Diet, Risk Factors and Cardiovascular Diseases: Systematic Review

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Abstract: Objective: Globally, CVD is the major cause of death. Improving diet and lifestyle can prevent the rapidly increasing burden of CVD. The present review aims to present the existing literature published regarding the role of diet and risk factors in the prevention of heart diseases limited to time frame from 2011 to 2022. Methods: Both quantitative such as cross sectional, correlation, retrospective case control, prospective cohort studies and qualitative studies are included in this review to gain an in-depth understanding of the dietary choices that increases the risk of CVD. The present review included a total of 45 studies. Among them, 15 studies were regarding dietary patterns of heart patients, 24 articles related to risk factors and 6 related to knowledge of risk factors among heart patients. Results: Numerous epidemiological researches had emphasized that by adopting healthy practices, like choosing a diet rich in whole grains, fruits, vegetable, fish and low in trans-fat, saturated fat, refined carbohydrates, sugar-sweetened beverages, sodium can reduce the risk of getting heart diseases. There are numerous risk factors that can contribute to heart diseases. These include both nutrition and lifestyle factors. Conclusion: There is an urgent need to educate public on nutritional issues, provide diet plans according to cost and cultural preferences, design health programs, conduct awareness seminars and counseling of CVD patients on dietary habits & physical activity mandatory for a healthy life. It is a major challenge to reduce these risks factors on both global and national level. Government, policymakers and communities should take preventive measures to reduce this huge burden of diseases.

Keywords: Cardiovascular Disease, Risk Factors, Diet, Dietary Patterns, Saturated Fats

1. Introduction

Globally, cardiovascular diseases (CVD) are a leading cause of death [1, 2]. According to World Health Organization [WHO], CVD are diseases that affect the heart and blood vessels. On global level, around 17 million people die every year from CVD [3]. In developing countries like Pakistan, CVD are responsible for over 200,000 deaths per year. Males have a three times higher death rate from CVD in contrast to females [4].

Dietary patterns have collectively been influenced by urbanization, economic development, market globalization and industrialization where the shift from traditional to western-type dietary patterns is a characteristic feature [5]. According to the global nutrition transition, the pattern of diet in low-to-middle income countries has quickly shifted towards less-healthy diets in recent decades. Examples include increased consumption of processed, energy-dense foods, eating out more frequently, and increased use of edible oils and sugar-sweetened beverages [6] The rise of CVD in South Asians has been linked to a Western diet, which is characterized by increased intake of refined grains, sweets and desserts, sugary drinks, and deep-fried dishes [7, 8]. In contrast, a Mediterranean diet that comprises of fish, whole grains, legumes, fruits, and vegetables is seen to be healthy [8].

There are numerous risk factors that can lead to CVD. These include both nutrition and lifestyle related factors, such as

excessive consumption of saturated fats, smoking, and a sedentary lifestyle. The most prominent factors contributing to heart diseases are smoking, diet, stress, sedentary lifestyle and family history [8]. Lower rates of CVD mortality have been reported for people who consume whole grains, fish, vegetables and fruits. Dietary patterns such as Dietary Approaches to Stop Hypertension (DASH) diet and Mediterranean diet play key role in lowering the rates of CVD mortality [1]. Adequate and balanced dietary intake can also reduce the occurrence of many of the risk factors for CVD, including hypertension, hypercholesterolemia, hyperlipidemia, obesity and diabetes [9, 10].

Aim of Study

The world is undergoing rapid nutrition transition. Promoting healthy dietary patterns is challenging because it is strongly associated with behaviors, attitudes, values, environmental and social factors. This requires an in-depth understanding of diet and risk factors among CVD patients. Therefore, the aim of current review is to explore the literature related to dietary patterns among CVD patients. Second objective is to assess the risk factor and its knowledge among CVD patients. The present review will answer the following questions:

1) Do dietary patterns play a significant role in the management and prevention of cardiovascular diseases?
2) Which factors promote the rapidly increasing incidence of cardiovascular disorders?
3) How does knowledge regarding risk factors influence the dietary choices of CVD patients?

2. Methods

This systematic review reviews all papers published related to dietary patterns and risk factors of participants with CVD. Google Scholar, Pub Med, Science Direct, Cochrane Library, Food Science and Technology Abstracts, MEDLINE and Scopus were the search engines used to find articles limited to a time frame from 2011 to 2022. Both quantitative such as cross sectional, correlation, retrospective case control, prospective cohort studies and qualitative studies are included in this review to gain an in-depth understanding of the dietary choices among participants with CVD. Articles were searched using keywords like cardiovascular disease, risk factors, diet, dietary patterns, saturated fats, meat & poultry, dairy, fruits & vegetables. Boolean operators were used for more productive search.

3. Results

The present review was conducted following the guidelines of PRISMA. The flowchart of literature search is shown in Figure 1. A total of 300 articles were searched through different databases. After removal of duplicate articles, there were 100 articles screened for including in the review. Majority of studies were excluded because they failed to report dietary patterns and risk factors of CVD patients. A total of 45 studies are included in the present review. Among them, 15 studies were regarding dietary patterns of CVD patients, 24 articles related to risk factors and 6 related to knowledge of risk factors.
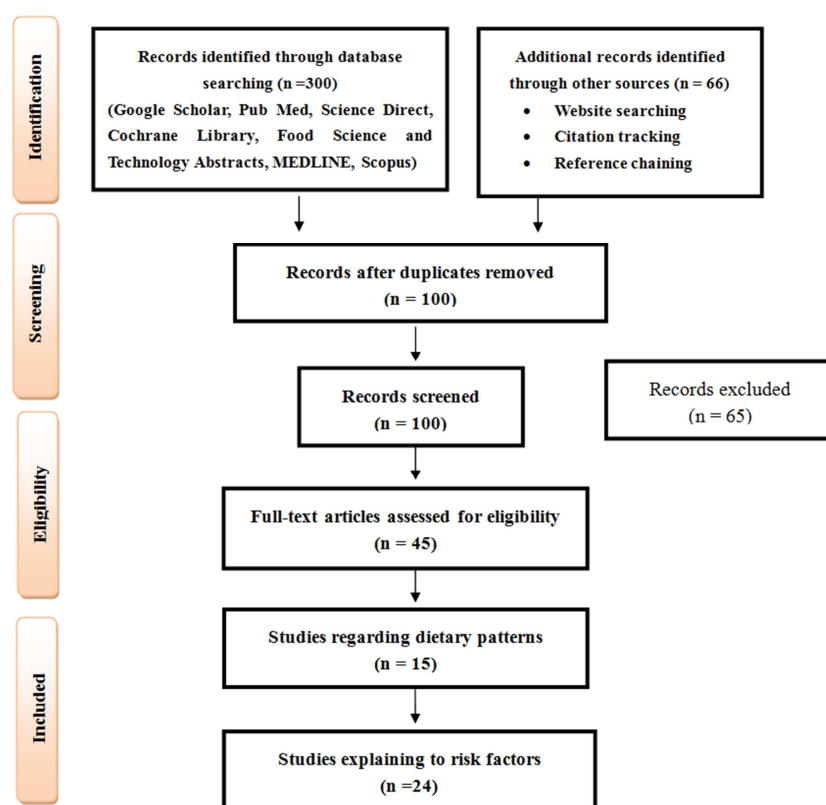

Figure 1. Search Strategy [Articles].

Food Choices and Dietary Patterns among CVD patients

Dietary patterns include the diversity, balance, and combination of meals and drinks that are regularly ingested. This covers all meals and drinks, whether they are made and eaten at home or elsewhere. Adherence to heart-healthy eating habits is linked to the best cardiovascular health. Heart-healthy dietary patterns, or those associated with low CVD risk, often include plenty of fruits and vegetables, whole grain meals, lean meats and poultry, low-fat or fat-free dairy products, healthy sources of protein [mainly plants, fish, and shellfish], liquid plant oils, and minimally processed foods. Additionally, these patterns have minimal intakes of salty and sugary beverages and foods. To lessen the incidence of harmful cardiovascular disorders including obesity, high blood pressure, and metabolic syndrome, efforts to establish and maintain good dietary and lifestyle practices from birth throughout the life course remain a major priority.

A prospective study was conducted in 9 European countries to assess the dietary patterns of CVD participants via 24-hour dietary recall. It was concluded that high intake of red and processed meat increases the risk of CVD. In contrast, consumption of cheese, eggs and yogurt was negatively associated with risk of heart diseases. Authors reported high cholesterol and blood pressure levels among CVD participants consuming increased red [processed] meat [11]. In Jordan it was stated that dietary pattern and lifestyle play significant role in the prevention of CVD. The authors investigated four-hundred participants with CVD. Data was collected using interview-based questionnaires. A lower incidence of CVD was linked to the "Healthy Dietary Pattern," which included a diet high in olive oil, fruits, vegetables, legumes, whole grains and fish. The "High-Fiber Pattern", which is mainly composed of legumes and bulgur, significantly reduced the CVD. The "Western Dietary Pattern," which consists of refined grains, sweets and deserts, sugary drinks, and deep-fried foods, was not significantly associated with CVD [12]. High red meat intake increases risk of heart diseases was concluded by a prospective study concluded in United States. If protein sources are shifted than CVD risk can be reduced. With the help of designed questionnaire, diet of 35-55 years old females with no heart diseases and risk factors was assessed. After follow up of 26 years, it was observed aging, smoking, high red meat intake and high fat diary were significantly associated with elevated risk of CVD. On the other hand, intake of poultry, nuts and fish decreases the risk of CVD [13]. Improved anthropometric measures and lipid profile was favorably associated with dietary pattern comprising of increased consumption of vegetables, fruits, raisins, nuts, seeds, milk and low-fat dairy in Central Europe [Poland] [14]. In India, it was concluded that dietary patterns comprising of increased intake of salt and alcohol were strongly associated with increased incidence of CVD. The present study was conducted in a time period of two months. Single stage cluster random sampling method was used and data was collected by using a questionnaire [15]. According to an observational study in Pakistan, it was stated that poor dietary habits, physical inactivity, fatty foods, obesity and smoking were positively associated with CVD. The present study included 200 participants with CVD from different hospitals of Southern Punjab [16]. In cardiac unit of Hayatabad Medical Complex, Peshawar a study was conducted to determine dietary factors leading to CVD. Authors investigated 200 CVD patients, including both males and females for period of three months. The data was collected through self-constructed questionnaire and food frequency questionnaire. The results concluded that low intake of fruits and vegetables and increased consumption of beef, dairy, carbohydrates, saturated fat, fried products on daily basis were that major dietary factors contributing to CVD. Moreover, majority of heart patients were male, illiterate and had low socioeconomic status [17]. In Taiwan, diet of 62,965 participants within age group 40 years and above was assessed using a food frequency questionnaire. Taiwanese that were consuming fruits and vegetables were less likely to get heart diseases. In contrast, processed meat intake was directly related to CVD. Hence, stated that a diet comprising of fruits and vegetables plays a major role in the prevention of CVD [18]. Around 150 heart patients were interviewed regarding their dietary patterns in a cross-sectional study in Brazil. It was reported that daily intake of cholesterol, fiber and protein was above the recommended amount whereas, carbohydrates consumption was below the recommendation, lipids intake was according to the recommendations. Poor dietary intake was positively associated with stress [19]. Another study indicated that the most important predictors of CVD were meat and type of tea. This study was performed on 600 participants with CVD. The participants were classified in to two groups [CVD group and the normal group]. All the participants were questioned regarding nutritional profile. CVD was most often diagnosed in males than in females. Participants with CVD had high body mass index [BMI]. Participants with CVD were frequently consuming coffee and black tea. On the other hand, females mostly consumed green tea and were physically active [20]. In Pakistan, it was concluded that there was increased intake of meat, saturated fat and processed foods among CVD patients. Consumption of fruits and vegetables among heart patients was reported to be very low on daily basis [21]. To determine the dietary and nutritional intakes of bank employees in Accra in relation to the recommended dietary intake for the control of cardiovascular diseases, a cross-sectional study was conducted. The salt and cholesterol intake was within the advised ranges. All study participants consumed less dietary potassium, fiber, fruits, and vegetables on average than the recommended levels [22].

In a qualitative study in Zambia, 34 interviews and 6 focus group interviews with 27 males and 40 females were conducted to gain an in depth understanding of dietary patterns of CVD patients. The interview guide covered a variety of lifestyle-related subjects, such as eating habits,

cultural conceptions of health, health-seeking behaviors, and attitudes of lifestyle-related CVDs and illnesses like obesity, hypertension, and diabetes that increase the risk of CVDs. Excessive salt, sugar, and cooking oil consumption along with poor quality cooking oil and consumption of meat or vegetables contaminated with chemicals, were the major dietary factors. However, they claimed that many of the dietary factors were difficult to avoid due to ingrained taste preferences, limited knowledge, and unavoidable socioeconomic and cultural circumstances [23]. In another qualitative study, barriers to following the dietary recommendations were discussed with 37 participants with CVD from 33 different postcodes in Adelaide, Australia. The coding of recurrent themes in Nvivo was used to conduct thematic analysis. The volume and contradictory nature of dietary information were the most prominent barriers to making changes identified in interviews [24]. Many people find it challenging to maintain heart-healthy eating habits since the food environment has a significant impact on people's food preferences, diet quality, and therefore cardiovascular health at many levels. There are several systematic federal, state, and municipal behaviors and laws that prevent the adoption of these eating patterns against the backdrop of widespread nutrition misinformation [25].

Factors that increases the risk of CVD

In Jordan, a study was conducted to assess the risk factors for CVD, it was concluded that gender; age, smoking and diabetes were strong risk factors. 356 of the 557 patients in the study had a CVD, whereas 201 had a normal cardiogram. Most of the participants were males with median age 55 years. Moreover, majority of the participants were diabetic and smokers [26]. In a cross sectional study in Iran, it was suggested that the risk of CVD was higher in low socioeconomic status. The present study was conducted at Tabriz Shahid Madani Hospital to explore the current socioeconomic status of 189 participants with CVD. Data was collected through a structured questionnaire. Less educated participants, people living in urban areas, housewives, retired males were more susceptible to CVD [27]. In Palestine, it was reported that high LDL, high HDL, low HDL, diabetes, hypertension, sedentary lifestyle, smoking and genetics positive family history, smoking and genetics were the significant risk factors of heart diseases. Gender differences showed that males were more prone to CVD as compared to females. A questionnaire was used to collect data. The most prominent risk factors were physical inactivity, hypertension, diabetes, LDL/HDL ratio $\geqslant 3$, smoking, positive family history, multigravida and living in refugee camps [28]. According to a study conducted in India [Ahmedabad], it was concluded that the behavioral risk factors for heart disease are preventable. The majority of the 135 newly diagnosed CVD cases in the current study were males. Alcoholics, smokers, and users of smokeless tobacco were much more prevalent among cases than controls [29]. According to a cross-sectional study conducted in Iran, patients who had traditional CVD risk factors (other than smoking) were more likely to be female. Data was collected

by trained physicians via face-to-face interviews and from patient hospital files. The findings revealed that the females had higher levels of triglyceride, cholesterol, low-density lipoprotein, high-density lipoprotein, and fasting blood sugar than males, in addition to being substantially older, less educated, and more overweight than males. Among the risk variables, diabetes mellitus and hypertension had the highest correlation among female CVD patients. Compared to male CVD patients, female patients had a higher prevalence of hypertension than male patients. The most prevalent risk factor in the male patients was cigarette smoking [30].

Another cross-sectional study conducted in rural India found a significant burden of CVD risk. A piloted and semi-structured questionnaire was used to collect data. The study found that the mean age of the participants was 54.2 years old and that 46.7% of them were male. Alcohol consumption, a high salt diet, and low HDL values were the main CVD risk factors observed [16]. Diabetes, hypertension, smoking, inactivity, and obesity were found to be significant risk factors for CVD in an Indian case-control research. The study included 80 controls and 40 known CVD cases. The relationship between numerous risk factors and CVD was evaluated [31]. In order to explore the socio demographic profile and risk factors of individuals with CVD, a case control study was conducted in India. According to this study, the higher risk of CVD may be reduced by lifestyle changes. 100 cases and 100 controls who were group matched to the cases were included in the study. The results of the current investigation revealed the importance of family history, alcohol consumption, smoking, sedentary behavior, Type 2 diabetes, and hypertension in the development of CVD [32]. In Pakistan it was found that participants with CVD are more often subjected to high risk of mortality because of various diseases, obesity, smoking etc. Stress, nicotine use, diabetes, hypertension, and hypercholesterolemia were significant risk factors and contribute to the development of CVD. According to the findings, men were more likely than women to experience CVD [33]. In Islamabad, risk factors of CVD were identified. Data was collected from 2000 persons randomly. Parameters which were studied included gender, age, marital status, socioeconomic status, ethnic origin, weight, hip measurement, waist measurement, height, serum levels of cholesterol, HDL cholesterol, LDL cholesterol, blood pressure measurement, glucose, urea and hemoglobin, smoking history, history of documented CVD, family history of cardiovascular disease, diabetes mellitus, hypertension. According to the findings, men were more likely than women to experience CVD among all age groups. Smoking was significantly more prevalent in men. While LDL cholesterol was lower and total cholesterol was higher in women. HDL cholesterol was also higher in women than in men. Systolic and diastolic blood pressure (SBP and DBP) were higher in both sexes. Females tend to have higher BMI. Compared to men, women had a higher prevalence of Type 2 Diabetes Mellitus [34].

According to another cross-sectional study in Pakistan, to explore the prevalence of risk factors for CVD it was stated

that the prevalence of individual risk factors ranged from 30 to 52.5%. The present study included 200 participants with CVD from different hospitals of Southern Punjab. Data was collected by using a questionnaire regarding demographic information, tobacco use, dietary habits, physical activity, and family health history. From patient medical reports, history of diabetes mellitus (DM), hypertension, or its treatment was recorded. The study found that the most common risk factors for CVD were obesity, smoking, poor dietary habits, hypertension, inactivity, and consumption of fatty foods. Less frequent risk factors included diabetes and family history of CVD [15]. An association between increased screen time along with a sedentary lifestyle and increased risk of CVD was found in a study conducted on 1033 Korean children belonging to the age groups of 12-18 years. Participants were asked to fill out a Health Behavior Survey, which contained questions regarding the time spent on weekdays as well as weekends and other holidays in front of TV, mobile, gaming console or any other screen. A questionnaire with open-ended questions was used to obtain a measure of the physical activity the children engaged in, in terms of the frequency and duration of moderate-to-vigorous physical activity (MVPA). Weight and height of the children were also measured by trained volunteers. Values of blood pressure, LDL cholesterol, HDL cholesterol, triglycerides, and total cholesterol of the children were also obtained. According to the results of the study, more time was spent by boys in playing computer or video games, while watching TV as a favorite activity among girls. More screen time was found to be associated with high abdominal obesity and low HDL levels among the children and these can later become major risk factors for the development of CVD [35]. In Lahore, it was stated that majority of CVD patients were >40 years of age. A sample of 400 patients was investigated by authors. According to the findings, out of 400 patients, 12% of patients were under 40 years old [Group A], and 88% of patients were over 40 years old [Group B]. Majority patients were males [77%] as compared to females [22.5%]. Patients had smoking, diabetes mellitus, hypertension, and family history of CVD, hyperlipidemia, and other conditions respectively [36]. In Zahedan around 213 heart patients were examined. Results showed that 70% of patients were women and only 30% were men. Risk factors in CVD patients were age, gender, hypertension, diabetes, cholesterol and smoking [37]. A hospital-based, cross-sectional study was conducted to determine the clinical epidemiology of CVD in men and women in Iran. Data of 20,750 CVD patients was taken from hospital records. Result showed that more patients were males as compared to females. The mean age was 61. Prevalence of hypertension and diabetes was higher in females than in males. The incidence of smoking was higher in males. The CVD incidence pattern and risk factors prevalence are significantly different between men and women in Iran [38]. In a ambispective, cross-sectional study association between body mass index (BMI) and severity of CVD, its risk factors was assessed with patients older than 18, underwent coronary angiography. Data regarding age, weight, height, presence of associated co morbidities, history of smoking, and was collected from patients' records. The result reported that obesity was an independent risk factor for the early incidence of CVD, which is strongly associated with the presence of co morbidities such as DM, HTN and DSLP. It was concluded that there is Positive association between body mass index (BMI) and severity of CVD [39].

At the Sudan Heart Center in Khartoum, Sudan, a prospective cohort research was conducted to investigate the relation between smoking and the onset of CVD in male patients over the age of forty. 168 adult male patients were evaluated. A questionnaire was used to gather the information. The findings showed that out of 144 patients, 65% [94] of the patients were smokers, 74% of the 94 smokers had smoked for more than 10 years, and 26% had smoked for less than 10 years. It was determined that smoking increases the risk of developing cardiovascular disease. According to this study, CVD patients are more likely to have smoked in the past [40]. A cross-sectional retrospective analysis of 187 CVD patients was done at the Benghazi Medical Center. They were examined for risk factors between January 2015 and December 2015. A questionnaire was used to gather the data. Majority patients were under the age of 45. In the study of risk variables, it was discovered that 63.4% of young patients smoked, 44% had a history of dyslipidemia, and 14% had a drinking history. Smoking was the only significant modifiable risk factor in young CVD patients; other variables had a weaker association than in older individuals [41]. To assess the alteration in serum lipid profiles in patients with CVD, a cross-sectional study was carried out at the cardiology department of Shalamar Hospital and the Punjab Institute of Cardiology [Lahore]. A questionnaire was used to collect the patient's demographics and lipid profile [in mg/dl]. As a result, there were more men than women. On average the patients were 53 years old. Participants had reduced TC, LDL-C, and HDL-C, and increased TGs levels. It was concluded that prevalence of CVD was higher in males than females. Phasic fluctuations in serum lipid profile were observed after CVD [42]. In Nanjing, East China, a study was carried out to determine the prevalence and risk factors for hypertension, diabetes, and dyslipidemia as well as to assess their adverse effects on CVD. To choose representative individuals, a multistage, stratified random cluster selection technique was employed. Blood tests, physical measurements, and questionnaires were completed by all eligible participants. The findings showed that men were more likely than women to have hypertension, but that there was no sex-related difference in the prevalence of diabetes or dyslipidemia [43]. From October 22, 2009, to April 22, 2010, a cross-sectional study was carried out at the Cardiology and Medical Unit-B of Ayub Medical College, Abbottabad. By non-probability sampling, CVD patients above the age of 25 were included in the study. Around 150 patients were included in the study. Data was collected using structured questionnaire. The study's participants were 57.75 years old on average. Diabetes mellitus was prevalent and the majority of diabetics had poor glycemic control. One out of

every three CVD patients in this study had diabetes mellitus, which was a significant number [44]. In Trinidad, a case-control research was performed to identify the CVD risk factors. The study's target audience consisted of CVD patients. Data collection was done through a questionnaire, and data analysis was done with SPSS version 19. The study's findings revealed that, for male CVD patients compared to non-CVD patients, the odds of hypertension, CVD, and alcohol consumption were higher; for female CVD patients compared to non-CVD patients, the odds of diabetes were higher; and the odds of living a stressful life were higher for non-CVD patients but were similar for both groups with regard to sex and age > 45 years. The study's findings revealed that stress reduction, CVD, diabetes, hypertension, and smoking were effective CVD predictors [45]. The most important CVD risk variables were determined via a retrospective case control research in Palestine. Gender disparities suggested that men are more likely than women to have cardiovascular disease. In the current investigation, a systematic random sample of 100 cases who had received an official CVD diagnosis were matched sexually to 100 controls who had normal test results and were free of the condition. Data collection was done using a questionnaire [22].

In order to investigate the prevalence of CVD among patients with diabetes mellitus and to identify risk variables in a nationwide survey, a cross-sectional study was carried out. In order to assess the status of care for diabetes patients aged at least 18 years who received medical treatment in the target hospital for the previous 12 months, a study was conducted in 2013 that evaluated national outcomes among patients with diabetes who visited 831 public hospitals in Thailand. In total, 25,902 diabetic patients were enrolled in this study. 918 people had CVD that was found. The study came to the conclusion that diabetic patients had an issue with CVD. Regular CVD screenings for diabetic people are necessary, and their risk factors should be carefully managed [46]. From March 2005 to March 2006, a cross-sectional study was conducted in South Karnataka to identify CVD among smoker. This preliminary one-year study was carried out at the Sri Devraj Urs Medical College's Kolar teaching referral hospital. 200 adult men over the age of 30 who visited the hospital complaining of chest pain were chosen. Smokers [the study group] and non-smokers were divided up into the subjects [controls]. This study demonstrated that smokers had a greater incidence of CVD than nonsmokers. Atherosclerosis, which is a condition that affects the arteries, may be exacerbated by higher amounts of nicotine [47].

Knowledge regarding CVD risk factors

Despite the rising prevalence of cardiovascular disease in developing nations, there is a little information to raise awareness of the problem, which is essential for putting CVD prevention strategies into action. In Andhra Pradesh, researchers conducted a study to regarding knowledge of heart disease risk factors among 4535 individuals from 20 villages. A questionnaire was used to assess the participant's knowledge regarding cardiovascular risk factors such as

smoking, physical activity, alcohol use etc. According to statistical analysis of the data, those with lower socioeconomic status had higher rates of tobacco and alcohol use, lower fruit intake, and overall lower knowledge of CVD risk factors, whereas those with higher socioeconomic status had higher rates of obesity, sedentary lifestyles, hypertension, diabetes. It was stated that those with greater understanding of the risk factors leading to heart disease were more willing to try to change their behavior and lifestyle, independent of their socioeconomic background [48].

From June to September 2018, a cross-sectional survey was carried out in two referral hospitals in Eastern Ethiopia. Knowledge of cardiovascular risk factors among individuals with cardiovascular disease was the study's main finding. Using a validated tool, the understanding of cardiovascular disease risk variables was assessed. The understanding of cardiovascular risk factors was well-understood by more than half of patients, while only 46% showed less-than-ideal knowledge in this area. Higher cardiovascular risk factor knowledge scores were linked to urban residency, but lower knowledge scores were predicted by never getting married, having no formal education, or having less education. There was no statistically significant correlation between actual cumulative risk behavior and knowledge of cardiovascular risk factors [49]. Researchers discovered a gap between knowledge of the risk factors of cardiovascular disease and lifestyle practices in a cross-sectional study involving 5,000 men from the air and land components of the Belgian army, 2299 of them were soldiers and 598 were decorated officers. Semi-quantitative food frequency questionnaires were used to gather data on food consumption and lifestyle with the main goal of relating lifestyle habits and knowledge of cardiovascular risk factors. The questionnaire collected information regarding participants' personal details, including their marital status, occupation, age, weight, number of children, and smoking. Whereas the participants' knowledge regarding cardiovascular risk factors was assessed via an open-ended questionnaire. The majority of participants mentioned smoking, overeating, and a sedentary lifestyle as the major risk factors for CVD, while the least number of individuals identified obesity, excessive salt consumption, and a low intake of fruits and vegetables as key risk factors for CVD. The study's findings also showed a link between lower socioeconomic status and education levels and a lack of knowledge about CVD risk factors [50]. Another study reported insufficient knowledge regarding risk factors of CVD among Croatian population. Highly trained professionals conducted face-to-face interviews with participants, asking them about the risk factors related to CVD. The participants knew that elevated LDL levels increase the risk of heart diseases and high HDL has positive health effects. Few participants knew what their ideal total cholesterol levels should be, 43.3% and 74.4% of the population were aware of their blood pressure and total cholesterol levels, respectively. Knowledge regarding reference values for blood pressure and total cholesterol was found to be favorably associated with a higher level of

education. More than half of population had never discussed risk factor for heart disease with their doctor. The study's findings confirmed the necessity of promoting CVD prevention [51]. A convenience sample of 2,200 patients from general clinics in the United States was selected for a cross-sectional study that sought to evaluate patients' regarding risk factors related to CVD. The current survey assessed demographic information, health-related behaviors, cardiovascular disease history, and awareness of the American Heart Association's recommended CVD risk factors [avoiding smoking, regular physical activity, balanced diet, BMI, cholesterol, blood pressure and blood glucose measurements]. As a consequence, 37% of the components were accurately recognized by the participants. Diabetes, fruit/vegetable eating, and exercise had the lowest recognition rates. Moreover higher education level was directly correlated with more knowledge of CVD risk factors [52]. A cross-sectional study indicated a lack of understanding of the risk factors for cardiovascular diseases. In the present study questionnaire was used to gather participants' knowledge regarding CVD risk factors via open ended and close ended questions. According to the study's findings, majority of respondents were unaware of any cardiovascular disorders, and 2/3 of participants had no idea regarding heart attack symptoms were. The majority of people correctly identified smoking, obesity, an unhealthy diet, and a lack of exercise as the main risk factors for heart disease, indicating that knowledge levels regarding heart disease risk factors was moderate. Higher levels of education and female gender were found to be associated with higher levels of knowledge [53].

4. Conclusion

The risk of developing heart disease can be decreased by 50% by adopting healthy behaviors, such as choosing a diet high in whole grains, fruits, vegetables, and seafood and low in trans fat, saturated fat, refined carbs, and sugar-sweetened beverages. Physical inactivity is an important factor contributing to CVD because nowadays, the majority of our population is involved in physically less active jobs as per the nature of the job. Environmental factors such as smoking, tobacco, low socioeconomic status and low education also increases the burden of disease. Nowadays globally, there is a consistent trend of lower intake of fruits, vegetables, whole grains and a higher intake of convenience foods, refined carbohydrates and sugary drinks. It is a major challenge to reduce these risks factors on both global and national level. Government, policymakers and communities should take preventive measures to reduce this huge burden of diseases. There is an urgent need for to educate public on nutritional issues, provide diet plans according to cost and cultural preferences, design health programs, conduct awareness seminars and counselling of CVD patients on dietary habits & physical activity mandatory for a healthy life.

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