estimated 1.99 years. Since hepatitis C is due to contamination of blood and injection instruments, the mean age may differ in different circumstances.

Since the prevalence of hepatitis C is related more to the quality and contamination of blood rather than demographic factors, hence, we study only its prevalence

Table 1: Distribution of hepatitis C among thalassemia major patients by sex

<table>
<thead>
<tr>
<th>Hepatitis C</th>
<th>Infected</th>
<th>Uninfected</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>No.</td>
<td>No.</td>
<td>No.</td>
</tr>
<tr>
<td>Males</td>
<td>52</td>
<td>12.8</td>
<td>354</td>
</tr>
<tr>
<td>Females</td>
<td>64</td>
<td>16.0</td>
<td>336</td>
</tr>
<tr>
<td>Total</td>
<td>116</td>
<td>14.4</td>
<td>690</td>
</tr>
</tbody>
</table>

Χ²=1.9

p = 0.1
of this infection with regard to blood, age and sex. Other factor is not taken into consideration. All the patients were using antiviral drugs. Also 6% of the patients were affected by hepatitis B.

**DISCUSSION**

This study showed that the main factor to prevention of this infection among these patients is complete and correct collection and screening of donated blood. It seems that the contamination of packed red blood cell is more than washed red blood cell. Therefore packed red blood cell should be inspected with great attention. This study showed that probably O blood group predisposes the patients to HCV infection but further study should be conducted to approve this result. Since this infection is communicable through injection instruments such as transfusion and chemotherapy instruments, so it seems that sterilization of these instruments and training patients to privately use them are importance.

Hepatitis C prevalence in this study was 14.4%. This result showed that prevalence of this infection is much lower than that of the USA (Melody et al., 2004). Nevertheless prevalence of hepatitis C is related more to the quality and contamination of blood rather than other factors, so this difference in special periods and different cities or countries is not out of expectation. The prevalence of hepatitis C in this study is also different from the previous study in Iran (Tamaddoni et al., 2007; Mirmomen et al., 2006) and it is higher than of it. This can be due to distribution of infected blood all over the country for the purpose of transfusion in specific period of time. The most important way of hepatitis C transmission is through blood transfusion. In Iran most infections happened before 1996, because after then blood was screened carefully for the prevention of infection.

In this study, there was not any statistically significant relation between sex and prevalence of hepatitis C. It is clearly that the male and female patients used the same blood and the main way of the infection transfer is transfusion, so it is not expected to observe any differences between male and female subjects. Unless
accidentally one sex be exposed more to infected blood
than the other one. This result is in accordance with
the previous findings in Iran (Tamaddoni et al., 2007;
Mirmomen et al., 2006).

As we found in this study it seems that packed red
blood cell is more contaminated than washed red blood
cell. According to the findings of this study, the
prevalence of hepatitis C in patients who used packed red
blood cell was significantly more than those who use
washed red blood cell (Table 3). It is recommended that
to pay more attention to patients who used packed red blood
cell because they are at higher risk of infection.

Another interesting result of this study was that the
prevalence of hepatitis C among the patients with O blood
group was more than the other patients. It seems that this
blood group is more susceptible to contamination than
other blood groups. Therefore, careful screening of this
blood group is more important. Further studies are
necessary to prove if there is a factal relationship between
blood group and hepatitis C and other infection disease
among these patients.

Hepatitis C not only causes suffering to the patients
and their families, it may be communicated to others
(Hajiani et al., 2006; Jules et al., 1999; Bastie et al., 1995)
so study about this infection in different times is very
important.

The findings show that, despite blood screening to
eliminate pathogenic factors, hepatitis C resulting from
infected blood was observed. Most of these patients were
affected in recent years. Hence careful screening and
healthy blood transfusion is too important.

Hepatitis C is a global main problem with expensive
treatment and the result of the treatment is not always
satisfactory (Melody et al., 2004) hence prevention of this
infection is very important. It must be mentioned that the
blood needs through screening before transfusion to
decrease the risk of infection. Moreover, all of injection
instruments for chelating therapy must be sterilized before
application. Health care service authorities and personnel
should take these points into consideration. It suggested
that thalassemia major patients with hepatitis C must
avoided drinking alcohol, because it causes the liver
damage, increase the risk of liver cancer and decrease
response to Interferon (Sheila and James, 1999; Marsano
and Pena, 1998).

Thalassemia major is a hereditary disease which
necessitates blood transfusion and chelation therapy
tought the life. Appropriate treatment and care may lead
to a normal life cycle in these patients. It is possible that
these patients like their peer groups without any serious
complication continue their life. Patients and their families
cooperation with physicians, health service personnel’s
education of patients and their families, encouragement of
patients, following appropriate treatment procedures and
familiarizing patients with the complications can
significantly decrease the complications of beta-
thalassemia majors specially iron overload complications.
It’s clear that bone marrow plantation is not possible for
all patients. It is hoped that more efforts into these
patients bring appropriate treatment methods to promote
the patient’s life quality.

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