

Original Research Article

Volume 5, Issue 4 -2019

DOI: <http://dx.doi.org/10.22192/ijcrms.2019.05.04.001>

Cardiovascular complications in Iranian hemodialysis patients: A systematic review and meta-analysis

Halime Aali

Department of Internal Medicine, Zabol University of Medical Science, Zabol, Iran.

Abstract

Objective: The aim of this systematic review and meta-analysis was to evaluate the Prevalence of cardiovascular complications specifically mitral regurgitation in Iranian hemodialysis patients.

Methods: The method applied for this systematic review was PRISMA guidelines (Moher et al, 2009). For findings the related studies, the researchers searched the electronic databases including the international databases (MEDLINE [PUBMEDINTERFACE], GOOGLE SCHOLAR and ISI web of science [web of scientific interface]), the national databases (MAGIRAN, SID), and the related national journal.

Results: These studies had been conducted on 143 participants. The main design of the studies was cross sectional. studies were from Babol and kordestan Province. Based on the results of random effects model, the Prevalence of mitral regurgitation in Iranian hemodialysis patients in 143 patients was %58 (95% confidence interval [CI]: 50, 66, $I^2 = 19.7\%$)

Conclusion: The cardiovascular system is largely affected by the renal failure and dialysis. Thus, cardiovascular diseases are highly prevalent in dialysis patients.

Keywords: cardiovascular complication, hemodialysis, renal failure.

Introduction

Cardiovascular complications account for more than 50% of mortality cases in hemodialysis patients; this is three times more than non-uremic kidney disease patients (1). Moreover, there are factors that are specific to hemodialysis and result in a high incidence rate of heart diseases (2). These factors include the stress created on the myocardium due to the repeated increase of intravascular fluid volume, increase or decrease of rare elements working as enzymatic factors, and factors controlling the ATPase of myocardium (3). The most important heart complications in

hemodialysis patients are the structural disturbances and left ventricular dysfunction that are commonly observed in patients with chronic kidney disease (4).

Given what stated above, it is attempted to determine the significance of cardiac disorders in the complications and mortality rate of chronic kidney disease patients undergoing hemodialysis (6). The aim of this systematic review and meta-analysis was to evaluate the Prevalence of cardiovascular complications specifically mitral regurgitation in Iranian hemodialysis patients.

Materials and Methods

Eligibility criteria

The method applied for this systematic review was PRISMA guidelines (Moher et al, 2009). Observational studies were included in the present study as well. Moreover, case studies, case reports, clinical trials, and reviews (systematic and narrative reviews) were excluded. The related literature was collected by using medical subject headings (MeSH) and keywords related to cardiovascular complications in Iran. For findings the related studies, the researchers searched the electronic databases including the international databases (MEDLINE [PUBMEDINTERFACE], GOOGLE SCHOLAR and ISI web of science [web of scientific interface]), the national databases (MAGIRAN, SID), and the related national journal. The formal screening procedure was conducted by two researchers and based on the eligibility criteria as well as consensus (in case of disagreements). The full texts of the articles were provided for all headings having the required eligibility criteria. Other information was collected from the study, so that all questions regarding the eligibility criteria were responded. The exclusion criteria were recorded. None of the authors of the review had any prejudices about the journals, authors, and institutions related to the study. The data extraction items included the general information (corresponding author, publication year, and province), characteristics of the study (study design, sampling method, data collection tool, research location, sample size,

abbreviated heading, characteristics of the questionnaire, and psychometric features), and participants' characteristics (demography and sample size). Hoy et al's risk of bias tool was applied for assessing the quality of the study (Hoy et al, 2012).

Results

Research selection

In total, in the initial search, as many as 185 articles were obtained from different databases. From 185 non-duplicate studies, 155 articles were excluded for having non-related subjects. From the remaining 30 studies, 2 cases had the required legibility criteria. From 28 excluded articles, 3 cases were reviews, 16 articles were qualitative, 1 cases were letters to the editor, 8 cases were not full texts.

Characteristics of the study

These studies had been conducted on 143 participants. The main design of the studies was cross sectional. These studies had been conducted only in 2 provinces out of 31 provinces of the country. studies were from Babol and kordestan Province. All of the studies had been conducted in medical centers (n=2). The studies had been conducted with a simple random sampling method and had low likelihood bias (n=2) (figure 1).

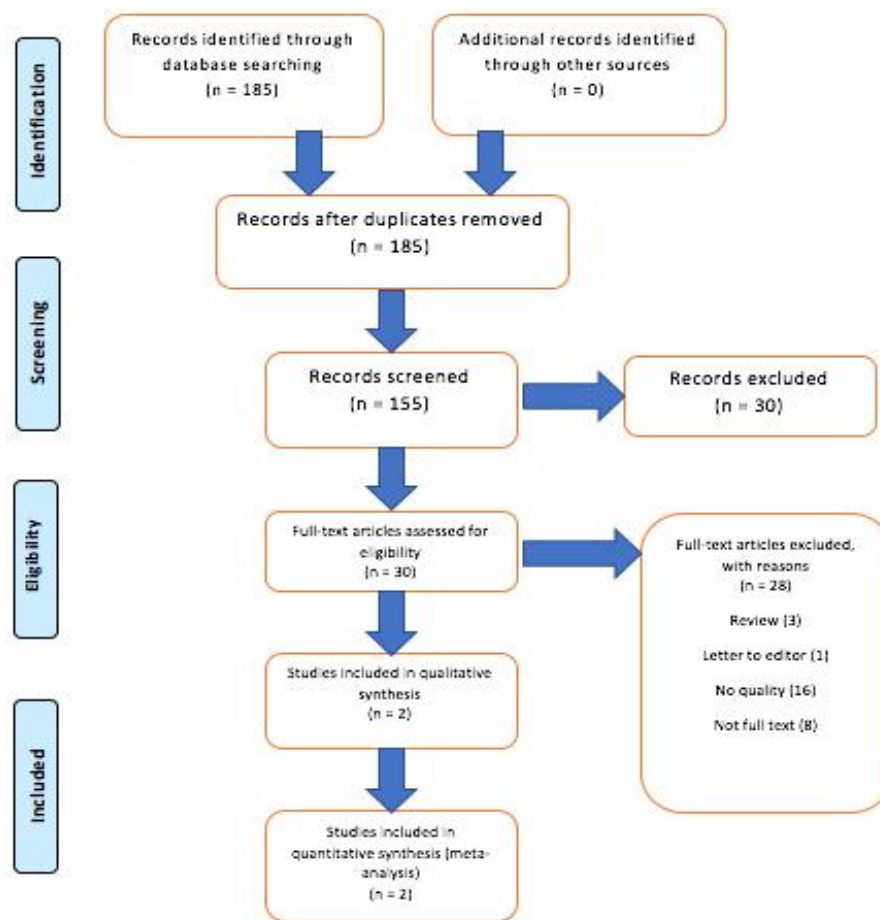


Fig 1.

Table 1: Characteristics of final included studies about Prevalence of cardiovascular complications in Iranian hemodialysis patients

ID	Author	Year	N	Province	Prevalence							bias
					AR	MR	Pericardial effusion	LVH	TR	Calcified Aort	Calcified mitral	
1	Jalali	2002	103	Babol	19.4%	55.33%	18.4%	30.1%	12.61%	1.94%	3.88%	Low
2	Gheidari	2003	40	Kordestan	32.5%	65.5%	62.5%	72.5%	40%	57.5%	17.5%	Low

Table 2: shows the quality of the articles that is calculated using a checklist which includes 6 criteria.

Author	year	Sample size	AR	HTN	MR	TR	Calcified valve
Jalali ^[20]	2002	√	√	*	√	√	√
Gheidari ^[21]	2003	√	√	√	√	√	√

Meta-analysis the Prevalence of mitral regurgitation in Iranian hemodialysis patients

Based on the results of random effects model, the

Prevalence of mitral regurgitation in Iranian hemodialysis patients in 143 patients was %58 (95% confidence interval [CI]: 50, 66, I² = 19.7%) (table 3)

Table 3: Prevalence of cardiovascular complications in Iranian hemodialysis patients

Study	Year	ES	95% conf. Interval		%weight
			Low	Up	
Jalali	2002	0.55	0.45	0.64	70
Gheidari	2003	0.65	0.50	0.79	29
Pooled ES	-----	0.58	0.50	0.66	100

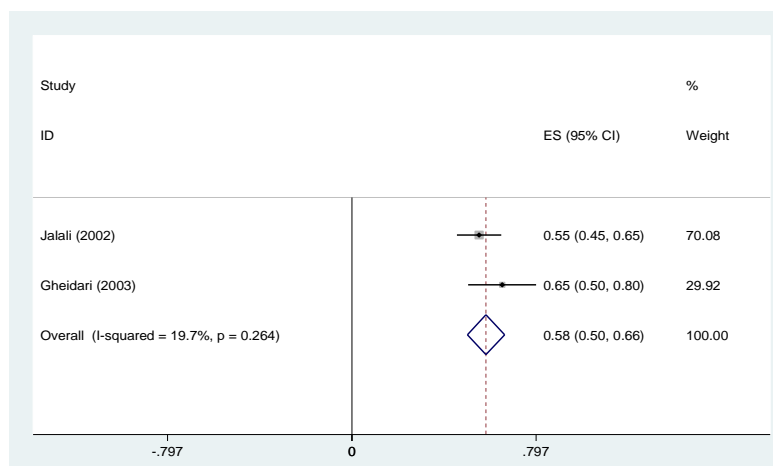


Fig. 2 : The Prevalence of mitral regurgitation(MR) in Iranian hemodialysis patients and its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the % value and the length of the lines showing the 95% confidence interval in each study.

Discussion

Due to high prevalence of mitral regurgitation in Iranian hemodialysis patients we decided to calculate the prevalence of mitral regurgitation. the Prevalence of mitral regurgitation in Iranian hemodialysis patients in 143 patients was %58 (95% confidence interval [CI]: 50, 66, $I^2 = 19.7\%$). Hemodialysis is regarded as one of the common treatments before conducting kidney transplant. Despite the progresses achieved in hemodialysis technology, there are still complications arising from hemodialysis (7 and 8). The most common hemodialysis complications are low blood pressure and heart arrhythmia; they are treated in most of the case by balancing fluids and electrolytes. Other complications of these patients are muscle cramps, nausea and vomiting, chest pain, back pain, itch, and ague (9).

Chronic kidney disease refers to the progressive and irreversible destruction of kidney function (10). The clinical manifestation of kidney failure is seen as uremic syndrome; it occurs when glomerular filtration reaches less than 10 ml in ten minutes milliliter per minute (11). At the beginning of renal failure and before the emergence of uremic syndromes, it is required to initiate one of the alternative treatments such as hemodialysis, peritoneal dialysis, and kidney transplantation (12-14). One of the main reason of the high rate of cardiac complications in patients undergoing hemodialysis is the increasing prevalence of major risk factors in these patients including hypertension, anemia, increased blood volume, arteriovenous fistulas, uremia, disorder of calcium and phosphorous hemostasis, lipid disorder, and diabetes mellitus (15).

The cardiovascular system is largely affected by the renal failure and dialysis. Thus, cardiovascular diseases are highly prevalent in dialysis patients (16-19). The main reason for this is the increased prevalence of atherosclerotic agents, especially increased arterial blood pressure and diabetes. There are a number of other factors, such as increased blood triglyceride, hyperparathyroidism, vascular calcification and abnormal metabolism of calcium and phosphorus most commonly seen in uremic patients and resulted in cardiovascular complications.

References

1. Slinin Y, Foley RN, Collins AJ. Calcium, phosphorus, parathyroid hormone, and cardiovascular disease in hemodialysis patients: the USRDS waves 1, 3, and 4 study. *Journal of the American Society of Nephrology*. 2005 Jun 1;16(6):1788-93.
2. Block GA, Kilpatrick RD, Lowe KA, Wang W, Danese MD. CKD–Mineral and Bone Disorder and Risk of Death and Cardiovascular Hospitalization in Patients on Hemodialysis. *Clinical Journal of the American Society of Nephrology*. 2013 Dec 6;8(12):2132-40.
3. Goto T, Takase H, Toriyama T, Sugiura T, Kurita Y, Tsuru N, Masuda H, Hayashi K, Ueda R, Dohi Y. Increased circulating levels of natriuretic peptides predict future cardiac event in patients with chronic hemodialysis. *Nephron*. 2002;92(3):610-5.
4. Hirakata H, Nitta K, Inaba M, Shoji T, Fujii H, Kobayashi S, Tabei K, Joki N, Hase H, Nishimura M, Ozaki S. Japanese Society for Dialysis Therapy guidelines for management of cardiovascular diseases in patients on chronic hemodialysis. *Therapeutic Apheresis and Dialysis*. 2012 Oct;16(5):387-435.
5. Drechsler C, Schneider A, Gutjahr-Lengsfeld L, Kroiss M, Carrero JJ, Krane V, Allolio B, Wanner C, Fassnacht M. Thyroid function, cardiovascular events, and mortality in diabetic hemodialysis patients. *American Journal of Kidney Diseases*. 2014 Jun 1;63(6):988-96.
6. Turan MN, Gungor O, Asci G, Kircelli F, Acar T, Yaprak M, Ceylan N, Demirci MS, Bayraktaroglu S, Toz H, Ozkahya M. Epicardial adipose tissue volume and cardiovascular disease in hemodialysis patients. *Atherosclerosis*. 2013 Jan 1;226(1):129-33.
7. Razeghi E, Sahraian MA, Heidari R, Bagherzadeh M. Association of inflammatory biomarkers with sleep disorders in hemodialysis patients. *Acta Neurologica Belgica*. 2012 Mar 1;112(1):45-9.
8. Giannaki CD, Zigoulis P, Karatzaferi C, Hadjigeorgiou GM, George KP, Gourgoulisanis K, Koutedakis Y, Stefanidis I, Sakkas GK. Periodic limb movements in sleep contribute to further cardiac structure abnormalities in hemodialysis patients with restless legs syndrome. *Journal of Clinical Sleep Medicine*. 2013 Feb 15;9(02):147-53.
9. Brandenburg VM, Kramann R, Koos R, Krüger T, Schurgers L, Mühlenbruch G, Hübner S, Gladziwa U, Drechsler C, Ketteler M. Relationship between sclerostin and cardiovascular calcification in hemodialysis patients: a cross-sectional study. *BMC nephrology*. 2013 Dec;14(1):219.
10. Langote A, Ahearn M, Zimmerman D. Dialysate calcium concentration, mineral metabolism disorders, and cardiovascular disease: deciding the hemodialysis bath. *American Journal of Kidney Diseases*. 2015 Aug 1;66(2):348-58.
11. Pun PH, Lehrich RW, Honeycutt EF, Herzog CA, Middleton JP. Modifiable risk factors associated with sudden cardiac arrest within hemodialysis clinics. *Kidney international*. 2011 Jan 2;79(2):218-27.
12. Iwabuchi Y, Ogawa T, Inoue T, Otsuka K, Nitta K. Elevated E/E' predicts cardiovascular events in hemodialysis patients with preserved systolic function. *Internal Medicine*. 2012;51(2):155-60.
13. Leal VO, Lobo JC, Stockler-Pinto MB, Farage NE, Abdalla DS, Junior ML, Mafra D. Is zinc- α 2-glycoprotein a cardiovascular protective factor for patients undergoing hemodialysis?. *Clinica chimica acta*. 2012 Mar 22;413(5-6):616-9.
14. Block GA, Zaun D, Smits G, Persky M, Brillhart S, Nieman K, Liu J, St Peter WL. Cinacalcet hydrochloride treatment

- significantly improves all-cause and cardiovascular survival in a large cohort of hemodialysis patients. *Kidney international*. 2010 Sep 2;78(6):578-89.
15. Daugirdas JT, Chertow GM, Larive B, Pierratos A, Greene T, Ayus JC, Kendrick CA, James SH, Miller BW, Schulman G, Salusky IB. Effects of frequent hemodialysis on measures of CKD mineral and bone disorder. *Journal of the American Society of Nephrology*. 2012 Apr 1;23(4):727-38.
 16. Edmondson D, Gamboa C, Cohen A, Anderson AH, Kutner N, Kronish I, Mills MA, Muntner P. Association of posttraumatic stress disorder and depression with all-cause and cardiovascular disease mortality and hospitalization among Hurricane Katrina survivors with end-stage renal disease. *American journal of public health*. 2013 Apr;103(4):e130-7.
 17. Halime Aali. (2019). Prevalence of limb complications in Iranian diabetic patients: A systematic review and meta-analysis. *Int. J. Adv. Res. Biol. Sci.* 6(2): 242-247.
 18. Halime Aali. (2019). Prevalence of cardiovascular complications in Iranian diabetic patients: A systematic review and meta-analysis. *Int. J. Curr. Res. Med. Sci.* 5(2): 39-45.
 19. Malekzadegan, Aali H. "The Study of Success rate of CPR in 0-14 years Trauma Children who admitted to the Emergency of Khatam-Alanbia Hospital Zahedan , Iran 2016."
 20. Jalali F, Rezaie N, Namdar Z. Study of cardiac complications in patients with chronic renal failure under hemodialysis (Babol, 1997-2000)
 21. Gheidari M. The prevalence of cardiovascular complications in hemodialysis patients in Sanandaj city in 1999.

Access this Article in Online	
	Website: www.ijcrims.com
	Subject: Medical Sciences
Quick Response Code	

How to cite this article:

Halime Aali. (2019). Cardiovascular complications in Iranian hemodialysis patients: A systematic review and meta-analysis. *Int. J. Curr. Res. Med. Sci.* 5(4): 1-6.

DOI: <http://dx.doi.org/10.22192/ijcrms.2019.05.04.001>