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Narrative Review

A NARRATIVE REVIEW OF OPTIMAL CARE FOR PATIENTS WITH CARDIOVASCULAR DISEASE AND TYPE 2 DIABETES: COLLABORATIVE RESPONSIBILITIES OF CARDIOLOGISTS AND DIABETOLOGISTS.

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ABSTRACT

Diabetes and cardiovascular disease are linked, putting diabetics at higher risk of cardiovascular events and death. Comprehensive cardiovascular risk mitigation includes blood glucose management. Diabetes vascular protection includes hypertension, dyslipidemia, and lifestyle changes. Optimizing diabetic vascular protection requires cardiologists and diabetologists to work together. This narrative review examines type 2 diabetes' complex association with cardiovascular disease. Glycemic control and vascular protection methods in diabetics are crucial for early detection and therapy of coronary artery disease (CAD). It also highlights the difficulties of selecting diabetes patients for cardiac tests and the importance of interdisciplinary care. This narrative review underlines the substantial link between type 2 diabetes and cardiovascular disease and that glucose control is only one part of cardiovascular risk management in diabetics. Since improper glucose regulation is common in coronary artery disease, early glycemic control is crucial. Regular diabetes and glucose intolerance screening is advised for cardiac patients. Determining who needs non-invasive cardiac testing is difficult. A multidisciplinary team of cardiologists and diabetologists is needed to treat diabetic and cardiac patients. Further research should refine risk stratification approaches to identify diabetic people who might benefit most from CAD tests. Novel therapies to improve diabetic glucose control and cardiovascular outcomes are also needed. Long-term studies on interdisciplinary care teams and patient outcomes are needed. Clinicians should prioritize comprehensive vascular protection strategies for type 2 diabetics due to their complex cardiovascular risk. Identifying diabetic cardiac patients should be simplified. In this high-risk group, multidisciplinary care teams improve patient management and outcomes. To improve diabetes and cardiovascular disease care, policymakers should develop recommendations that encourage cardiologists and diabetologists to work together.

Keywords: *Type 2 Diabetes, Cardiovascular Disease, Glycemic Control, Vascular Protection, Multidisciplinary Care, Coronary Artery Disease, Glucose Regulation.*
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INTRODUCTION

Cardiovascular disease (CVD) represents a notable complication associated with type 2 diabetes mellitus (T2 DM), and conversely, individuals afflicted with CVD exhibit an elevated propensity for the development of diabetes. The association between these phenomena is frequently elucidated through the lens of shared genetic and environmental factors, commonly referred to as the 'common soil' hypothesis [1]. The environmental factors encompass suboptimal early nutrition, abdominal obesity, and insulin resistance during adulthood.

In the majority of individuals, T2 DM manifests with a comparable lifetime susceptibility to cardiovascular events, akin to that of an individual without diabetes who has previously encountered a myocardial infarction. The association between the incidence of myocardial infarctions and cerebrovascular accidents and the degree of insulin resistance is highly interconnected. Insulin resistance, also known as T2 DM, represents a pivotal element within the metabolic syndrome, a conglomeration of factors linked to a notably heightened susceptibility to cardiovascular events.

It has been observed that a considerable proportion, specifically around 75%, of individuals diagnosed with T2 DM will ultimately succumb to CVD. The incidence of cardiovascular mortality associated with diabetes has experienced an approximate 30% escalation over the course of the past two decades [2]. Moreover, it is noteworthy that individuals afflicted with T2 DM exhibit an increased propensity for harboring latent cardiac pathologies, thereby leading to unfavorable prognoses subsequent to cardiovascular complications. These untoward consequences encompass escalated mortality rates and diminished efficacy of therapeutic interventions targeting cardiac ailments.

In order to optimize CVD outcomes, it is imperative to effectively manage cardiovascular risk factors in patients with diabetes and accurately diagnose diabetes in individuals with pre-existing CVD. Optimal management of patients concurrently afflicted with both cardiovascular

disease and diabetes necessitates a synergistic alliance between specialists in cardiology and diabetology.

This narrative review examines the complex link between type 2 diabetic mellitus (T2 DM) and cardiovascular disease (CVD), concentrating on hereditary and environmental variables. Insulin resistance, a key component of metabolic syndrome, is examined in people with and without diabetes to determine its effect on cardiovascular events. The current state of cardiovascular mortality connected with diabetes is also examined, revealing developments over the past two decades. These key characteristics reveal the consequences for optimizing cardiovascular outcomes, including risk factor management and diabetes diagnosis in CVD patients. Furthermore, a coordinated approach between cardiology and diabetology specialists improves the care and well-being of patients with the complex intersection of these two disorders.

METHODOLOGY

The literature for relevant research articles, studies, and reviews on the complex link between type 2 diabetic mellitus (T2 DM) and cardiovascular disease were searched for this narrative review. The review focused on English-language publications, but a few non-English pieces were included for their relevance. Medical databases like PubMed, MEDLINE, Embase, Scopus, and Google Scholar were searched. "Type 2 diabetes mellitus," "cardiovascular disease," "insulin resistance," "metabolic syndrome," "glycemic control," "cardiovascular risk factors," "acute coronary syndrome," "dyslipidemia," "blood pressure management," "lipid-lowering therapies," "coronary artery disease," "vascular protection," "diabetes diagnosis," and "screening for diabetes."

The initial search revealed several relevant publications, which were carefully vetted for relevance to the review's aims based on titles and abstracts. Studies that focused just on T2 DM or CVD without discussing their interaction were omitted. References from review articles and meta-analyses were also considered for inclusion.

A wide range of research articles and reviews were chosen due to their relevance to the complex relationship between T2 DM and CVD, glycemic control and risk factor management, insulin resistance and metabolic syndrome, and risk assessment and management. The narrative review included these sources to cover the topic, including recent advances and topics for further study.

REDUCING RISK OF CARDIOVASCULAR EVENTS AND MORTALITY IN TYPE 2 DIABETES

Increased risk of heart problems in people with T2 DM is strongly correlated with high blood sugar levels, according to a study that used data from the United Kingdom Prospective Diabetes Study (UKPDS). A lower risk of heart attacks was linked to lowering HbA1c levels; for every 1% decrease in HbA1c, the risk was estimated to be 14% lower [3].

It's crucial to remember, though, that people with diabetes frequently have additional heart-related risks, such as elevated blood pressure and abnormal cholesterol levels. By the age of 45, about 40% of people with type 2 diabetes have high blood pressure, and by the age of 75, that number rises to 60% [4]. Diabetes patients who have elevated blood pressure have an increased chance of dying or having non-fatal heart attacks. Strict blood pressure management (below 144/82 mmHg) dramatically lowers the risk of stroke and mortality from diabetes.

Dyslipidemia, a condition in which the liver creates more toxic lipoproteins and triglycerides while lowering good HDL-C, is another typical side effect of T2 DM. An elevated risk of heart disease is linked to this particular kind of cholesterol imbalance.

It is imperative to improve HDL-C and lower triglyceride levels in patients with coronary artery disease (CAD) in order to lower cardiovascular risk. Gemfibrozil-induced increases in HDL-C levels have been found in studies such as the Veterans Affairs HDL Intervention Trial (VAHIT) to substantially lower cardiovascular events [5]. However, as demonstrated by the Fenofibrate Intervention and Event Lowering in Diabetes (FIELD) trial, fenofibrate had inconsistent and weak benefits on cardiovascular outcomes in people with diabetes, which does not firmly support its usage [6].

Even in individuals without existing heart disease or dyslipidemia, lowering LDL-C levels through therapies can lower the risk of subsequent cardiovascular events in type 2 diabetes patients. Statins can significantly reduce the incidence of heart attacks, strokes, and the need for revascularization when used to lower LDL-C levels, according to clinical trials like the Heart Protection Study and the Collaborative AtoRvastatin Diabetes Study (CARDS) [7]. Those with diabetes who have been diagnosed with coronary artery disease also show these benefits.

Effectively controlling diabetic dyslipidemia is still difficult, though, as some elements of lipid dysfunction may not be adequately addressed by existing therapies. While statin monotherapy in particular might not be able to entirely address all lipid-related problems, the combined benefits of increasing HDL-C and reducing LDL-C levels have been shown to be associated with a lower risk of cardiovascular disease. In the future, newer and more potent HDL-raising medications might provide even more cardiovascular risk reduction.

HYPERGLYCAEMIA AND CARDIOVASCULAR RISK IN ACUTE CORONARY SYNDROME PATIENTS

The blood sugar levels of people with T2 DM who suffer a heart attack T2 DM are admitted to the hospital are associated with their chances of surviving the event. A history of heart attacks, smoking, high blood pressure, and age are other risk factors, as are prior episodes of congestive heart failure and the length of diabetes. Even in non-diabetic patients, high blood sugar levels at hospital admission are linked to an increased risk of severe cardiac events and death.

In severely ill individuals, both with and without T2 DM, intensive blood sugar control with intravenous insulin has been demonstrated to improve cardiovascular outcomes and minimize fatalities from multiple organ failure, sepsis, and renal failure. Intense insulin therapy decreased mortality in a trial of individuals with T2 DM following a MI by 29% after a year as compared to normal care, and this effect continued at the three-year follow-up [8].

DIGAMI-2, a different trial, did not, however, demonstrate any variations in mortality between the groups receiving intensive insulin and standard care. This may result from variations in the procedure and design of the studies, as well as from the degree to which glycemic control was attained [9].

Intravenous insulin is an excellent method of controlling blood sugar, although it is labor-intensive and needs careful observation. Following this acute phase, various options for follow-up treatment are available: switching to subcutaneous insulin prior to discharge; initiating insulin with the assistance of the family physician and a diabetes nurse educator; or prompt referral to a diabetologist while maintaining intravenous insulin (in accordance with the DIGAMI protocol).

A multidisciplinary team approach comprising both cardiologists and diabetologists is necessary to provide these patients with the best care possible.

IDENTIFYING PATIENTS WITH DIABETES AT RISK OF CARDIOVASCULAR DISEASE

Patients with diabetes who are over 65 are more likely to have cardiovascular disease than not; up to 88% of this age group exhibits cardiovascular disease symptoms. Significant coronary artery blockages are predicted to exist in even 25% of people over 60, and these blockages can cause silent (symptomless) heart issues [10].

Finding diabetic patients with CAD who are at a heightened risk of heart-related mortality is a challenge, as the majority of these patients should receive vascular protection regardless of their CAD diagnosis. Exercise ECG, stress perfusion imaging, and stress echocardiography are among the diagnostic screening techniques for CAD. But it's important to choose these tests wisely, considering things like accuracy, cost-effectiveness, patient safety, and the possible significance of the test results.

The American Diabetes Association (ADA) has established guidelines for choosing diabetic patients who should get cardiac testing [11]. In addition to individuals with conventional cardiovascular risk factors including high levels of blood pressure and unstable lipid profiles, this also includes those who have symptoms or signs of artery disease. It is imperative that these tests result in improved patient outcomes and treatment, not more intrusive, needless procedures.

The advantages and disadvantages of treatment for each patient should be considered if a CAD diagnosis is made. According to the American Dental Association, the identification of asymptomatic CAD at an early stage should initiate a comprehensive approach that includes blood pressure control, aspirin therapy, cholesterol-lowering drugs, and ideally the use of an ACE inhibitor [11]. It has been demonstrated that this comprehensive strategy considerably lowers cardiovascular risk in people with T2 DM.

The decision between angioplasty and bypass surgery, two revascularization techniques, can be difficult to make because of their varying life benefits. According to certain research [12], angioplasty increases mortality in diabetes people with multivessel disease. Drug-eluting stents, on the other hand, have better angioplasty results. To compare drug-eluting stent angioplasty and surgical revascularization, more study is still required.

Because there are so many cases of diabetes, it is not practical to test all diabetic patients for CAD; however, in order to start appropriate treatments, it is necessary to identify individuals who are most at risk of developing a life-threatening condition. Diabetes patients continue to have a much higher absolute risk of cardiovascular disease than people without the disease, despite advancements in medical care and a drop in the prevalence of cardiovascular disease over time. To lower the risk of CAD problems, it is crucial to take aggressive preventative measures into account for all diabetes patients.

SCREENING FOR DIABETES IN CARDIAC PATIENTS

Problems with blood sugar levels are common among individuals with CAD. For instance, in the Euro Heart Study, a survey of more than 4,000 CAD patients who saw cardiologists [13]:

- Acute coronary syndrome (ACS) patients who had not previously been diagnosed with diabetes showed problems with glucose tolerance (36%).
- An additional 22% had just received a diabetes diagnosis.
- Of the patients receiving elective consultations, 14% had just received a diabetes diagnosis, and 37% had issues with their glucose tolerance.

Furthermore, poorer outcomes are predicted among patients with glucose tolerance issues who have had a MI. A study

involving patients with MI from the VALsartan. In Acute myocardial infarction (VALIANT) trial lends credence to this theory [14]. Following a year of observation:
- Compared to individuals without diabetes, those with preexisting diabetes and those who were diagnosed with the disease during the research had similar, greater mortality rates—roughly 1.5 times higher.

This shows that underlying metabolic problems are contributing to the higher risk of death in even recently diagnosed diabetes individuals, who first appear comparable to non-diabetic people. As a result, it's critical to screen hospitalized patients with cardiac disease for diabetes at the time of admission.
Although it is the simplest to diagnosis new cases of diabetes, fasting plasma glucose (FPG) testing is not highly sensitive. An oral glucose tolerance test (OGTT) with a typical 2-hour duration is more effective in identifying diabetes in high-risk populations, such as heart disease patients. Individuals with impaired glucose tolerance (IGT), who do not fit the criteria for diabetes but yet have an increased risk of developing heart issues in the future, can also be identified by this test. Therefore, an OGTT is recommended for patients with acute coronary syndrome. If they receive a diabetes diagnosis for the first time, they ought to be referred to a diabetes education center and a diabetic specialist for additional assessment and a treatment plan.

DISCUSSION

The intricate interplay between type 2 diabetes mellitus and cardiovascular disease poses a substantial challenge in the management of the health status of afflicted individuals. The present narrative review has underscored the imperative requirement for a comprehensive approach to cardiovascular risk reduction in individuals with diabetes, encompassing the optimization of glycemic control, effective management of blood pressure, and appropriate treatment of dyslipidemia. Significantly, the glycemic control attained via intensive insulin therapy during episodes of acute coronary events has exhibited enhanced cardiovascular outcomes, underscoring the significance of managing hyperglycemia in individuals with cardiac conditions. Furthermore, the detection of individuals presenting with both T2 DM and CAD continues to pose a formidable challenge, necessitating meticulous evaluation of screening approaches and diagnostic examinations to enhance patient prognoses.
Moreover, this narrative review highlights the imperative of adopting a multidisciplinary approach that encompasses the collaboration of cardiologists and diabetologists in order to deliver optimal healthcare to individuals afflicted with this intricate confluence of medical conditions. Given the heightened susceptibility of individuals diagnosed with T2 DM to CVD, it is imperative for policymakers to deliberate upon and endorse recommendations that foster inter-professional collaboration among healthcare specialists. This collaborative approach holds the potential to enhance patient management strategies and ultimately optimize clinical outcomes. Furthermore, it is imperative to direct research endeavors towards the enhancement of risk stratification methodologies in order to identify diabetic individuals who would derive the greatest advantage from CAD examinations. Additionally, there is a need to explore innovative therapeutic interventions that can optimize glycemic control and improve cardiovascular outcomes in this population.

CONCLUSION

There exists a considerable degree of overlap between the pathological conditions of diabetes and cardiovascular disease. Based on the existing body of evidence, it is indicated that the implementation of strategies aimed at mitigating the likelihood of cardiovascular events in individuals without diabetes is equally, if not more, efficacious in individuals with diabetes. However, there has been a persistent increase in cardiovascular mortality among individuals with diabetes, primarily attributed to the suboptimal utilization of evidence-based therapies within this specific demographic.
Diabetologists are advised to exercise due diligence in assessing the cardiovascular risk in their patients, whereas cardiologists are urged to conduct thorough evaluations of their cardiac patients for diabetes and other manifestations of glucose intolerance. Effective interdisciplinary communication and the establishment of shared treatment protocols play a pivotal role in enhancing patient outcomes.

Limitations and Future Research

The narrative review has limits despite its insights. First, while we have evaluated the influence of glycemic control on cardiovascular outcomes, the complexity of diabetes and the risk variables require further investigation into the best risk-reduction techniques for this population. Study tailored diabetes and cardiovascular risk reduction for distinct patient profiles and comorbidities. The review stressed diabetologist-cardiologist teamwork in addressing both illnesses. The effects of collaborative care models on patient outcomes need more research. Research should develop and evaluate integrated care options to reduce diabetes cardiovascular risk. We examined cardiac patient diabetes screening and diagnostic methods, however more study is needed to standardize diabetes screening. Standardized criteria are needed to identify high-risk patients who may benefit from early treatment.

Clinical and Policy Implications

This narrative analysis emphasizes the necessity for an integrated diabetes and cardiovascular disease management plan. Cardiologists and diabetologists should screen cardiac patients for diabetes and cardiovascular risk. Smooth specialist communication improves joint care results. Diabetics have a higher risk of cardiovascular disease, hence healthcare policy should encourage interdisciplinary treatment. Spread clear cardiac patient diabetes screening and risk assessment recommendations. Innovative cardiovascular risk reduction research and tailored diabetes management should be promoted by policymakers.

Acknowledgement
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List of abbreviations
T2 DM- Type 2 diabetes mellitus
CAD- Coronary artery disease
CVD- Cardiovascular disease
UKPDS- United Kingdom Prospective Diabetes Study
VAHIT- Veterans Affairs HDL Intervention Trial
HDL-C- High density lipoprotein cholesterol
FIELD- Fenofibrate Intervention and Event Lowering in Diabetes
LDL-C- Low density lipoprotein cholesterol
CARDS- Collaborative AtoRvastatin Diabetes Study
MI- Myocardial infraction
ADA- American Diabetes Association
ACS- Acute coronary syndrome
FPG- Fasting plasma glucose
OGTT- Oral glucose tolerance test
IGT- Impaired glucose tolerance

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