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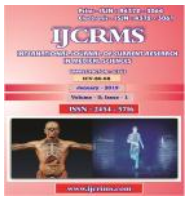

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Prevalence of cardiovascular complications in Iranian diabetic patients: A systematic review and meta-analysis

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Abstract

Introduction: Diabetes mellitus is a chronic metabolic disease that can be diagnosed with increased blood glucose level and disorders in the metabolism of carbohydrate, fat, and protein. This disease is highly important for its prevalence causes and complications. The aim of this systematic review and meta-analysis was to evaluate the Prevalence of cardiovascular complications in Iranian diabetic patients.

Methods: The review of references and resources was done using the Medical Subject Headings (MeSH) and keywords related to the source of information on the incidence of general Prevalence of cardiovascular complications in Iranian diabetic patients.

Results: Based on the results of random effects model, the incidence of cardiovascular complications in 2294 patients was 35.1% (95% confidence interval [CI]: 33.2, 37, I^2 = 94.4).

Discussion: Cardiovascular complications and hypertension are the most common problems of diabetic patients. Since obesity is one of the risk factors of diabetes and cardiovascular diseases, it is required to be regarded a dangerous disease and attempts must be made to treat it. People need to receive adequate training about obesity and complications arising from it. the aim of this systematic review and meta-analysis was to evaluate the Prevalence of cardiovascular complications in Iranian diabetic patients.

Keywords: diabetes, risk factors, diabetes complication, cardiovascular

Introduction

Diabetes mellitus is a chronic metabolic disease that can be diagnosed with increased blood glucose level and disorders in the metabolism of carbohydrate, fat, and protein (1,2). This disease is highly important for its prevalence causes and complications (3). Nowadays, diabetes is regarded as one of the most important health and social-economic problems of the world. According to the World Health Organization's prediction, the world's diabetic population was 171 million in 2000 and is projected to rise up to 366 million people in 2030(4). As a chronic disease, diabetes plays a significant role in the developing physical injuries, mortality, and health costs (5). Moreover, it has a major effect on people's health and has been recognized as a serious risk factor of cardiovascular diseases (6). Individuals with diabetes are subject to serious and fatal complications (7). Cardiovascular diseases, stroke, retinal damage[1] and blindness, peripheral neuropathy, end stage renal disease, and amputation of end organs are the most serious complications of diabetes. The cost of diabetes is very high for countries(8,9).Diabetic individuals

especially patients with diabetes-associated cardiovascular complications have been reported to have lower levels of health, lower levels of quality of life, higher levels of depression and disability, and obvious disorders in social and vocational fields(10,11). In fact, diabetes is associated with major behavioral issues, and psychological and social factors play a vital role in the management and course of the disease(12). Identifying the risk factors and making proper interventions against them are included as the basic measures taken in the management of diabetes and its complications(13). The most important issue making the diagnosis and intervention of risk factors more important is the emergence of chronic complications(14). In fact, a major cause of diabetes-associated mortality is cardiovascular disease. In diabetic patients, cardiovascular disease is two to five times more common than normal individuals(15). In addition, the risk of stroke is very high in these individuals(16). According to the studies conducted, the risk factors of cardiovascular complications in patients with type 2 diabetes are complicated and multifactorial. The most important risk factors and complications of diabetes include obesity, high age, family history of diabetes, high-intensity diabetes, lack of self-management, lack of blood glucose control, unhealthy lifestyle, and low quality of life(5,17).

Methods

Eligibility criteria

The methods used for this systematic review were based on the "Cochrane Systematic Study Booklet" and "Appropriate Items for Systematic and Meta-Analysis Study (PRISMA)" tool. Observational studies conducted on general population have been added and studies conducted on specific population have been removed. Results are summarized as reported in the research. The minimum sample size was 25 patients in each study. The Prevalence of cardiovascular complications in Iranian diabetic patients was calculated in this study.

Searching strategies and databases

The review of references and resources was done using the Medical Subject Headings (MeSH) and keywords related to the source of information on the incidence of general Prevalence of cardiovascular complications in Iranian diabetic patients. To find references, the international Databases (MEDLINE PubMed interface), Google Scholar, and Web of Science) and domestic databases (SIDs and Migiran) and journals were searched; unlimited searching, in terms of both setting and language, was done until June 30, 2018. PRESS standard and the Health Sciences Librarian were used for designing the strategy.

MEDLINE application was used to search other databases. In addition, PROSPERO was used to provide a systematic search that was completed recently. To search for headlines and abstracts, boolean (AND, OR, NOT), mesh, coordinate {truncation} * and related words were used; following keywords were used to provide a comprehensive context: diabetes, risk factors, diabetes complication, cardiovascular, and prevalence rate and percent.

Research selection and data extraction

According to the research protocol, two researchers observed the titles and abstracts separately according to the eligibility criteria; in the next step, after the removal of repeated studies, the full text of the paper was studied based on the eligibility criteria and the required information was extracted. Consensus method was used to solve the disagreements between two researchers. The extracted data included the general information (corresponding author, year and place), characteristics of the research (research design, sample size, location, study period, and risk of bias), and characteristics of participants.

Quality control

To assess the quality of the methodology and bias risk, each observation study was evaluated using a tool developed by Hoy et al; this 10-item scale evaluated the quality of the study in two dimensions, including external credentials (items 1 to 4 target populations, sampling frame, sampling method, and minimum indirect neglect)

and internal validity (items 5 up to 9 covering methods for data collection, case definition, study tools, and data collection mode and item 10 covering assessing relevant assumptions or analyzes). The risk of abuse was assessed by two researchers separately and possible disparity of ideas was resolved by consensus.

Aggregation of data

All eligible studies were included within the systematic review. The heterogeneity of primary studies was assessed by performing I^2 tests. Subgroup analysis was conducted to determine the heterogeneity based on the participants in the study, gender, and age. Meta-analysis was performed using the STAT 14 statistical software.

Results

1. Selecting eligible papers and researches

In the initial search on various databases, a total of 310 articles were reviewed, 265 of which turned out to be repetitive during screening process of title and abstract. 26 articles were removed due to unrelated title; out of the remaining 19 articles, 6 articles met the inclusion criteria. Of the 13 articles that were removed, 4 were reviews, 2 were letters to editors, 1 had no complete text, and 6 had low quality and could not be considered in the research. (Figure 1)

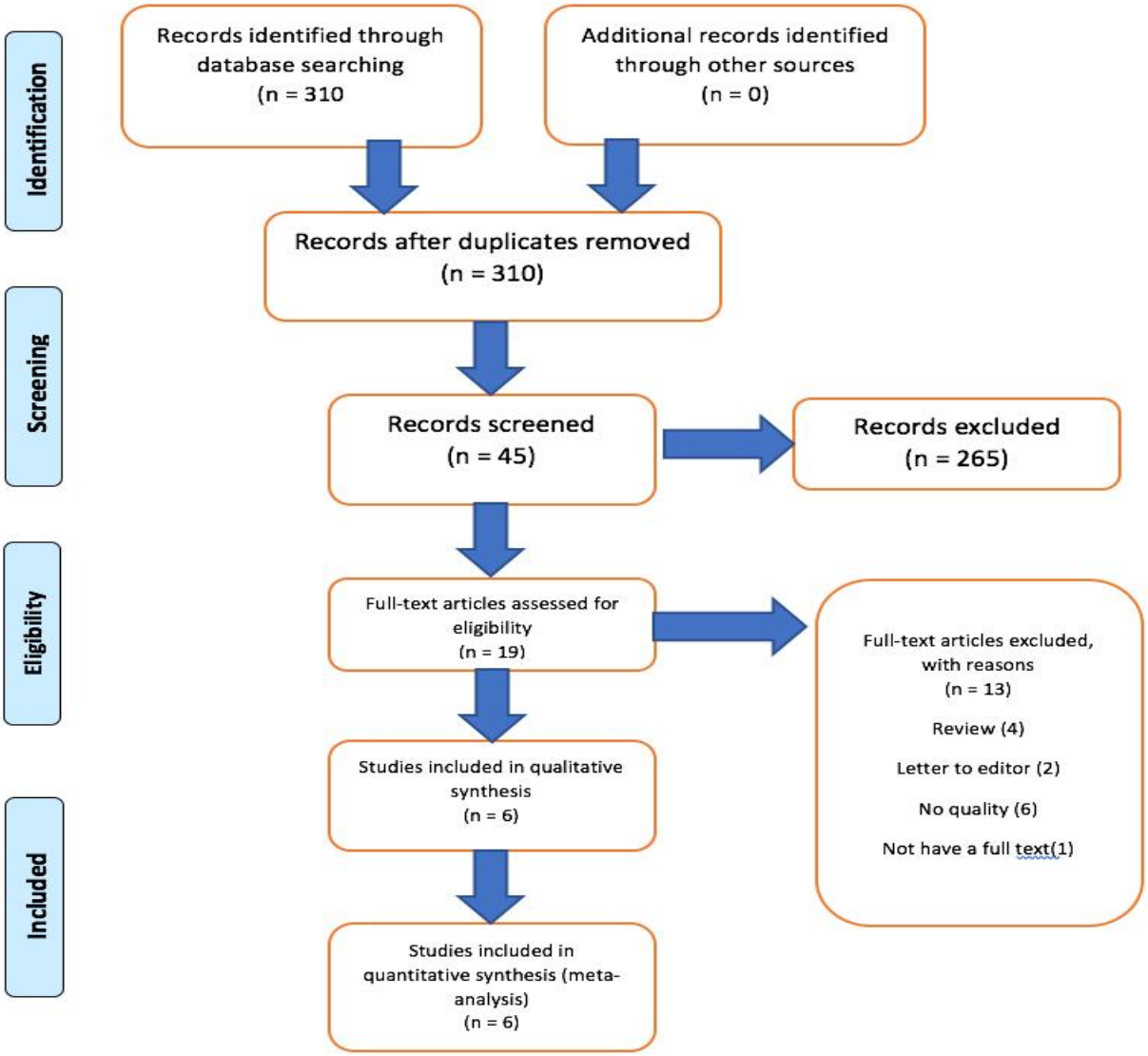

Fig 1.prisma flow chart

2. Characteristics of the researches and papers

The final research was conducted on 2294 participants; with an age range of 15 and 80 years old; a cross-sectional design was used in all studies. Research was conducted in only 5 provinces out of 31 provinces of Iran. Of the 6 studies, 2 were from Shahroud andother were from Hamadan,freidounkenar,ghasrshirin and shadgab; the majority of papers were conducted on outpatient cases (n= 4) through random sampling (n = 4). Required data was collected through interview (n = 5) and had a low bias risk (n = 6) (Table 1).

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

ID	Author	Year	N	Mean of age	prevalence	Bias
1	Heshmati[17]	2013	400	-	38.8%	Low
2	Olfatipour[18]	2016	347	43.72	45.8%	Low
3	Abbasiyan[19]	-	400	49.6	37.9%	Moderate
4	Khatony[20]	2014	286	58.25	43.4%	Low
5	Abbasian[21]	2007	340	50.2	18.6%	Low
6	Cheraghi[22]	2010	521	-	35.7%	low

Meta-analysis Prevalence of cardiovascular complications in Iranian diabetic patients:

Based on the results of random effects model, the incidence of cardiovascular complications in 2294 patients was 35.1% (95% confidence interval [CI]: 33.2, 37, I^2 = 94.4).

Table 2: Prevalence of cardiovascular complications in Iranian diabetic patients

Study	year	ES	95% conf Interval		weight
			low	up	
Heshmati	2013	0.388	0.34	0.436	16.12
Olfatipour	2016	0.458	0.406	0.510	13.35
Abbasiyan	-	0.379	0.332	0.426	16.26
Khatony	2014	0.434	0.377	0.491	11.09
Abbasian	2007	0.186	0.145	0.227	21.38
cheraghi	2010	0.357	0.316	0.398	21.79
Overall random pooled ES	----------	0.351	0.332	0.370	100

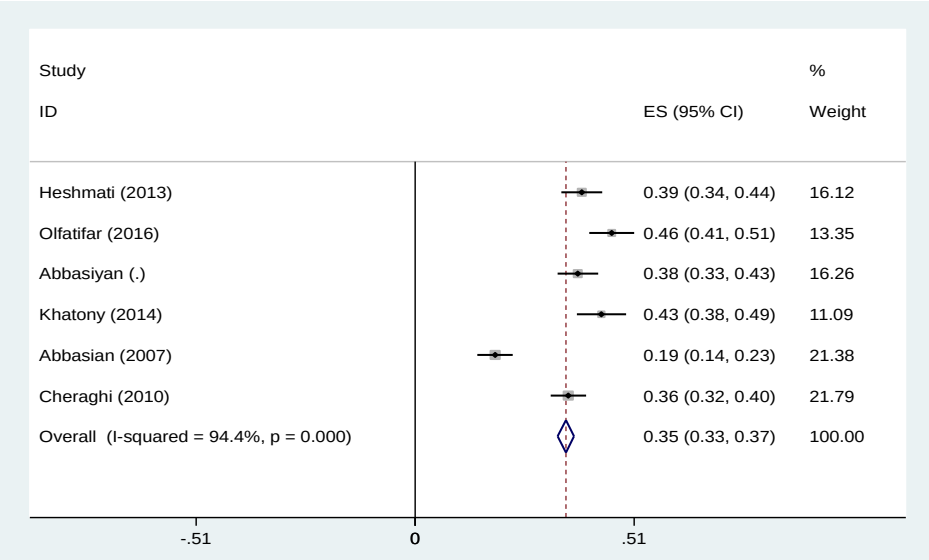

Fig.2. The incidence of Prevalence of cardiovascular complications in Iranian diabetic patients its 95% interval for the studied cases according to the year and the city where the study was conducted based on the model of the random effects model. The midpoint of each section of the line estimates the% value and the length of the lines showing the 95% confidence interval in each study.

Discussion

Based on the results of random effects model, the incidence of cardiovascular complicationsin 2294 patients was 35.1% (95% confidence interval [CI]: 33.2, 37, I^2 = 94.4). Long-term complications of diabetes are regarded as medical problems. Researchers have long been studying the mechanisms of these complications and methods of prevention and treatment(18). Diabetes self-management and appropriate control of blood glucose are the main principles for controlling diabetes and preventing its complications. They are also necessary for preventing short and long-term complications(19). Chronic complications of diabetes are associated with high levels of blood glucose. For this reason, diabetic patients are more likely subject to complications such as blindness, heart diseases, neuropathy, and nephropathy normal individuals(20). The studies indicated that the irreversible complications of diabetes arise from the final products of glycationthat brings about different complications in diabetics by changing the composition ofcholesterol, albumin, collagen, and hemoglobin(21).

The complications of this disease are various. One of the special diabetic issues is the occurrence of cardiovascular complications. Self-management of blood glucose (SMBG) delays the occurrence of cardiovascular complications; increased blood glucose is the major cause of complications of diabetes(22).Self-management of diabetes is an active and spontaneous that includes activities such as controlling food intake, doing sports, and regular heart examination for controlling cardiovascular complications of diabetes and their management by the patient(23). The studies have indicated that improved self-management of diabetes is likely to improve the diabetics' health status, reduce diabetes complications, and reduce patients' hospitalization for diabetes-associated complications(24). Cardiovascular complications and hypertension are the most common problems of diabetic patients. Since obesity is one of the risk factors of diabetes and cardiovascular diseases, it is required to be regarded a dangerous disease and attempts must be made to treat it.People need to receive adequate training about obesity and complications arising from it(25).

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