

## THE PREVALENCE OF ANTI HCV INFECTION AND ITS RELATED FACTORS IN PATIENTS WITH BETA-THALASSEMIA IN SHIRAZ-IRAN

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### ABSTRACT

**Purpose:** Hepatitis C virus (HCV) is a serious public health problem around the world. Patients with major thalassemia are at high risk of hepatitis C due to the blood transfusion from donors infected by HCV. The aim of this study was detecting the prevalence of HCV and its related factors in Shiraz-Iran.

**Material and Methods:** This Retrospective Cohort study was conducted in Shiraz City, the south of Iran, from 2004 to 2014 enrolling 839 beta-thalassemic patients. Data were collected from the patient's medical records and they were analyzed using multiple logistic regression. **Results:** The prevalence of HCV was estimated 4.4% among thalassemic patients. The mean age of patients was 22.87(8.11). 23(5.5%) and 14(3.3%) of beta thalassemic patients which were infected by HCV were male and female respectively. Age, type of thalassemia and heart complications had a significant association with HCV seropositivity in multiple logistic regression models.

**Conclusions:** Our findings revealed that Age, type of thalassemia and heart complications were the main risk factors for HCV infection among beta-thalassemic patients. Due to the increase of patients survival and since the HCV is related to the other complications, we must use some methods such as weekly cares, fresh blood transfusions to patients and timely and early hemoglobin treatment to reach to decrease and delay the effect of this disease in patients.

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### Introduction

Beta thalassemic patients are exposed to hundred or thousand blood of donors during their lives, because they need blood products repeatedly. So they are at high risk of blood-borne disease such as HIV and viral hepatitis. HCV virus is one of the

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blood-borne pathogen associated with multiple complications and mortality [1-2]. The studies have shown more than 50% of major thalassemic patients would be infected by a type of hepatitis [3-4]. The infectious after blood transfusion is still one of the most principal challenges in human society despite all of the progresses of human knowledge. All the efforts for HCV prevention and treatment lead to decrease transmission of the hepatitis significantly [5-6-7]. The studies have shown the prevalence of the infectious depends on the first time they ever used blood products [8-9]. Iran is situated in the middle of thalassemia belt and has a high frequency rate for thalassemia carriers [10]. Iran has more than 2000 patients with thalassemia already [11]. According to different researches, the prevalence of HCV in beta thalassemic patients is 20%-30% in our country [12-13]. Beta thalassemic patients are at high risk of liver fibrosis because of a high range of hemoglobin in liver, further their livers are more vulnerable than non-thalassemic patients. Moreover, it must be more dangerous for them to be infected by HCV and it will cause serious damages such as Hepatocellular Carcinoma [6]. Considering that no study has been done about the prevalence of HCV in Fars yet, it can examine the effects of factors related to thalassemic patients which are infected by HCV. By recognizing these factors we can improve blood transfusion centers and try to minimize the complications associated with blood and blood products. In this study, the prevalence of HCV and its related factors have been examined in Fars Province.

### Materials and Methods

This Retrospective Cohort study was conducted in Shiraz City, the south of Iran, from 2004 to 2014 enrolling 839 beta-thalassemia patients. The data of all patients based on census method were cross-sectionally extracted from patients' medical records using a predetermined checklist including age (calendar age at the study enrollment time), sex, education level, marital status (single or married), consanguinity, ferritin & hemoglobin level, blood transfusion, type of beta-thalassemia (major or intermedia), and accompanied diseases (Hepatitis C, Diabetes type 2, Splenectomy, Hypogonadism, Thyroidism). Ferritin and hemoglobin levels are measured every six months and once a month, respectively. The average level of the last four times (except for two patients) was considered as the level of ferritin and hemoglobin in the analysis.

#### Statistical Analysis

We used mean and standard deviation and relative and absolute frequency to analyze quantitative and qualitative variables, respectively. They were used to find significant associations between patient's characteristics and HCV positivity. Multiple logistic regression models were applied to estimate adjusted odds ratio and 95% confidence interval for risk factors of HCV positivity. Statistical tests were conducted at the  $P < 0.05$  significance level. The collected data were coded and entered in a data base file. After complete entry, data were transferred to the SPSS software version 16 (SPSS Inc., Chicago, IL).

This study has been approved in ethical committee of Shiraz University of Medical Sciences. All information from medical records of patients is kept confidentially.

### Results

Eight hundred and thirty nine patients with thalassemia enrolled in this study. 37 of participants (4.4%) were infected by HCV. 23(5.5%) and 14(3.3%) of them were male and female respectively. The mean age of these patients were 22.87(8.11). Out of all 37 patients, 30(5.2%) had major thalassemia and 7(2.9%) had intermedia thalassemia. Also 18 patients who had consanguineous marriage were infected by HCV. 18 patients with education level higher than diploma and 16 ones with diploma and lower than diploma [Table 1]. In beta thalassemic patients, the frequency of patients with Splenectomy was 386(43.5%), patients with heart complications was 170(20.3%), patients with diabetes was 125(14.9) and in patients with Osteoporosis was 313(37.3) and at last in patients with Parathyroid complications was 232(27.3).

**Table 1.** Description of the socio-demographic factors of the HCV of Thalassemia patient in Fars province, Iran

	Total	HCV	
		positive	negative
Gender (n=839)			
Female	421(50.2)	14(3.3)	407(96.7)
Male	418(49.8)	23(5.5)	395(94.5)
Marital Status (n=835)			
Single	742(88.9)	34(4.4)	708(75.4)
Married	93(11.1)	2(2.2)	91(97.8)
Education Level(n=808)			
Diploma and lower than diploma	325(40.2)	16(4.9)	309(95.1)
Higher than diploma	483(59.8)	18(3.7)	465(96.3)
Type of Thalassemia(n=826)			
Major	581(70.3)	30(5.2)	551(94.8)
Intermedia	425(29.7)	7(2.9)	238(97.1)
Type of Parents Marriage (n=833)			
Consanguineous	420(50.4)	18(4.3)	403(95.7)
Non-consanguineous	413(49.6)	18(4.4)	395(95.6)

The crude analysis of variables related to HCV has been shown in [Table 2]. The results showed the risk of HCV increases 9% by aging [OR:1.09,95% CI(1.05-1.15)] which is statistically significant. The risk of HCV in patients with some complications is more than other patients who have not these complications. For example, in patients with splenectomy was 4times more and patients with heart disease was 10 times more [OR:3.73,95%CI(1.82-7.66)]. Also in patients with diabetes was 2.5 times more [OR:2.55,95%CI(1.23-5.31)] and 3 times more in patients with thyroid complications[OR:3.73,95%CI(1.82-7.66)]. In patients with Hypogonadism 2.5 times more than the patients who have not this complications [OR:3.73,95%CI(1.82-7.66)]. All of these results were statistically significant as well. The risk of HCV in men was 69% more than women and 2 times more in single compared with married ones. But these were not statistically significant. This risk in high educated people was 34% more than low educated ones. Also, patients with a hemoglobin level of greater than 9.5 g/dl (33%) had a lower risk of HCV positivity in comparison with patients who had a greater hemoglobin level and in patients who had serum ferritin levels less than (2500 ng/ml) were 34% less than those who had higher ferritin levels. But also these were not statistically significant.

**Table 2.** Crude Odds Ratio (OR) estimating the factors associated with Thalassemia patients with HCV

	Hepatitis	
	OR(95% CI)	P <sub>Value</sub>
Age(years)		0.001**
Sex		
Female	Reference	Reference
Male	1.69(0.85-3.37)	0.128
Married status		
Married	Reference	Reference
Single	2.19(0.52-9.25)	0.288
Education		
Higher than diploma	Reference	Reference
Diploma and lower than diploma	1.34(0.67-2.67)	0.408
Type of thalassemia		
Intermedia	Reference	Reference
Major	1.85(0.80-4.27)	0.149
Hemoglobin Level(g/dl)		
>9	Reference	Reference
<=9	1.80(0.91-3.52)	0.090
Ferretin Level(ng/mL)		
More than 2500	Reference	Reference
Less than 2500	0.57(0.29-1.12)	0.103
SPELENECTOMY		
No	Reference	Reference
Yes	3.73(1.82-7.66)	0.001**
DIABET		
No	Reference	Reference
Yes	2.55(1.23-5.31)	0.012
Thyroid complications		
No	Reference	Reference
Yes	3.36(1.27-9.07)	0.018
HYPOGONADISM		
No	Reference	Reference
Yes	2.44(1.26-4.74)	0.008

Adjusted multiple logistic regression about related factors of HCV in patients with thalassemia have been shown in [Table 3]. The risk of HCV infection in major thalassaemic patients was 3 times more than patient with intermedia thalassemia [OR:3.09,95%CI(1.19-8.03)]. Also it was 10 times more in patients with heart complications in comparison with those who had not such complications.

**Table 3.** Adjusted Odds Ratio (OR) estimating the factors associated with Thalassemia patients with HCV

	Hepatitis	
	OR(95% CI)	PValue
Age(years)	1.09(1.05-1.15)	0.001**
Type of thalassemia		
Intermedia	Reference	Reference
Major	3.09(1.19-8.03)	0.021
Heart Attack		
No	Reference	Reference
Yes	4.57(2.25-9.29)	0.001**

### Discussion

Among all of the blood-borne infections, HCV is the most important one. The prevalence of HCV all over the world is 3% [9]. The screening tests of HCV were discovered in 1990. After 1992 the screening test on blood bags became mandatory. Nowadays the risk of transmission of HCV decreases to 1:100000 by the help of the third generation kits [14]. In Iran HCV Ab tests were conducted on blood donors by first generation of ELISA (enzyme linked immunosorbant assay) method and by since 1375 and by third generation of ELISA method since 1377 [15].

This Retrospective Cohort study were conducted on 911 beta thalassaemic patients in Shiraz from 2004 to 2014. In this study the prevalence of HCV in beta thalassaemic patients was 4.4%. The former researches reported that the prevalence of HCV was 7-64% in Iran [16]. For example, 28.1% in Khuzestan [17], 64% in Rasht [18], 25% in Shiraz [19], 8% in Isfahan [20] and 13% in Sistan and Baluchestan as well [21]. The reason of such this wide range is the difference between type and sensitivity of diagnostic tests. In Arabic countries the prevalence of HCV in beta thalassaemic patients was in a range from 33% to 67.3% [22-23]. A study was conducted in Pakistan which includes 180 children with major thalassemia from January 2002 to December 2003. Out of all 180 children, 75 of them were HCV infected [24]. In another study in India, the prevalence of HCV was 23.1% in beta thalassaemic patients [25].

This study also evaluated the risk factors of HCV in beta thalassaemic patients. The results of multiple logistic regression modeling have shown that age, type of thalassemia and heart complication have a significant correlation with HCV positivity. The findings proved that the risk of HCV will be increased about 9% by aging. Patients who were infected by HCV not only are at risk of Cirrhosis and Hepatocellular Carcinoma but also have other comorbidities disease included renal diseases, hematological, rheumatic and dermatological conditions [26]. It has been reported that HCV infection can increase the risk of Atherosclerosis and Coronary artery diseases [27-28]. The findings of this study correspond to the findings of Roed study which shows the increase of Cardiovascular disease risk in patients with HCV [29].

### Conclusions

Our findings revealed that Age, type of thalassemia and heart complications were the main risk factors for HCV infection among beta-thalassaemic patients. Due to the increase of patients survival and since the HCV is related to the other complications, we must use some methods such as weekly cares, fresh blood transfusions to patients and timely and early hemoglobin treatment to reach to decrease and delay the effect of this disease in patients.

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### Conflict of interest

The Authors have no conflict of interest.

### References

1. Centers for Disease Control and Prevention. Hepatitis C. Atlanta, GA: CDC; 2015.
2. World Health Organization. Hepatitis C: fact sheet. Geneva, Switzerland: WHO; 2015.

3. Amaruud DN, Kumar A, Vaidyas S, Murti P, Bichile SK, Kalro RH, et al. Frequency of hepatitis B, C and D and human immunodeficiency virus infections in multi-transfused thalassemics. *Indian J Gastroenterol* 1992; 11(2): 80-1.
4. Fontes EM, Amorim L, Carvalho SM, Farah MB. Hemophilia care in the state of Rio de Janeiro. *Rev Panam Salud Publica* 2003; 13(2-3):124-128.
5. A Special Meeting Review Edition: advances in the treatment of hepatitis C virus infection from EASL 2014. *Gastroenterol Hepatol (N Y)* 2014; 10(6 Suppl 2):1-19.
6. World Health Organization. WHO guideline on the use of safety-engineered syringes for intramuscular, intradermal and subcutaneous injections in health-care settings. Geneva, Switzerland: WHO; 2015.
7. World Health Organization. Making all injections safe. Geneva, Switzerland: WHO; 2015.
8. Najmabadi H, Teimourian Sh, Khatibi T, Neishabury M, Pourfarzad F, Jalili Nejad S, et al. Amplification refractory mutation system (ARMS) and reverse hybridization in the detection of beta-thalassemia mutation. *Arch of Iranian Medicine* 2001; 4(4):165-70.
9. Memon MI, Memon MA. Hepatitis C: an epidemiological review. *Viral Hepatitis* 2002; (9):84-110.
10. Abolghasemi H, Amid A, Zeinali S, Radfar MH, Eshghi P, Rahiminejad MS, et al. Thalassemia in Iran: Epidemiology, prevention, and management. *J Pediatr Hematol Oncol* 2007; 29(4):233-238.
11. Rajaeefard A, Hajipour M, Tabatabaee HR, Hassanzadeh J, Rezaeian S, Moradi Z, et al. Analysis of survival data in thalassemia patients in Shiraz, Iran. *Epidemiol Health* 2015;37:e2015031.
12. Saber-firrozi M, Yazdankhah S, Karbasi HT. Anti HCV seropositivity among multiply transfused patients with Beta-thalassemia major in southern Iran. *Iran J Med Sci* 1996; 21:56-9.
13. Ebrahim-Poor S, Yaghoobi M, Gharamaleki V, Khoshavar H, Sakini E, Madadi A. Seroepidemiological studies of hepatitis B and C in hemophiliacs in north-western Iran. *Iran J Med Sci* 1997; 22(3-4):126.
14. Seed CR, Cheng A, Ismay SL, Bolton WV, Kiely P, Cobain TJ, et al. Assessing the accuracy of three viral risk models in predicting the outcome of implementing HIV and HCV NAT donor screening in Australia and implementing for future HBV NAT. *Transfusion* 2002; 42(10): 1365-72.
15. Rezvan H, Abolghasemi H, Kafiabad SA. Transfusion - transmitted infections among multitransfused patients in Iran: a review. *Transfus Med* 2007; 17(6): 425-33.
16. Mirmomen S, Alavian SM, Hajarizadeh B, Kafaee J, Yektaparast B, Zahedi MJ, et al. Epidemiology of hepatitis B, hepatitis C, and human immunodeficiency virus infections in patients with beta-thalassemia in Iran: A multicenter study. *Arch Iran Med* 2006; 9(4):319-23.
17. Boroujerdnia MG, Zadegan MA, Zandian KM, Rodan MH. Prevalence of hepatitis-C virus (HCV) among thalassemia patients in Khuzestan Province, Southwest Iran. *Pak J Med Sci* 2009; 25(1):113-7.
18. Ansari MM, Kooloobandi A. Prevalence of hepatitis C virus infection in thalassemia and haemodialysis patients in north Iran-Rasht. *J Viral Hepat* 2002;9(5):390-2.
19. Akbari A, Imanieh MH, Karimi M, Tabatabaee HR. Hepatitis C virus antibody positive cases in multitransfused thalassemic patients in South of Iran. *Hepat Mon* 2007;7(2):63-6.
20. Ataei B, Hashemipour M, Kassaian N, Hassannejad R, Nokhodian Z, Adibi P. Prevalence of Anti HCV Infection in Patients with Beta-Thalassemia in Isfahan-Iran. *Int J Prev Med*.2012;S118-123
21. Sanei-Moghaddam E, Savad koochi S, Rakhshani F. Prevalence of hepatitis B and C in patients with major Beta-thalassaemia referred to Ali-Asghar hospital In Zahedan, 2002. *Blood Sci J Iran* 2004; 1(1):19-26.
22. Al-Mahroos FT, Ebrahim A. Prevalence of hepatitis B, hepatitis C and human immune deficiency virus markers among patients with hereditary hemolytic anaemias. *Ann Trop Paediatr*.1995; 15(2):121-128.
23. Al-Kubaisy WA, Al-Naib KT, Habib M. Seroprevalence of hepatitis C virus specific antibodies among Iraqi children with thalassaemia. *East Mediterr Health J* .2006; 12(1-2):204-210.
24. Hussain H, Iqbal R, Khan MH, Iftikhar B, Aziz S, Burki FK, et al. Prevalence of hepatitis C in beta thalassaemia major. *Gomal J Med Sci* . 2008; 6(2):88-90.
25. Makroo RN, Arora JS, Chowdhry M, Bhatia A, Thakur UK, Minimol A. Red cell alloimmunization and infectious marker status (human immunodeficiency virus, hepatitis B virus and hepatitis C virus) in multiply transfused thalassemia patients of North India. *Indian J Pathol Microbiol*.2013, 56(4):378-383
26. Chen SL, Morgan TR. The natural history of hepatitis C virus (HCV) infection. *Int J Med Sci* (2006); 3: 47-52.
27. Kiechl S, Egger G, Mayr M, Wiedermann CJ, Bonora E, Oberhollenzer F, et al. Chronic infections and the risk of carotid atherosclerosis: prospective results from a large population study. *Circulation* (2001); 103: 1064-1070.
28. Arcari CM, Gaydos CA, Nieto FJ, Krauss M, Nelson KE. Association between Chlamydia pneumoniae and acute myocardial infarction in young men in the United States military: the importance of timing of exposure measurement. *Clin Infect Dis* (2005); 40: 1123-1130.
29. Roed T, Lebech AM, Kjaer A, Weis N. Hepatitis C virus infection and risk of coronary artery disease: a systematic review of the literature. *Clin Physiol Funct Imaging* . 2012; 32(6):421-30.