



HCV prevalence and predominant genotype in IV drug users

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ABSTRACT

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Hepatitis C virus (HCV) causes 308000 deaths due to liver cancer and 758000 deaths due to cirrhosis every year. Almost 170 million people have HCV infection around the world. Information regarding this virus helps us to determine the prevalence of other hepatitis C genotypes in population, especially in intravenous drug users. It is assumed that some genotypes are more common in certain areas or groups of people. A recent study strongly confirms the central role of injecting network traits, not only as a transmission factor but also as a predictor of HCV genotype and phylogenetic determination in different communities. Hepatitis C genotypes and subtypes have different prevalence considering the country. Risk factors such as transfusion, hemodialysis, route of acquisition and etc, are detected in intravenous drug users. Several conducted studies have investigated the prevalence, risk factors, and predominance of HCV genotypes infection in different parts of Iran.

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Introduction

According to World Health Organization (WHO) reports, hepatitis C causes 308000 deaths due to liver cancer and 758000 deaths due to cirrhosis every year (1). Totally, 170 million people have HCV which is not considered a malignant infectious disease while compared to its annual mortality rate (2,3). Hepatitis C virus (HCV) is

belonging to flaviviridae virus family, initially known as non-A non-B hepatitis virus. It causes chronic hepatitis that may progress to cirrhosis and hepatocellular carcinoma(4,5). It is estimated that about 80% of HCV infected victims will develop chronic hepatitis. About 3-11% of those will progress to liver cirrhosis during 20-

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year time interval and the risk of liver failure and hepatocellular carcinoma increase as a life-threatening factor (6-8). HCV hepatitis is estimated to be the leading cause of liver transplantation in the world (9). The main route for HCV transmission is blood-borne including contaminated blood transfusion or blood products, needle or syringe sharing among members of intravenous drug parties or undergoing a needle stick by health workers. Other risk factors are high-risk sexual behaviors, tattooing, shaving in contaminated barber, reused and unsterilized dental and surgical instruments, and carelessly prepared laboratory equipment (10-12). Currently, the major contributor and driving risk factor for localized and universal spreading of HCV infection are injection drug users (IDUs). According to the 5'-end sequence of genome, HCV is classified to six distinct genotypes (genotype 1 to genotype 6). Every main genotype consists of some subtypes named a, b, c, etc (13,14). Determination of molecular genotyping of HCV in patients is necessary, for proposing therapeutic protocols (2). It is assumed that some genotypes are more common in certain areas or groups of people. For instance, genotype 3 and subtype 1a are widespread in IDUs of western countries (15-18), but 1b version is common among IDU population of Prague (19) and genotype 4 is responsible for most of the infections in IDUs of north-eastern of Poland (20). Whether social networks mitigate the HCV transmission or not is a fact of controversy. While some authors denied the role of these networks in HCV spreading (21-23), a recent study strongly confirmed the central role of injecting network traits, not only as a transmission factor but also as a predictor of HCV genotype in different communities (24).

According to results of this study, the network characteristics like behavior of

members, epidemiologic characteristic of members, the size of network population and socioeconomic class of members and so on, will define the rate of HCV transmission among IDUs (25). Recognition and control of these networks in targeted community care program, can improve the quality of HCV transmission in IDUs (24). Worldwide estimation of anti-HCV positivity ranges from 60-80% of injection drug users that presents the positive anti-HCV in about 10 million IDUs (26). China, USA, and federation of Russia are three leading countries for having most infected population. The prevalence of human immunodeficiency virus (HIV) positive is lower than anti-HCV positive among injecting addicted persons (26).

HCV in Iran

Several conducted studies have investigated the prevalence, risk factors, and predominance of genotypes of HCV infection in different parts of Iran. Health care standards including blood checking for HIV, hepatitis B virus (HBV) and HCV are elevated since 1996. New policies against drug abusing patients in health care approaches have changed the problems of blood-borne viral infections including HCV (27). It is conservatively estimated that there are about 180000 IDUs in Iran (28). Currently, IDUs are the main fuel for driving HCV transmission in Iran and HCV prevalence has reached to 50-75% among IDUs, (29-37). As described before, there is a correlation between certain groups and predominant HCV genotypes. 3a and 1b are prevailing genotypes in European IDUs and post-transfusion victims respectively (38,39). Preponderant genotype is not definitely recognized in Iranian IDUs but 1a is reported as the commonest genotype in post-transfusion subjects (40-42). The predominant HCV genotype varies geographi-

Table 1. HCV genotypes distribution in Iran

Author Reference	Publication year	Population	Province	No. of Patient Studied	Results
Assarehzadegan (43)	2009	Patients on hemodialysis	Khuzestan	34	1a (41.1%), 3a (35.2%), 1b (23.5%)
Samimi Rad (40)	2007	Patients with thalassemia and those with hemophilia	Markazi	2 patients with thalassemia and 23 with hemophilia	Hemophilia: Genotype one in 50%, three in 18.2%, two in 4.54%, and mixed in 27.3%, Thalassemia: two (40%) had positive results for HCV RNA and one sample was subtype 3a.
Keyvani (44)	2007			2231	1a, (39.7%), 3a (27.5%), and 1b (12.1%)
Kabir (45)	2006	Patients with HCV	Tehran	156	1a (37.8), 3a (28.9%), 1b (16.7%)
Hosseini-Moghaddam (41)	2006	Patients on hemodialysis	Tehran	66	3a (30.3), 1a (28.8%), 1b (18.2%), 4 (16.7%)
Mousavi (46)	2011-2012	Injecting drug users	Bandar Abbass	509	1a(62.1), 1b(23), 3a(14.9)
Joukar (47)	2011	Patients on hemodialysis	Guilan	514	1a(59.4), 3a(40.6)

cally among IDUs in Iran according to different performed studies. The frequency and distribution of common HCV genotype in Iran are summarized in Table 1.

It has been demonstrated that HCV genotype prevalence is changing continuously in different population and social networks (24).

Based on evidences obtained from blood donor screening, overall prevalence of HCV infection was 0.12%-0.59% among blood volunteers in Iran; ten times lower compared to reported positive Hepatitis B virus seroprevalence in a conducted study by Abedi et al (48-50). While much higher rates of HCV infection (31.5% to 47%) is demonstrated among IDUs inmate in jails, parks, or other public residential places (32,35,51). This wide discrepancy in HCV prevalence, directly results from higher frequency of high risk behaviors like injecting drugs and homosexuality especially among prisoners and tattooing among IDUs. In addition, incarceration duration solely increases the likelihood of HCV infection (52).

Although similar to many other countries the

main mode of HCV spreading in Iran is drug injecting, it seems that tattooing performance is more effective in HCV transmission than drug injecting inside the prison 33. This is in harmony with other performed studies in different times and places (51,53,54).

In another study attending to estimate co-infection rate among Iranian IDUs, it is showed that HCV infection is more common than HIV infection among IDUs (34.5% vs. 10.7%) and HCV infection is more common among HIV positive rather than in HIV negative IDUs (80.6% vs. 28.7%, $P < 0.0001$) (11).

HCV around the world

According to WHO records, 3% of population is infected by HCV throughout the world (55). A quarter of million deaths are caused by HCV infection in any way. About 10 million HCV positive IDUs are living throughout the world with maximum burden in Eastern Europe, East and South East Asia (26). All reported articles showed that the primary and essential rout of HCV

transmission is blood contact mainly occurs in injecting drug users followed by unsafe sex practices, occupational exposures, and mother to child transmission. There is no consistent rhythm on HCV genotype distribution throughout the world. Table 2 shows the HCV prevalence and localized predominant genotype in every country. IDU network as the main source of HCV and probably other blood-borne viral infection like HIV and HBV need to be managed and controlled. Preventive and therapeutic programs for infected and non-infected IDUs are necessary to stop rapid progression of HCV. Unfortunately, educational steps and elevation of knowledge about drug injection consequences had little outcomes

among IDUs (65). Other effective practical interventions are recognition and medical treatment of infected IDUs. Medications are too expensive to cover all patients, so prevention of paying several times, encouragement the patients to join to therapeutic programs, and easy access to medication should be established. HBV vaccination should be performed specially among HCV infected IDUs because co-infection causes higher complication and mortality rates. In addition, co-infection can increase the HCV transmission and rapid elevation of HCV disease burden among IDUs and non-IDUs (66). Alcohol consumption should be encouraged to be limited or even discontinued and patients

Table 2. HCV prevalence in some different countries

Authors Reference	Country	Number of participant	Date	HCV-antibody? %	HCV-RNA %	Predominant genotype
Rehman (56)	—	200	2010	31.5	24	2a(35.7),3a(28.6),4(14.3), 1a(7.1)
Lopez (57)	Brazil	691	2005-2006	6.9	85.4*	1a(63.4),3a(19.5),1b(17.1)
Xia** (58)	China	15036	1994-2006	61.4	—	Not determined
Judd (59)	London Glasgow	354 366	2001-2002	35 57	—	Not determined
Chalabicz (20)	Poland	111***	2007	—	—	1(38.7),3(37.8),4(23.4) 85% of HIV/HCV co-infections
Vicknasingam (60)	Malaysia	526	2009	67.1	—	Not determined
Paintsil (61)	St.Petersburg Russia	387	2006	94.6	—	3a(55.9),1b(29.2), 1a(11.9)
Muasya (62)	Kenya	333	—	22	55.5	1a+1b(75,1a>1b),3a(25)
Liu (63)	Taiwan	990	1993-2006	96.6	—	1a(29.2),6a(23.5), 3a(20.2)
reeman (17)	Australia	141 88	1974-1975 1994-1996	84 84	—	1(92),3(1) 1(69),3(25)
Shrestha (64)	Nepal	72	—	60	—	1a(49),V/3a(44),1/1a+V/3a(5),1a(49),V/3a(44),1/1a+V/3a(5)

*Among HCV-Ab positive injecting drug users; **A systematic review article with meta-analysis reviewing 65 studies performed throughout China; ***All of participants were selected from HCV-Ab and HCV-RNA positive tests

should be evaluated for other disabling liver diseases management(67, 68). Needle and syringe should be provided feasibly for IDUs, harm reduction centers should be organized to maintain the patients on safer drug use conditions(69). Strategies are required to stop the universal rapid increasing growth rate of HCV infection and its related consequences.

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Conflict of Interest

The authors declare no conflict of interest.

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