



Risk Factors of Cardiovascular Disease in Iraq from 2000 to 2023: A Systematic Review

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Abstract: Background: Cardiovascular disease has become the leading cause of death worldwide. (CVD) is today the leading cause of global mortality and morbidity.

Aims : To assess the risk factors associated with cardiovascular illnesses in Iraq.

Methods: The researcher searched Web of Sciences, Google Scholar, PsycINFO, Scopus, and PubMed. The study included a **Systematic** review of the studies on **risk factors of cardiovascular disease** from 2000 to 2023.

Results: Only eleven research articles from 2000 to 2023 addressed the risk factors for cardiovascular disease in Iraq. The 22 items of the STROBE checklist were applied after a quality assessment to strengthen reporting on epidemiological observation studies. No articles were excluded.

Conclusion: A thorough analysis examined Iraqi cardiovascular disease risk factor studies from 2000 to 2023. With only eleven papers, the study found few relevant studies. Smoking, hypertension, diabetes, and obesity are common risk factors. Women are more likely to have certain risk factors. Acute coronary syndromes are more common in people 45–65. However, younger people have risk factors. Smoking and obesity increase cardiovascular disease risk.

Keywords: Cardiovascular disease, Risk Factors, Systematic Review, Iraq

Introduction

Cardiovascular disease has become the leading cause of death worldwide(1). (CVD) is today the leading cause of global mortality and morbidity(2). Given that age substantially diminishes the typical performance of the cardiovascular system, the prevalence of cardiac diseases develops with age(3). The most common risk factors for the incidence of cardiovascular illnesses include hypertension (a double-edged sword: an intrinsically cardiovascular condition as well as a risk factor for other cardiovascular diseases), Diabetes Mellitus, dyslipidemia, obesity, smoking, and aging (4)(5). Diabetes affects people all over the world, and the prevalence of both type 1 and type 2 diabetes is increasing; The estimated number of individuals with diabetes in 2000 was 171 million; a twofold increase is anticipated by 2030. This widespread disease is mostly caused by type 2 diabetes, to which various factors contribute, including increased longevity, obesity, poor diet, sedentary lifestyle, and increasing urbanization (6). Hypertension is one of the most serious health issues, and it continues to have a significant role in the development and death from coronary artery disease, stroke, heart failure, and renal failure (7). Age is an immutable risk factor that is additionally

recognized as an autonomous risk factor for the development of atherosclerosis and subsequent cardiovascular disease (8). Cigarette smoking is a significant contributor to the development of cardiovascular disease (CVD) and is the second leading cause of death from CVD, following high blood pressure. High blood glucose, physical inactivity, obesity, and raised cholesterol levels are other key risk factors for CVD mortality. CVD accounts for more than 17 million deaths worldwide each year (9). Obesity presents substantial risks for cardiovascular disease (CVD) both bluntly, through intrinsic insulin resistance and metabolic alterations, as well as subtly, by affecting additional relevant risk factors such as type 2 diabetes (T2DM), dyslipidemia, and hypertension (HTN) (10). In Iraq, cardiovascular disorders are recognized as a prominent contributor to disease-related mortality, with a notably elevated incidence observed within the youth population (11).

Methods

Search strategy

A systematic literature search was conducted on the databases (including Web of Sciences, Google Scholar, PubMed, PsycINFO and Scopus). The search was between 2000 and 2023. Initially, a comprehensive search was conducted to gather all pertinent articles by employing specific keywords and appropriate Boolean operators, such as "and" and "or," along with applicable tagging based on the database's nature. The search technique employed in PubMed is as follows: ("cardiovascular diseases" OR "Iraq" OR [Risk Factors AND "cardiovascular diseases"]) OR "Heart diseases" AND [Iraq (tiab) OR Iraq OR Iraq (ad)].

Quality assessment

The reliability and validity of research studies, clinical trials, and data sources were utilized to evaluate the relevance of risk factors associated with cardiovascular disease. Studies undertaken by respected universities, peer-reviewed publications, and high sample numbers were also searched for more robust evidence. The study's design, methodology, statistical analysis, and generalizability of the results are all considered. Additionally, look for any conflicts of interest among researchers. The Preferred Reporting Materials for Systematic Reviews (PRISMA) protocol was employed to verify the adherence to the proper sequence of items in this systematic review.

Outcome Measures

The significant outcome of the present work was identifying risk factors for cardiovascular disease. The study was based on the analysis of cardiovascular disease reports and the identification of associated risk factors.

Selection of studies

The systematic search identified 396810 articles. Several steps in the inclusion and exclusion process were completed until eleven articles were included (see Figure 1).

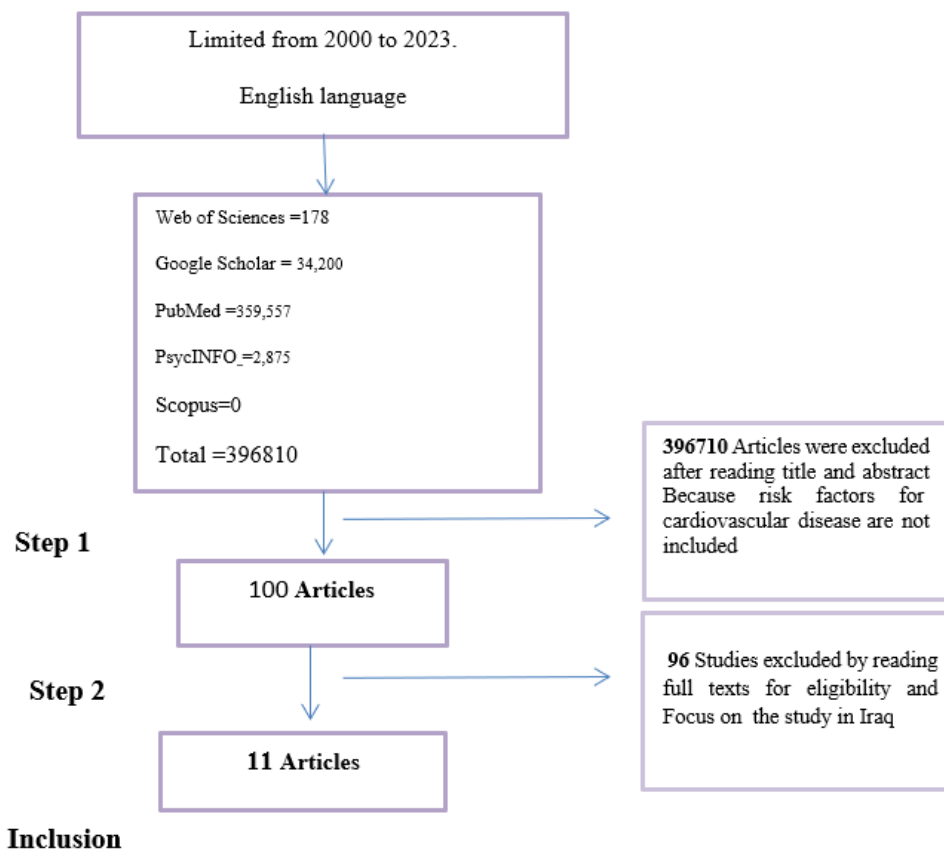


Figure 1. Flow chart the systematic search and exclusion process

Results

The results showed that the risk factors for cardiovascular disease investigated in Iraq were only four research articles from 2000 to 2023. The 22 items of the STROBE checklist were applied after a quality assessment to strengthen reporting on epidemiological observation studies.

Table 1: The review of studies

Author (Year)	Location	Population	Statistical Methods	Type of Study	Results	STROBE Score
Ameen Mosa. et al (2013) (12)	Mosul	220 patients	All continuous variables were presented as figures, percentages, or mean standard deviations. Every factor was compared using the Chi-square test, except the mean age, which was analyzed using the ANOVA test. Means were compared using the student's T-	Prospective study	The primary rationale for angiography was unstable angina (U.A.) and non-ST segment elevation myocardial infarction (NSTEMI). The predominant risk factor observed was being male and over 45. The prevalence of smoking is 49%, followed by hypertension (47.2%), dyslipidemia	15

			test. The criterion for statistical significance was a P-value below 0.05.		(40%), and non-insulin-dependent diabetes mellitus (23.5%). The distribution of smoking, gender, NIDDM (non-insulin-dependent diabetes mellitus), H.T. (hypertension), and dyslipidemia among different subgroups of patients exhibited statistically significant differences.	
Mohammad, Jehangeer, & Shaikhow. (2015) (13)	Duhok	445 adult patients	SPSS for Windows, version 16.0, Chicago, and Microsoft Office Excel 2007 were utilized to conduct the data analysis. Category parameters were represented using counts and percentages, whereas constant parameters were calculated using mean and standard deviations.. The chi-square test was employed to make comparisons between categorical	A cross-sectional study	The incidence of PCAD, as confirmed by angiographic evidence, was 31%. In the PCAD group, there was a higher prevalence of hyperlipidemia ($p = 0.04$), positive family history of coronary artery disease ($p = 0.002$), type A lesions ($p = 0.02$), single vessel disease ($p = 0.01$), and medicinal therapy ($p = 0.01$) compared to the MCAD group. The logistic regression model revealed significant associations between several	19

			<p>variables. The student t-test was applied to the variables that were continuous. Utilizing a logistic regression model, premature CAD risk factors were identified. A P-value less than 0.05 was considered to be statistically significant.</p>		<p>factors and PCAD. Specifically, being male (odds ratio [OR] 3.38, confidence interval [C.I.] 1.96–7.22), smoking (OR 2.08, C.I. 1.05–4.12), hypertension (OR 1.58, C.I. 1.25–2.03), hyperlipidemia (OR 1.89, C.I. 1.17–2.42), and a positive family history of coronary artery disease (OR 2.62, C.I. 1.38–9.54) were found to be associated with PCAD. The sensitivity analysis demonstrated that individuals with coronary stenosis over 70% had the highest specificity (94.2%) and positive predictive value (96.5%) compared to those with lesser degrees of blockage.</p>	
<p>Khalis B. et al (2016) (14)</p>	<p>Erbil</p>	<p>359 participants</p>	<p>The Statistical Package for Social Sciences (SPSS, version 15.0) was utilized for data entry and analysis. The data was analyzed using</p>	<p>A cross-sectional study</p>	<p>The average \pm standard deviation ages of males and females were 38.53 ± 14.59 and 34.92 ± 14.96 years, respectively. The prevalence of smoking was</p>	<p>17</p>

			the Chi-square test of association and the student t-test. P values of 0.05 were considered statistically significant.		14.8% among males and 5.2% among females. In addition, the incidence of hypertension was 12.3%, with a more significant occurrence among females (14.3%) compared to males (9.4%) (P = 0.164). Nevertheless, the event of diabetes and obesity was notably more significant in females (16.7% and 38.1%) compared to males (8.7% and 20.8%), with statistically significant differences (P<0.05).	
Ban Waheed. et al (2016) (15)	Kerbala	207 adolescents	SPSS (version 24.0) was used to analyze the data. All quantitative variables or numbers were expressed as mean +/- standard deviation and categorical variables were expressed as percentages. Data for two groups were compared using the student t-test, while data for more than two groups were analyzed using	A cross-sectional study	Significantly higher AIP values (> 0.30) in the overweight and obese categories are associated with a high risk of CVD. This gives evidence that the research population's reported unhealthy weight is closely linked to a high chance of acquiring CVDs in adulthood; hence, it is advised that the AIP be routinely checked, particularly in	16

			ANOVA. A multivariate regression analysis was performed to estimate the effect of each variable on obesity. A p-value of 0.05 was considered statistically significant for all tests. The correlation coefficient was utilized to quantify the relationship strength between variables with p 0.05 significance.		high-risk individuals.	
Abd, Abd, & Raman, (2019) (16)	Thi-Qar	80 patients	Descriptive statistics were employed to ascertain the attributes of our study population. A chi-square test was performed to ascertain the association between the selected parameters. The process of data coding and analysis was conducted utilizing the Statistical Package for Social Science (SPSS) version 20.0. Statistical tests were conducted at a significance	A Cross-sectional study	Approximately 65% of individuals were diagnosed with hypertension. Within this study, 45% of the patients had a confirmed diagnosis of diabetes, while the remaining 55% were discovered to not be suffering from diabetes. A total of 56.3% of patients were found to have a previous record of elevated cholesterol levels. With respect to the patient's family history, 46.3% of patients had	17

			level of 5%.		<p>a familial predisposition to cardiac disorders. This study revealed that individuals who engage in the habit of smoking were The smoking rate was 56.3%, while the nonsmoking rate was 43.7%.</p> <p>Passive smoking was reported in the majority of patients (78.75%).</p> <p>Finally, the results of the obesity study were found to be distinct. The 95% CI interval indicates that there are no outliers in the research population.</p>	
Jalal Khaznadar and Salh (2020) (17)	Sulaimanyia	125 patients	<p>The data that was gathered was analyzed using SPSS version 20. To achieve this objective, the categorical data was examined using descriptive statistics, and the findings were presented in numerical form (frequency) and as percentages. Furthermore,</p>	prospective study	<p>The findings suggested that the males comprised the preponderant cohort.</p> <p>Moreover, acute coronary syndromes were most prevalent among those aged 45 to 65. Conversely, hypertension (54.4%), dyslipidemia (52%), smoking (42.4%), and diabetes mellitus (38.4%) were</p>	19

			<p>the Chi-square test was employed to ascertain the statistical significance of the impact of age on various risk factors associated with ACS. A significance level of 0.05 was used for all statistical tests.</p>		<p>identified as the most prevalent risk factors associated with acute coronary syndromes. Furthermore, The results showed a statistically significant difference between the age groups in how age affected both common and uncommon manifestations. Generation had no significant impact on the various categories of acute coronary syndromes. The types of acute coronary syndromes were not significantly influenced by age or typical or atypical symptoms. In the age groups that were examined, there was no significant impact observed from family history, hypertension, diabetes mellitus, obesity, smoking, physical inactivity, dyslipidemia, or any of the factors above.</p>	
Amen et al (2020)	Erbil	74 patients	Student's t-tests were	A Cross-sectional	The participants	17

(18)			<p>utilized to evaluate the differences in variables. A significance level of $P \leq 0.05$ was used to determine the statistical significance. The data were analyzed using SPSS version 21, a statistical software package developed by IBM in Chicago, IL, USA.</p>	study	<p>ranged in age from 20 to 90 years, with a mean of 55.5 ± 12.47 years. Male patients had a substantially higher incidence of AMI than their female counterparts. Notable discoveries revealed that hypertension affected 74.3% of AMI patients, and insufficient physical activity affected 85.1% of AMI patients. In 50% of the patients, elevated levels of low-density lipoprotein were detected, followed by high triglycerides (41.9%), low-density lipoprotein (39.2%), and high total cholesterol (34%). A total of 29.7% were diabetic, 35.1% were obese, and nearly 39.2% were smokers. Interestingly, a positive family history of CAD was present in 51.4% of the AMI patients.</p>	
Kamil, Dakheel and	Thi-Qar	200 patients	The statistical analysis	A Cross-sectional	The study found that the	18

Kadhem (2021) (19)			<p>system SAS (2012) was utilized to examine the various study parameter factors. The significance of multiple variables in this study was determined using the chi-square test.</p>	<p>study</p>	<p>most significant share (68.5%) was attributed to individuals who did not smoke, while the smoking category accounted for 31.50%. The majority of patients (94.00%) are not obese, but the remaining patients (6.00%) who are obese exhibit notable variations between these two groups ($P<0.01$). 60.5% of individuals engage in physical activity, whereas 39.5% do not. The majority of participants, accounting for 56.50%, were individuals diagnosed with diabetes. 43.50% of participants abstained. There are statistically significant differences seen between hypertensive patients ($P<0.01$) and those who do not have hypertension. Among the individuals, 59.50% were</p>	
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					<p>diagnosed with hypertension, whereas the remaining 40.50% were not. There was a highly significant effect ($P < 0.01$) of stress on angina, with a prevalence of 99.50%.</p>	
<p>Mohammad, Rashad, Habeeb, Rashad, & Saeed (2021) (20)</p>	<p>Duhok</p>	<p>300 adult patients</p>	<p>Microsoft Excel entered all the data into SPSS (Inc., 2009). PASW Statistics for Windows 18.0 (Chicago: SPSS Inc.) for statistical analysis. Statisticians used frequencies, percentages, and means. Analytical statistics used chi-square (χ^2). Both uncorrected chi-square and 2-tailed p-values were used. Charts that failed to fulfil Cochran's chi-square requirement (minimum 20% of cells < 5 and no cell < 1) were tested with Fisher's exact test. The statistical significance level was chosen at p-</p>	<p>A cross sectional study</p>	<p>The average age of the patients was 55.5 years, with a standard deviation of 10.4 years. With a prevalence of 55.3%, hypertension emerged as the predominant risk factor among participants. This was followed by dyslipidemia (42.7%), type 2 diabetes mellitus (29%), smoking (11%), and ex-smoking (9.3%). Except for smoking, women had a higher prevalence of all other risk variables. The angiographic study showed that 29.3% of the cases had normal angiograms, 23.3% had single vessel disease, 14.3% had double</p>	<p>19</p>

			value < 0.05.		vessel disease, 21.3% had triple vessel disease, and 11.7% had findings that were not important.	
Salah and Haitham (2023) (21)	Erbil	1000 participants	The data analysis was conducted using SPSS (version 25). The data of all participants were analyzed at the initial stage, and The data were described using descriptive statistics, including mean \pm standard deviation, chi-square, and number and percentage.	A cross-sectional study	The present investigation comprised one thousand participants, with a mean age of 50.1 ± 12.4 years. Among a population, 42.5% were aged 56–65, 55.2% were female, and 30.4% were uneducated. As a percentage, 86.5% are married. According to the study findings, 21.6% of the participants reported being smokers, 48.6% of the Attendees initiated smoking between the ages of 20 and 29, and 76.2% of the Participants exhibited a frequency of physical activity of no more than once per week. Concerning the medical conditions of the participants, the research revealed that 58.3% had diabetes, 29.7% were on insulin treatment, and	17

					62.4% had hypertension. A total of 44.6% of the participants reported using cholesterol-lowering medication, while 41.9% of the participants indicated being overweight.	
Qadir and Weli (2023) (22)	Sulaimani	1200 participants	The statistical program for social sciences, "SPSS" version 26, was utilized to input and save all data for statistical analysis. The Chi-square test was employed to examine associations between variables, where a P value of 0.05 or lower was deemed statistically significant.	cross-sectional study	The findings of this study indicate that there are notable levels of risk factors that can be changed, including low physical activity, smoking, hypertension, overweight, and obesity, among both male and female secondary school students in Sulaimani city. This reflects a severe public health issue and threatens community health. It is imperative to develop initiatives to promote health and raise public awareness. Ongoing monitoring for risk factors associated with cardiovascular disease (CVD) and early identification and prevention measures must be strengthened.	19

DISCUSSION

The systematic study aimed to identify the factors that increase the likelihood of developing cardiovascular diseases (CVD) in Iraq from 2000 to 2023. Although an extensive search was conducted across many databases, the findings indicated a need for more relevant studies, with only eleven research articles satisfying the criteria for inclusion. The need for more studies suggests a lack of studies on cardiovascular disease (CVD) risk factors in Iraq, emphasizing the necessity for more thorough investigations to gain a comprehensive understanding of the factors that contribute to cardiovascular diseases in the area. It is worth mentioning that most of the studies included in this research were conducted in northern Iraq and focused on identifying risk factors associated with cardiovascular disease.

The prevalence of risk factors is elevated. Multiple studies (12) (14) (15) (16) (17) (19) (20) (21)(22) have documented high rates of modifiable risk factors, including smoking, hypertension, diabetes, physical inactivity, and obesity. This issue is of great importance and emphasizes the necessity for initiatives in public health. Gender disparities: Several studies (12)(13)(14)(18)(20)(21)(22) have identified a greater incidence of specific risk factors, such as diabetes and obesity, among women. These findings indicate that interventions explicitly tailored to gender may be necessary.

The prevalence of acute coronary syndromes was highest among those aged 45 to 65, according to the age distribution(12)(15)(17)(18)(20)(21)(22) . Nevertheless, younger populations also exhibited risk factors such as hypertension and dyslipidemia. This underscores the significance of implementing preventative measures at an early stage. Modifiable variables: Numerous studies have identified controllable risk factors such as smoking, lack of physical activity, and unhealthy weight as substantial contributors to the risk of cardiovascular disease (15)(16)(18)(19)(21)(22). This highlights the possibility of using focused treatments to enhance health results.

Collectively, the information you presented depicts a problematic portrayal of the prevalence and impact of cardiovascular disease in Iraq. Nevertheless, it also underscores the capacity of public health initiatives to have a substantial effect by targeting changeable risk factors and advocating for healthy behaviors.

Implications for Public Health

The discovered risk variables highlight the complex and diverse character of cardiovascular illnesses in Iraq. Public health initiatives should incorporate gender-specific strategies, focus on modifiable risk factors such as smoking, physical inactivity, and obesity, and tackle the elevated prevalence of hypertension and diabetes. Based on the identified risk factors, customized approaches are crucial for efficiently preventing and controlling cardiovascular diseases in the Iraqi population.

Conclusions

Conclusively, this systematic review offers a thorough summary of the scarce yet essential research on risk factors for cardiovascular disease in Iraq, spanning from 2000 to 2023. The identified risk factors highlight the necessity of focused public health measures to tackle the Iraqi population's particular health difficulties. Future research endeavors should prioritize investigating supplementary risk elements and geographical discrepancies, as well as creating and assessing efficacious preventive measures customized to the distinct circumstances of Iraq.

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Suggestions for further research

Concentrating on emerging risk factors and novel biomarkers that may contribute to a better understanding of cardiovascular disease risk.

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