

INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN CHEMISTRY AND PHARMACEUTICAL SCIENCES

(p-ISSN: 2348-5213; e-ISSN: 2348-5221)

www.ijcrops.com

DOI: 10.22192/ijcrops

Coden: IJCROO(USA)

Volume 7, Issue 2 - 2020

Research Article



DOI: <http://dx.doi.org/10.22192/ijcrops.2020.07.02.002>

Prevalence of Hepatitis C virus among Iranian hemodialysis patients: A systematic review and meta-analysis

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Abstract

Aim : The aim of this study was evaluate the Prevalence of Hepatitis C virus among Iranian hemodialysis patients.

Methods: The methods used in this systematic review are developed based on the Checklist Guidelines (PRISMA). The searches were conducted by two independent researchers and the objective was to find studies published from 1/1/2009 to 30/5/2019.

Results: According to the random effects model, the overall prevalence of hepatitis C in 2211 hemodialysis patients was 11.5% (10.1- 12.9% at 95% confidence interval and $I^2 = 99.5\%$)

Conclusion: Due to the lack of vaccination for the prevention and complete treatment of the disease following exposure to HCV, it is necessary to cooperate to implement essential preventive measures to prevent this infection in the community and especially in the healthcare centers, and blood supply and blood products organizations. In order to design prevention principles, risk factors for this virus transmission must first be identified in the community and patients with special diseases who are at high risk of viral contamination.

Keywords: Hepatitis C virus, hemodialysis, risk factor, nosocomial transmission, kidney transplantation, blood transfusion

Introduction

Hepatitis C virus (HCV) is the main reason of chronic liver disease in patients suffering from chronic liver failure treated with hemodialysis or kidney transplantation (1). Most patients were infected with the virus through transfusion mediated HCV infections (2). Of course, kidney transplantation and hospital transfer during hemodialysis are other ways of transmitting infection (3). The prevalence of HCV infection

among hemodialysis patients is very different in different countries (4). For example, the prevalence ranges from 3% in northern Europe to 20% in southern Europe(5). Also, the rates of infection in different hemodialysis centers are different (6). Controlling HCV-induced liver injury in hemodialysis patients is a very important health issue (7). The virus causes chronic hepatitis and may develop to cirrhosis and hepatocellular carcinoma (8). This infection is an important cause of disability and mortality in renal failure

patients (9). According to the World Health Organization report, about 170 to 200 million people (3% of the world's population) are infected with HCV, and at least 21.3 million of them live in the Eastern Mediterranean countries (10). This virus has received much attention due to similar risk factors and simultaneous infection with the human immunodeficiency virus (HIV).

Methods

Inclusion Criteria (eligibility criteria):

The methods used in this systematic review are developed based on the Checklist Guidelines (PRISMA). Cross-sectional studies, case control study, and cohort study are included in this study and case reviews, letters to editors, case reports, clinical trials, study protocols, systematic reviews, and review studies are excluded.

Participants: All studies about the prevalence of hepatitis C were conducted on hemodialysis patients.

Results: The main objective of the study was the prevalence of hepatitis C in hemodialysis patients. **Sampling Methods and Sample Size:** All observational studies were included in the systematic review regardless of their design. The minimum sample size was 25 patients or more.

Search Strategy

The searches were conducted by two independent researchers and the objective was to find studies published from 1/1/2000 to 30/5/2019. Studies were searched in Cochrane Library and the English database, and studies published in MEDLINE were searched through PubMed, and those published in EMBASE™ were searched through Ovid. We searched the national database of Magiran and SID to find studies published in Iran. To ensure the adequacy of the studies, a list of references or related reviews found through searches was studied. Systematic review studies were searched through MESH and open-ended terms in accordance with publication standards. After finalizing the MEDLINE strategy, the

results were compared to search other databases, and PROSPERO was searched for recent or ongoing systematic reviews. The key words used in the search strategy include: Hepatitis C virus, hemodialysis, risk factor, nosocomial transmission, kidney transplantation, blood transfusion.

Study Selection and Data Extraction

Two researchers independently analyzed the titles and abstracts of the studies according to eligibility criteria. After excluding additional studies, the full texts of the studies were analyzed based on eligibility criteria and information about authors were collected if necessary. General information (relevant author, province, and publication year), study information (sampling technique, diagnostic criteria, data collection method, research conditions, sample size and risk of bias) and exclusion criteria were collected.

Quality Assessment

Hoy et. al.'s developed scale was used to assess the quality of the method and the risk of bias of observational studies.

Data Collection

All eligible studies were included in the data collection after systematic review and data were integrated using the forest plot. The random effects model was evaluated based on the overall prevalence of the disease among the participants. The heterogeneity of the initial studies was assessed using I^2 test. In addition, subgroups were analyzed based on the participants' age, publication year, and country to determine heterogeneity. Finally, a meta-analysis was performed in STATA14 statistical software.

Results

Study Selection

A total of 263 studies were extracted through initial searches in various databases. Among 263 studies identified by analyzing titles and abstracts,

212 studies were removed due to irrelevant titles. Of the remaining 15 studies, 8 met the study criteria. (Figure 1).

Research Properties

A total of 2211 patients undergoing dialysis were evaluated. All studies, were retrospective. A total of 9 studies from 5 provinces that met the inclusion criteria were evaluated. 3 studies conducted in Gilan, 2 in Tehran, 3 in Ghazvin, Kermanshah and Ahvaz were included in the study. Simple sampling method was used to select the sample (n = 8). In most studies the risk of bias was low. The main method of data collection was medical records. The main study sites were the hospitals (Table 1).

Meta-analysis of Hepatitis C Frequency in Hemodialysis Patients:

According to the random effects model, the overall prevalence of hepatitis C in 2211 hemodialysis patients was 11.5% (10.1- 12.9% at 95% confidence interval and $I^2 = 99.5%$) (Figure 2, Table 2).

Subgroup Analysis:

Meta-analysis of Prevalence of Hepatitis C in Hemodialysis Patients Based on Province:

According to the random effects model, the highest prevalence of hepatitis C in hemodialysis patients in Gilan was 12.7% (10.5 -14.9% at 95% confidence interval), in Tehran was 9.7% (7.8% - 11.6% at 95% confidence interval).

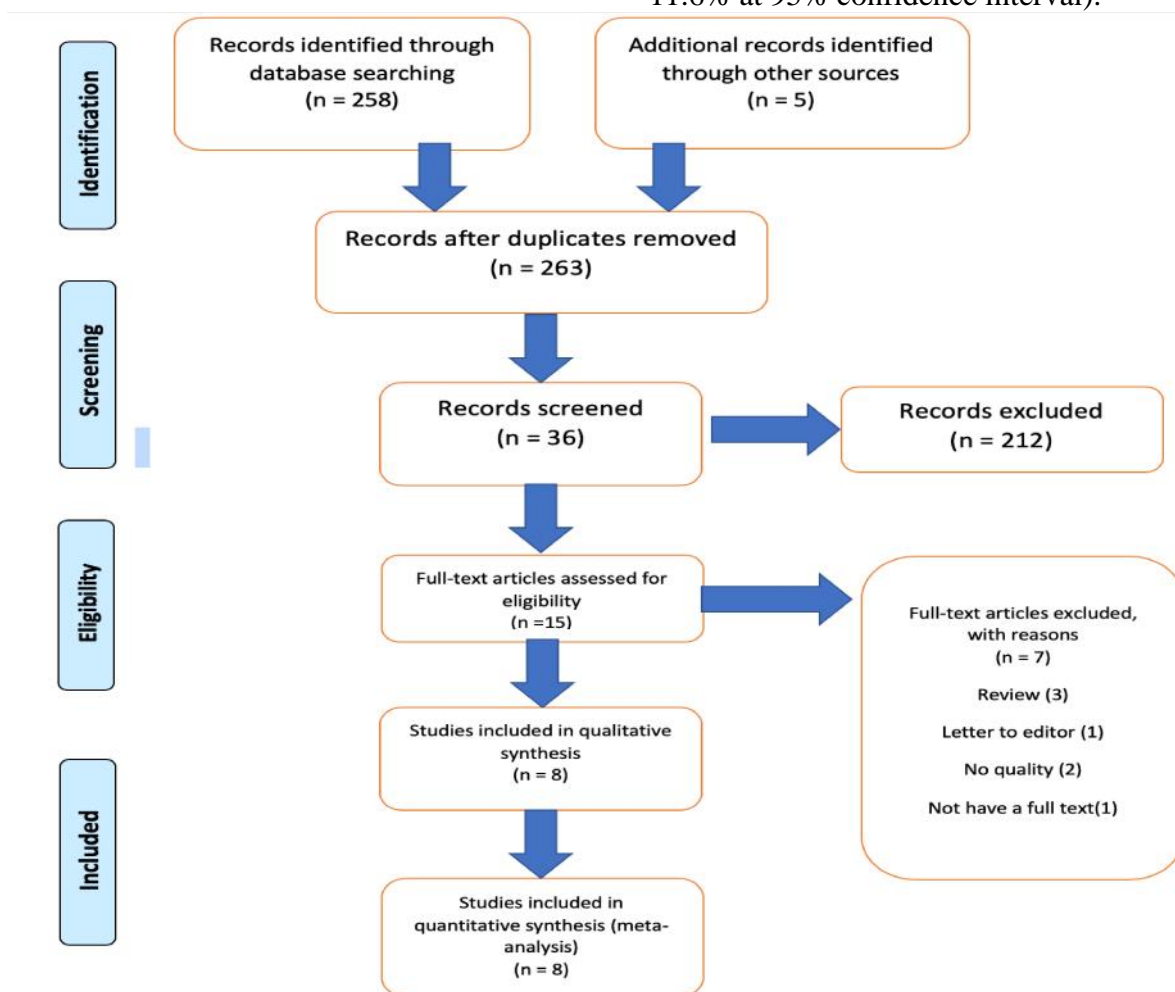


Fig 1. PRISMA flow diagram

Table 1 . characteristics of the included studies

ID	Author	Province	Publications year	Number of patients	Risk of bias
1	AmeneDadgaran (22)	Gilan	2005	393	Low
2	Mansour ghanaei (23)	Gilan	2008	163	Low
3	Manouchehr Makondi (24)	Ahvaz	2000	86	Low
4	MohtashamAmiri(25)	Gilan	2003	298	Low
5	Bijan Sabour (26)	Kermanshah	2003	140	Low
6	Moayed Alavian (27)	Tehran	2003	838	Low
7	KatayoonSaminirad (28)	Tehran	2005	204	Low
8	Hasan Bozorgi (29)	Ghazvin	2004	89	Low

Table 2. Meta-analysis of the Prevalence of Hepatitis C virus among Iranian hemodialysis patients

First author	95% confi. interval				Publications year	Number of patients
	Low	Up	ES	Weight		
Amene Dadgaran (22)	0.053	0.107	0.080	26.61	2005	393
Mansour ghanaei (23)	0.121	0.239	0.180	5.44	2008	163
Manouchehr Makondi (24)	0.212	0.408	0.310	1.98	2000	86
Mohtasham Amiri(25)	0.201	0.299	0.250	7.88	2003	298
Bijan Sabour (26)	0.124	0.396	0.260	1.02	2003	140
Moayed Alavian (27)	0.105	0.155	0.130	30.71	2003	838
Katayoon Saminirad (28)	0.020	0.080	0.050	21.30	2005	204
Hasan Bozorgi (29)	0.039	0.161	0.100	5.06	2004	89
Pooled ES	0.101	0.129	0.115	100	-----	-----

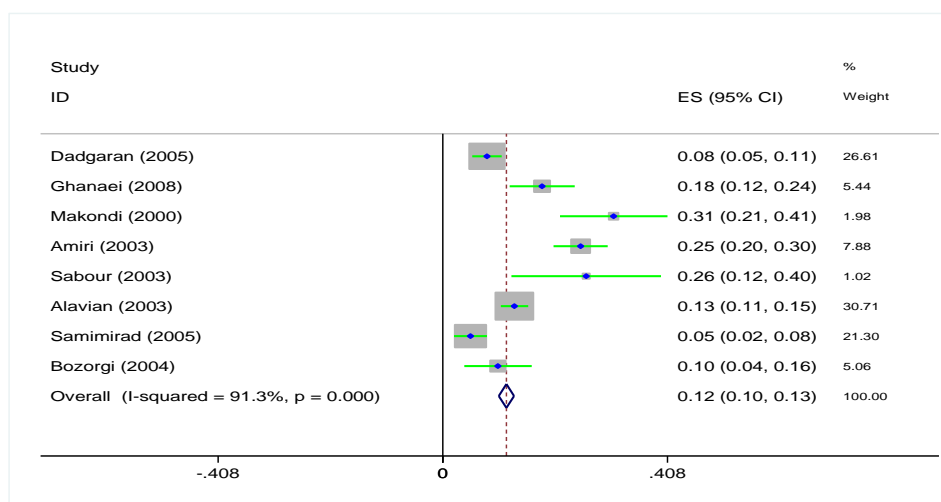


Figure 2. Meta analysis of the Prevalence of Hepatitis C virus among Iranian hemodialysis patients

Discussion

According to the random effects model, the overall prevalence of hepatitis C in 2211 hemodialysis patients was 11.5% (10.1- 12.9% at 95% confidence interval and $I^2 = 99.5%$). HCV infection is an important cause of chronic hepatitis and cirrhosis in hemophilia, thalassemia and renal failure patients, and is the most common indication of kidney transplantation in the adults (11). The prevalence of HCV is different in different countries and regions (12). Its prevalence is the lowest in England and Scandinavian countries (0.01 to 0.1%) (13). The prevalence of the virus is 1% in western and North American countries, 3-4% in Mediterranean and Asian countries, more than 10-20% in some parts of Central Africa, and is the highest (19-60%) in Egypt (14). HCV infection in Iran is mainly due to problems such as increasing the number of injecting drug users and common needles, contaminated blood or its derivatives in surgeries to protect hemophilia, thalassemia and renal failure patients (15). And unfortunately, increasing the number of hemodialysis and blood transfusion centers for patients with special diseases increases new sources of the virus in Iran (16). Although repeated blood transfusions and its derivatives survive hemophilia, thalassemia and renal failure patients, these patients are at high risk of blood born viral infections, especially Hepatitis viruses due to non-observance of important health issues in dialysis units (transmission of infection through dialysis, blood purification devices, and other medical centers) (17). Although using effective inactivation techniques for blood-borne pathogens has decreased the rate of infection transmission through condensed products, the rate of infection in less developed countries has increased due to insufficient funds, inadequate and inappropriate blood supply screening (18-21). Due to the lack of vaccination for the prevention and complete treatment of the disease following exposure to HCV, it is necessary to cooperate to implement essential preventive measures to prevent this infection in the community and especially in the healthcare centers, and blood supply and blood products organizations (22-23). In order to design

prevention principles, risk factors for this virus transmission must first be identified in the community and patients with special diseases who are at high risk of viral contamination.

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DOI: 10.22192/ijcrps.2020.07.02.002	

How to cite this article:

Ali Alidadi. (2020). Prevalence of Hepatitis C virus among Iranian hemodialysis patients: A systematic review and meta-analysis. Int. J. Curr. Res. Chem. Pharm. Sci. 7(2): 7-13.
DOI: <http://dx.doi.org/10.22192/ijcrps.2020.07.02.002>