INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN CHEMISTRY AND PHARMACEUTICAL SCIENCES
(p-ISSN: 2348-5213: e-ISSN: 2348-5221)
www.ijcrcps.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijcrcps Coden: IJCROO(USA) Volume 9, Issue 7 - 2022

Research Article

DOI: http://dx.doi.org/10.22192/ijcrcps.2022.09.07.002

The Prevalence of Vitamin D Deficiency among Iranian Patients with Ischemic Heart Disease: A Systematic Review and Meta-analysis

Mahboobeh Sheikh[1], Pouya Ostadrahimi[2*]
[1]Assistant Professor of Cardiology, Department of Cardiology, Zabol University of Medical Sciences, Zabol, Iran
[2]Assistant Professor of Pediatrics, Department of Cardiology, Zabol University of Medical Sciences, Zabol, Iran
Corresponding Author: Pouya Ostadrahimi, Assistant Professor of Pediatrics, Department of Cardiology, Zabol University of Medical Sciences, Zabol, Iran

Abstract

Introduction
Vitamin D deficiency, which is linked to several cardiovascular problems such as hypertension, peripheral vascular disease, coronary artery disease, and coronary artery disease, is one of the risk factors that has gained attention recently. In order to develop more effective preventative and treatment strategies in the future, we look into whether there are any real connections between vitamin D insufficiency and myocardial infarction in this study.

Methods
The analysis includes all studies, regardless of language, assessing vitamin D levels in Iranian patients with cardiovascular disease. Regardless of age, gender, or ethnicity, the research group contained healthy people. Stata software (11 Stata Corp., College Station, TX, USA) was used for data analysis.

Results
Three original articles were found after reviewing the entire texts. The overall prevalence of vitamin D deficiency among Iranian patients with cardiovascular disease was 65%(95%CI:62%-69%, I^2:82.4%)

Conclusion
Despite the fact that our knowledge of vitamin D insufficiency and its effects is fast-growing, there is still more to discover. The significant association between Iranian patients' vitamin D levels and heart health is the major finding of the current systematic study.

Keywords: Vitamin-D deficiency, Ischemic Heart Disease, Iran

Introduction

Ischemic heart disease is one of the most significant cardiovascular disorders, and it is also the most frequent cause of mortality worldwide today. Known risk factors for this condition include hypertension, abdominal obesity, lipid abnormalities, and blood sugar [1, 2]. Despite the development of contemporary knowledge, cardiovascular illnesses have emerged as the major cause of mortality. As a result, the focus is increasingly being directed to identifying other risk factors in order to prevent or detect these diseases early.Vitamin D deficiency, which is linked to several cardiovascular problems such as hypertension, peripheral vascular disease, coronary artery disease, and coronary artery disease, is one of the risk factors that has gained attention recently.A steroid hormone, vitamin D, is essential for maintaining the homeostasis of bone fibers that are involved in calcium metabolism in more than 36 different tissues [4, 5]. Naturally, a lack of vitamin D results in pathological processes.According to estimates from different civilizations, 20 to 100 percent of men and women are vitamin deficient [6]. Vitamins also have an impact on a number of coronary arterydisease risks factors, such as hypertension, diabetes, and dyslipidemia [7, 8].Vitamin levels are linked to a number of processes, such as changes in the renin-angiotensin system's regulation and the vascular smooth muscle's sensitivity to blood pressure regulation [10].

In 2010, it was discovered how very vital vitamin D is to the health of the cardiovascular system and other bodily systems.According to Dr. Anderson and colleagues' research, low vitamin D levels were linked to coronary heart disease, stroke, heart failure, and stroke, while vitamin D insufficiency was linked to a considerable rise in the prevalence of diabetes, hypertension, hyperlipidemia, and peripheral vascular disease.Several experimental investigations have demonstrated that vitamin D, which binds to the heart receptor, has a critical role in regulating blood pressure, limiting the progression of atherosclerosis, and controlling cardiac fibrosis and hypertrophy.As a result, studies on the preventative and therapeutic effects of vitamin D in cardiovascular illnesses have been conducted, which supports this association [12].The data indicate that extensive study has been conducted on the function of serum vitamin D levels in the direct development of myocardial infarction as well as the involvement of vitamin D in the causes of myocardial infarction, such as excessive blood pressure, diabetes, etc.For instance, research conducted in the United States discovered a considerable correlation between vitamin D insufficiency and female gender, age over 60, obesity, high blood pressure, and diabetes [13].In other comparable investigations, Dr. Peelz and colleagues have suggested that persons with cardiovascular illness take supplements of this vitamin based on the data discovered in their research, which is proof of the role this vitamin plays in the development of cardiovascular disease [14].A decrease in metabolic syndrome, diabetes, and cardiovascular disease was linked to raising vitamin D levels in different Canadian research [15].In order to develop more effective preventative and treatment strategies in the future, we look into whether there are any real connections between vitamin D insufficiency and myocardial infarction in this study.

Method

The link between vitamin D and CVDs was investigated in prospective cohort studies in adults without underlying CVD-related disorders. The following keywords are combined in the search strategy:

"Vitamin D" or "cholecalciferol" or "25-hydroxyvitamin D" or "25-OH-D" or "25 (OH) D" and "cerebrovascular disease" or "cardiovascular disease" and "mortality" or "incidence" or "survival" and "prospective studies" or "cohort studies" or "longitudinal studies" or "observational studies."

The analysis includes all studies, regardless of language, assessing vitamin D levels in Iranian patients with cardiovascular disease. Regardless

of age, gender, or ethnicity, the research group contained healthy people.

Exclusion criteria 1) case reports, editorials, letters, meeting abstracts, or review articles; and 2) retrospective studies, cross-sectional studies, or case-control studies.

Data analysis

Experiments for heterogeneity and diffusion bias were conducted, and the findings were pooled using a stochastic effects model. To assess our findings, multiple studies approaches, outcomes, and subgroups were subjected to sensitivity analysis and meta-regression. Integrated odds ratios were used to express the results (OR [95 percent confidence intervals, CIs]).

Results

Search for articles

The initial database search returned 451 items; 83 duplicates were then deleted (Figure 1). The remaining 368articles were reduced by 63 due to Review design and 281 due to inappropriate categorization after the title and review. Three original articles were found after reviewing the entire texts of the remaining 24 references.

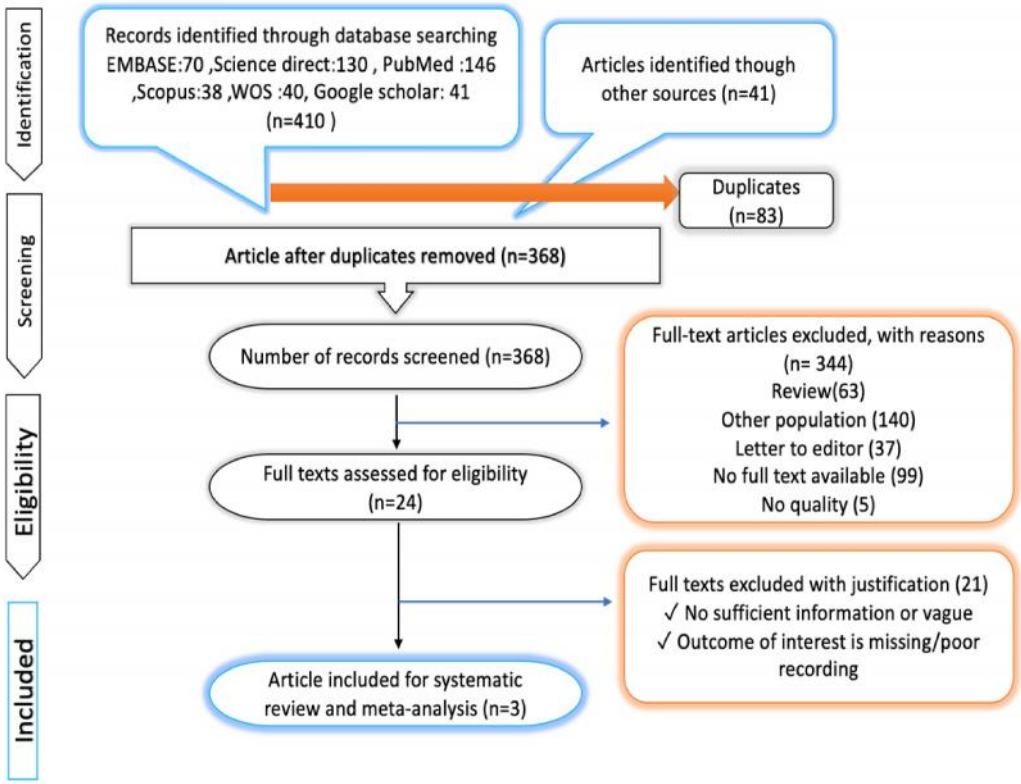


Figure 1. PRISMA flow diagram of patient selection

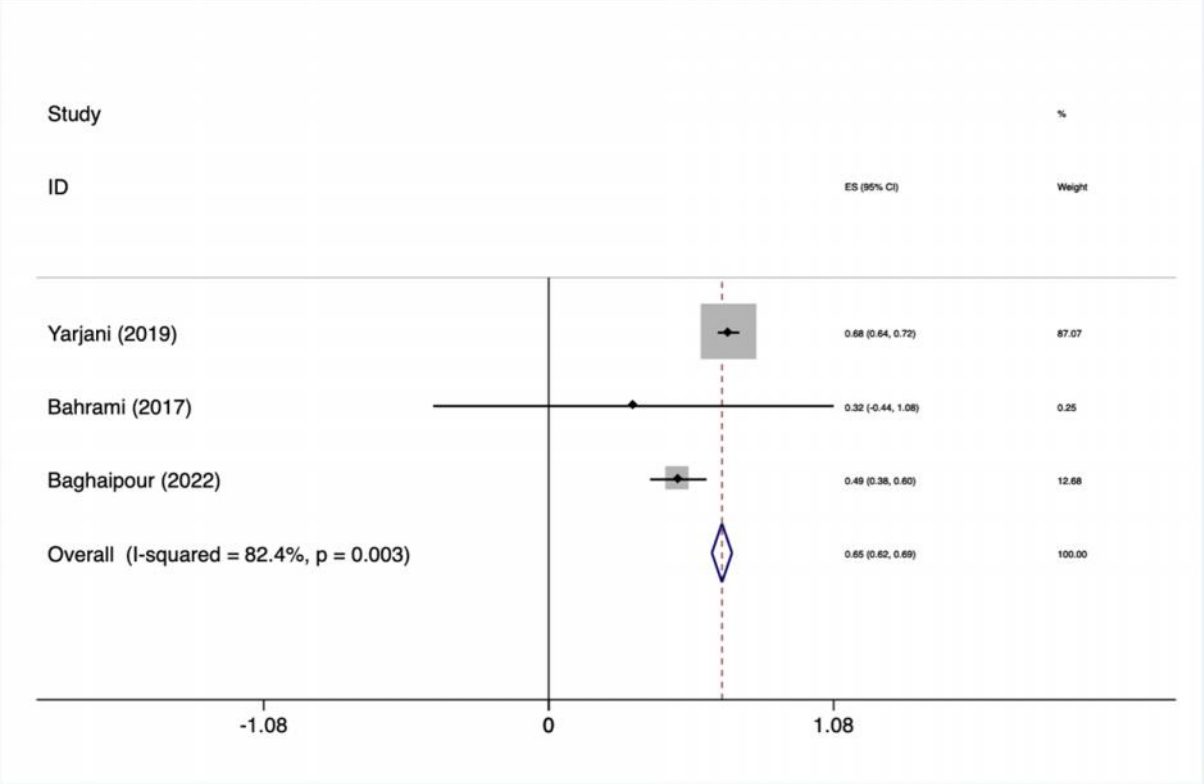
Meta-analysis of the prevalence of vitamin D deficiency among Iranian patients with ischemic heart disease

The overall prevalence of vitamin D deficiency among Iranian patients with cardiovascular disease was 65% (95%CI:62%-69%, I^2:82.4%)

Table1. Characteristics of the included studies regarding the vitamin D levels among patients with cardiovascular disease

Author	Year	Province	Design	Sample size	Mean age	Female/male	Level of vitamin D(case)	
							Lower than normal	normal
Yarjanli	2019	Tehran	Retro	502	56.8	244/258	68.2%	31.8%
Bahrami	2017	Hamedan	Retro	146	60.86±9.8	71/75	31.9%	68.1%
Baghaipour	2022	Tehran	Retro	84	67.51±12.90	40/44	48.8%	51.2%

Figure 2. Meta-analysis of the prevalence of vitamin D deficiencyamong Iranian patients with cardiovascular disease



Discussion

Numerous reputable research have shown a clear connection between vitamin D insufficiency and the incidence of chronic illnesses, including CVD risk factors and cardiac metabolism: extensive epidemiology research. Large-scale European cohort studies like the Third National Health and Nutrition Examination, the Framingham Children Study, or Tromso's studies are a few of the most notable instances of this study premise [16, 17].

The prevalence of arterial stiffness and left ventricular hypertrophy, as well as the escalation of hypertension, insulin resistance, type 2 diabetes, and dyslipidemia, were all associated with these groups' cross-sectional vitamin D levels. Additionally, vitamin D insufficiency has been linked to CVD mortality or onset in studies that tracked thousands of people for at least two decades [18, 19].Serum D level 20ng/mL is the diagnostic cutoff for diagnosing vitamin D insufficiency. This pathophysiological situation is typically brought on by low nutritional intake and insufficient secondary skin synthesis as a result of decreased sun exposure [18].In the heart and vascular endothelial cells, the nuclear 25-OH D receptor is abundantly expressed. Additionally, 25-OH D controls the action of pancreatic cells, obesity, the renin-angiotensin-aldosterone system, and energy expenditure.

Due to its receptor's participation in the regulation of hundreds of genes linked to cardiac metabolic pathways, the relationship between 25-OH D and cardiovascular disease may be clearly seen in both men and women.Indeed, the promoter region of many genes involved in diverse pathways, such as insulin sensitivity and secretion, has a high prevalence of vitamin D-responsive elements, indicating that this factor may play a role in the metabolic syndrome, a condition that is strongly associated with insulin resistance. Sexuality may play a role in this underlying mechanism's transmission [20].For instance, it has been discovered that exclusively in males, certain vitamin D receptor alleles mediate the connection between vitamin D and blood pressure [21].Additionally, sex hormones and vitamin D's metabolites interact with one another. Forthis purpose, a lab investigation revealed a connection between the pathways of the estrogen hormone and vitamin D, with vitamin D restoring endothelial function in cells isolated from mice having ovariectomies.The ability of vitamin D to restore cyclooxygenase-2 expression, thromboxane-prostanoid receptor antagonism and activation of nitric oxide synthesis were among the findings of this study [22].As a result, in a multiethnic study of atherosclerosis, a cross-sectional analysis revealed that vitamin D insufficiency was linked to lower levels of estradiol in women but that there was no interaction between testosterone and 25-OH D levels in males.The study's findings, however, indicate that vitamin D insufficiency may be a higher risk factor for cardiovascular disease (CVD) in postmenopausal women due to their prolonged exposure to circumstances linked to aging-related hormonal changes [19].Such assertions could offer scientific proof of a potential distinction between the development or progression of CVD in men and women and vitamin D.The final result may be impacted by confounding variables such as inflammation, obesity, insufficient physical activity, poor diet, and outdoor activities, which are highly related with vitamin D status and occur at varying rates across the sexes [23].

Conclusion

Despite the fact that our knowledge of vitamin D insufficiency and its effects are fast growing, there is still more to discover. The significant association between Iranian patients' vitamin D levels and heart health is the major finding of the current systematic study.

References

1. Wang TJ, Pencina MJ, Booth SL, Jacques PF, Ingelsson E, Lanier K, et al. Vitamin D deficiency and risk of cardiovascular disease. Cir- culation. 2008;117(4):503-11. DOI: 10.1161/CIRCULATIONAHA.107.706127 PMID: 18180395
2. Lee JH, O'Keefe JH, Bell D, Hensrud DD, Holick MF. Vitamin D defi- ciency an important, common, and easily treatable cardiovascular risk factor? J Am Coll Cardiol. 2008;52(24):1949-56. DOI: 10.1016/j. jacc.2008.08.050 PMID: 19055985
3. Mahdavi K, Amirajam Z, Yazdankhah S, Majidi S, Adel MH, Omidvar B, et al. The prevalence and prognostic role of vitamin D deficien- cy in patients with acute coronary syndrome: a single centre study in South-West of Iran. Heart Lung Circ.

2013;22(5):346-51. DOI: 10.1016/j.hlc.2012.11.006 PMID: 23266191

4. Mahboobeh S, Pouya O, Elham S. Evaluation of in-hospital Mortality of Acute Coronary Syndrome Based on Blood Glucose at Admission. Evaluation. 2021;9(2):2423-5571.
5. Holick MF. Vitamin D deficiency. N Engl J Med. 2007;357(3):266- 81. DOI: 10.1056/NEJMra070553 PMID: 17634462
6. Holick MF. High prevalence of vitamin D inadequacy and im- plications for health. Mayo Clin Proc. 2006;81(3):353-73. DOI: 10.4065/81.3.353 PMID: 16529140
7. Sheikh, M., Mahabadi, B.S. and Ostadrahimi, P., 2019. Prevalence of Renal artery stenosis in Iranian patients with coronary artery disease: A systematic review and meta-analysis. *Int. J. Curr. Res. Med. Sci*, *5*(1), pp.8-14.
8. Danescu LG, Levy S, Levy J. Vitamin D and diabetes mellitus. Endo- crine. 2009;35(1):11-7. DOI: 10.1007/s12020-008-9115-5 PMID: 18979202
9. Li YC, Kong J, Wei M, Chen ZF, Liu SQ, Cao LP. 1,25-Dihydroxyvi- tamin D(3) is a negative endocrine regulator of the renin-angiotensin system. J Clin Invest. 2002;110(2):229-38. DOI: 10.1172/JCI15219 PMID: 12122115
10. Sheikh M, Ostadrahimi P, Salarzaei M, Parooie F. Cardiac Complications in Pregnancy: A Systematic Review and Meta-Analysis of Diagnostic Accuracy of BNP and N-Terminal Pro-BNP. Cardiology and Therapy. 2021 Dec;10(2):501-14.
11. Anderson JL, May HT, Horne BD, Bair TL, Hall NL, Carlquist JF, et al. Relation of Vitamin D Deficiency to Cardiovascular Risk Factors, Disease Status, and Incident Events in a General Healthcare Population. Am J Card .106:963-8;2010
12. Gardner DG, Chen S, Glenn DJ. Vitamin D and the heart. Am J PhysiolRegulIntegr, Integr Comp Biol 2013;305:R969-77.
13. Martins D, Wolf M, Pan D, Zadshir A, Tareen N, Thadhani R, et al. Prevalence of Cardiovascular Risk Factors and the Serum Levels of 25-Hydroxyvitamin D in the United States: Data From the Third National Health and Nutrition Examination Survey. Arch Intern Med 2007;167:1159-65.
14. Pilz S, Tomaschitz A, Ritz E, Pieber TR. Vitamin D status and arterial hypertension: a systematic review. Nat Rev Cardiol 2009;6:621-30.
15. Pham T-M, Ekwaru JP, Setayeshgar S, Veugelers PJ. The Effect of Changing Serum 25-Hydroxyvitamin D Concentrations on Metabolic Syndrome: A Longitudinal Analysis of Participants of a Preventive Health Program. Nutrients 2015;7: 7271-84.
16. Hutchinson MS, Grimnes G, Joakimsen RM, et al. Low serum 25-hydroxyvitamin D levels are associated with increased all-cause mortality risk in a general population: the Tromsø study. Eur J Endocrinol. 2010;162:935-42. https://doi.org/10.1530/EJE-09-1041.
17. Fan C, Nieto FJ, Bautista LE, et al. Vitamin D intake and cardiovascular mortality in the NHANES I epidemiological follow-up study cohort. J Diet Suppl. 2012;9:79-89. https://doi.org/10.3109/19390211.2012.682204.
18. Al Mheid I, Quyyumi AA. Vitamin D and Cardiovascular Disease: Controversy Unresolved. J Am Coll Cardiol. 2017;70:89-100. https://doi.org/10.1016/j.jacc.2017.05.031.
19. Al Mheid I, Patel RS, Tangpricha V, et al. Vitamin D and cardiovascular disease: is the evidence solid? Eur Heart J. 2013;34:3691-36918. https://doi.org/10.1093/eurheartj/eht166.
20. Kouvari M, Yannakoulia M, Souliotis K, et al. Challenges in Sex- and Gender-Centered Prevention and Management of Cardiovascular Disease: Implications of Genetic, Metabolic, and Environmental Paths. Angiology. 2018;69:843-53.

https://doi.org/
10.1177/0003319718756732.

21. Muray S, Parisi E, Cardús A, Craver L, Fernández E. Influence of vitamin D receptor gene polymorphisms and 25-hydroxyvitamin D on blood pressure in apparently healthy subjects. J Hypertens2003;21:2069.https://doi.org/10.1097/01.hjh.0000098139.70956.
22. Dong J, Wong SL, Lau CW, Liu J, et al. Calcitriol restores renovascular function in estrogen-deficient rats through downregulation of cyclooxygenase-2 and the thromboxane-prostanoid receptor. Kidney Int. 2013;84:54-63. https://doi.org/10.1038/ki.2013.12.
23. Zhao D, Ouyang P, de Boer IH, et al. Serum vitamin D and sex hormones levels in men and women: The Multi-Ethnic Study of Atherosclerosis (MESA). Maturitas. 2017;96:95-102. doi: 10.1016/j.maturitas.2016.11.017.

Access this Article in Online	
Quick Response Code	Website: www.ijcrcps.com
	Subject: Medical Sciences
DOI: 10.22192/ijcrcps.2022.09.07.002	

How to cite this article:
Mahboobeh Sheikh, Pouya Ostadrahimi. (2022). The Prevalence of Vitamin D Deficiency among Iranian Patients with Ischemic Heart Disease: A Systematic Review and Meta-analysis. Int. J. Curr. Res. Chem. Pharm. Sci. 9(7): 8-14.
DOI: http://dx.doi.org/10.22192/ijcrcps.2022.09.07.002

