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DYSLIPIDEMIA FOR DIABETES MELLITUS AND CORONARY HEART DISEASE RISK

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ABSTRACT

Diabetes mellitus is a chronic metabolic illness that is distinguished by consistently elevated blood sugar levels. Diabetes mellitus can be caused by either an insufficient insulin synthesis or an inefficient use of insulin. People who have diabetes mellitus have an increased risk of developing health complications such as coronary heart disease and other concerns. The increased cardiovascular risk that diabetics experience is mostly attributable to the changed lipid profiles that are linked with the condition known as dyslipidemia. This literature review will investigate whether or whether there is a connection between type 2 diabetes, dyslipidemia, and the risk of coronary heart disease. Typical dyslipidemic symptoms of diabetes include increased amounts of microscopic, dense low-density lipoprotein cholesterol (LDL-C) particles, decreased levels of high-density lipoprotein cholesterol (HDL-C), and elevated triglyceride levels.

Keywords: *diabetes, mellitus, coronary, heart disease risk*

INTRODUCTION

The existence of the other illness can have an impact on the symptoms of diabetes mellitus and coronary heart disease (CHD), as well as the prognosis associated with having either of these conditions. People who have a higher predisposition to acquire diabetes often also have a higher predisposition to develop coronary heart disease. The following is the current state of our understanding with relation to coronary heart disease and type 2 diabetes:

Increased risk of coronary heart disease is seen when: Diabetes mellitus is one of the factors that contribute to coronary heart disease more than any other. Diabetes patients have an increased likelihood of getting coronary heart disease compared to the general population as a whole. Those who have trouble controlling their blood sugar levels over time and fail to do it successfully are putting themselves in a very precarious position.

Diabetes and cardiovascular disease are two conditions that are associated with a multitude of risk factors that can be present in an individual. Some of these risk factors include being overweight, having high blood pressure, having high cholesterol levels, and not getting enough exercise. These environmental factors contribute to the onset and progression of both diseases in certain people.

The development of atherosclerosis, also known as the accumulation of plaque in the arteries, is one of the primary causes of coronary heart disease. People who have diabetes are at a greater risk than the general

population for developing coronary heart disease (CHD), which is caused by the progression of atherosclerosis at a faster and more severe rate in this group than in the general population. Diabetes can lead to a number of problems, two of which are damage to the vascular walls and the formation of plaque in the blood vessels.

Insulin resistance is one of the most important risk factors for developing type 2 diabetes, which accounts for the vast majority of instances of the condition. Insulin resistance is a disorder that occurs when the hormone insulin is unable to stimulate the proper uptake of glucose by cells in an acceptable manner. Insulin resistance frequently occurs in patients before the diagnosis of type 2 diabetes. Insulin resistance is thought to play a part in the progression of atherosclerosis, which is a step prior to coronary heart disease (CHD).

DIABETES AND ATHEROSCLEROSIS

Experts believe type 2 diabetes mellitus (DM) to be on par with preexisting CAD risk since DM is such a substantial risk factor for CAD. Patients with diabetes are 2- to 4-times more likely to develop CAD than those without diabetes.

Hyperglycemia, dyslipidemia, and insulin resistance all contribute to endothelial cell and vascular smooth muscle dysfunction, impaired platelet function, and abnormal coagulation, all of which put diabetic patients at a higher risk for developing atherosclerotic CAD.8 The prevalence of additional CAD risk factors in the diabetic population is well established. Atherosclerotic plaques in diabetic individuals are characterised by a higher concentration of lipids and are thus more likely to break. Independent of other cardiovascular risk factors, Yoo et al. found that diabetic individuals had an increased atherosclerotic load and a 3.5-fold greater risk of coronary stenosis.

Atherosclerosis is mostly driven by inflammation. Adipose tissue releases a considerable number of inflammatory and pro-inflammatory cytokines in response to the acute phase reaction that occurs in type 2 DM as a result of obesity and insulin resistance. Diabetic individuals with CAD typically have endothelial dysfunction, as seen by elevated endothelin 1 and depleted nitric oxide. Relative to endothelin 1, vascular endothelial (VE)-cadherin has been found to be a more recent and accurate measure of endothelial function in diabetic individuals with CAD.

Increased platelet activity and blood coagulability contribute to increased thrombus development in type 2 DM. Short-term cardiovascular events are mostly unaffected by pathological changes in fibrinogen and plasminogen activation inhibitors in individuals with type 2 diabetes.

It is important to note that not all diabetes people with risk factors for cardiovascular disease really end up with cardiovascular disease. Recent research, however, has zeroed in on the significance that biomarkers such serum phospholipids play in the development of CVD in diabetes individuals. Recently, Beatriz Garca-Fontana and coworkers discovered that diabetic individuals with CVD have lower blood levels of four phospholipids compared to diabetic patients without CVD.

DIABETES IN CAD PATIENTS

Several studies carried out in the Arabian Gulf region experienced methodological issues as a result of the presence of a large number of employees from other countries. The inclusion of these individuals was reflected in the data, which demonstrated a prevalence that was not dissimilar to that which was observed in the location

where they had originally come from. As a direct consequence of this, we were unable to incorporate a significant number of these studies into our analysis.

In light of the fact that coronary heart disease affects around 85 percent of the population and cerebrovascular disease (CVD) affects approximately 15 percent, the World Health Organisation (WHO) decided to conduct a cross-sectional research on 10,000 patients residing in 10 different countries, the majority of which are located in the Middle East. It was discovered that the incidence of specific risk factors was quite high, and diabetes was diagnosed in about one third of the patients (31.5%).

OBJECTIVES

1. To study diabetes mellitus and coronary heart disease risk
2. To study dyslipidemia

Reduction of diabetic macrovascular disease

Diabetes is associated with an increased risk of cardiovascular disease as well as an increased risk of death when compared to people who do not have the illness.

Taking care of coronary art;ery disease (CAD) in persons who have diabetes is essential because people with diabetes have an increased risk of cardiovascular complications and the severity of those complications. Important things to keep in mind when treating coronary artery disease in diabetic people include the following:

Patients who suffer from both diabetes and CAD need to obtain and keep adequate management of their blood glucose levels. In order to keep one's blood sugar levels at a normal level, one must pay close attention to one's eating and exercise routines, in addition to making use of diabetic treatments such as insulin and oral hypoglycemic medications.

It is important to recognise that hypertension is a common consequence of diabetes as well as CAD and to manage it accordingly. It is required to make adjustments to one's lifestyle (such as reducing the amount of sodium one consumes and increasing the amount of physical exercise one gets), and in certain situations, it is necessary to use antihypertensive medicines in order to maintain blood pressure levels within the prescribed ranges.

Use of anti-platelet drugs in DM

Anti-platelet medicines are widely used in the management of diabetic mellitus (DM) because of the significant risk of cardiovascular complications. The following is some essential information regarding diabetes and the use of anti-platelet medications:

Anti-platelet therapy, such as low-dose aspirin, should be used for primary prevention among diabetic patients who are at a high risk of cardiovascular events. People who are above the age of 50 who have at least one additional risk factor for cardiovascular disease, such as smoking, having high cholesterol levels, having high blood pressure, or being overweight, are considered to be in this category.

People who have diabetes who have previously suffered from a cardiovascular event, such as a heart attack or stroke, frequently use anti-platelet medications as a kind of secondary prevention. By preventing the formation of blood clots, these drugs lower the risk of developing issues in the future.

The Mechanisms Behind How the Drug Works: Blood clots can be prevented with the assistance of anti-platelet drugs, which do their job by preventing platelets from aggregating. This makes it possible for blood clots to be avoided. Medicines such as aspirin, clopidogrel, prasugrel, and ticagrelor are examples of medications that are frequently prescribed.

Aspirin taken in low dosages (often between 75 and 100 milligrammes on a daily basis) is the drug of choice for the main prevention of diabetes. Platelet function is decreased as a result of its ability to irreversibly inhibit the enzyme cyclooxygenase. This results in a reduction in the synthesis of thromboxane A2, which is a potent platelet activator.

Blood pressure control

Maintaining blood pressure measurements within a normal range is what is meant by "blood pressure control" when referring to medicine. Blood pressure is defined as the force exerted on the arterial walls by the blood as it flows through the body. It is generally measured as the difference between the systolic pressure (which occurs when the heart contracts) and the diastolic pressure (which occurs when the heart relaxes).

The medical term for consistently raised blood pressure against the artery walls is hypertension, also known as high blood pressure. Hypertension is also known as high blood pressure. It plays a significant role in the progression of cardiovascular conditions such as heart disease, stroke, and other related problems. On the other hand, hypotension, also known as low blood pressure, is described by a reading that is continuously below the normal range, and it is associated with symptoms such as lightheadedness and fainting.

A healthy blood pressure should be maintained at a healthy level, and issues should be avoided at all costs. The following is a list of some of the most important things you can do to keep your blood pressure under control:

- **Make Some Modifications to Your Way of Living:**

Eat a diet that is rich in fresh produce, whole grains, lean meats, and dairy products with low fat in order to keep your weight in a healthy range. You ought to reduce the amount of salt, processed food, and fatty meals that you consume.

Take Charge of Your Weight: If you're currently overweight, you should work towards reaching a healthy size. Dropping some pounds can assist in bringing down your blood pressure.

Keep up an activity schedule of at least 150 minutes each week, which should consist of activities such as brisk walking, running, swimming, or cycling. By exercising on a consistent basis, one can improve both their cardiovascular fitness and their blood flow.

- **Monitoring All the Time:**

It is advisable to either keep up with routine exams with a healthcare practitioner or make use of a blood pressure monitor in the comfort of one's own home. This is helpful for monitoring your progression and ensuring that your blood pressure remains within the normal range.

- **Managing Tension:**

Stress on a continual basis might contribute to high blood pressure. Exercise, meditation, slow, deep breathing, and engaging in activities you find delightful are just few of the stress-relieving practises that can be put into practise.

- **Checkups that are prearranged with your physician:**

Visit the doctor on a regular basis so that they can check your blood pressure and evaluate your overall health. They have the ability to provide instructions and make adjustments to the treatment plan as necessary.

It's important to tailor your approach to decreasing blood pressure to both your unique needs as an individual and the specifics of any underlying health conditions you have. It is in your best interest to consult with a medical professional so that you can receive personalised guidance and pointers on how to bring your blood pressure under control.

Statins in DM

18,686 diabetic individuals took part in a meta-analysis of 14 different randomised trials of statins throughout a research that had a follow-up period of 4.3 years. Both overall mortality and vascular mortality fell by nine percent for every millimoles per litre (mmol/l) that the LDL-cholesterol level fell.

Statins used in high doses are recommended by the American Diabetes Association's (ADA) standard of medical care for diabetes patients in 2015. This recommendation is in accordance with the presence of cardiovascular diseases or other risk factors. This suggestion is made for persons with diabetes who are 40 years of age or older. The effectiveness of a moderate lipid-lowering medication (pravastatin 40 mg/day) was compared to the effectiveness of an intensive lipid-lowering regimen (atorvastatin 80 mg/day) in the treatment of 4162 patients diagnosed with ACS by Cannon and colleagues. After two years of therapy, there was a significant difference between the high-intensity atorvastatin regimen and the moderate pravastatin regimen in terms of survival and the avoidance of cardiovascular events.68 Data on the use of statins in those diagnosed with diabetes before the age of 40 are limited, and current guidelines do not advise its use in those under the age of 40 who do not have overt cardiovascular disease or other risk factors.

CORONARY REVASCULARIZATION IN DIABETICS

Patients who have coronary artery disease (CAD) who want to enhance the blood flow to their hearts may have coronary revascularization surgery. Plaque buildup in the coronary arteries is a telltale sign of coronary artery disease (CAD), which can reduce the amount of blood that is able to flow to the heart and consequently raise the risk of having a heart attack.

Diabetes mellitus, which has been associated to more extensive coronary artery disease, is one of the significant risk factors for CAD. People who have diabetes have a greater risk of developing a condition known as

"multivessel disease," which is characterised by the destruction of many coronary arteries. They may also have blood vessels that are more susceptible to damage, which raises the risk of complications both during and after revascularization procedures.

Revascularization of the coronary arteries can be accomplished primarily in two ways:

Thrombolysis in Myocardial Infarction, Abbreviated as "TIMI," Refers to After accessing the coronary artery that is obstructed or restricted, a balloon catheter is placed into the artery. The blood flow is improved as a result of the balloon being inflated, which causes the plaque to be compressed and the artery to become wider. An artery can be propped open with the use of a stent.

In coronary artery bypass grafting, often known as CABG, a graft vessel, typically an artery or vein taken from another part of the body, is used to build a bypass around a blocked coronary artery. This allows blood to flow more freely through the body. After undergoing bypass surgery, blood can once again flow to the muscle of the heart, which was previously blocked.

Revascularization procedures such as PCI and CABG have been demonstrated to have comparable rates of success in diabetic patients. When picking between these surgeries, significant factors to take into account include the severity and complexity of the patient's coronary artery disease, the presence of any additional comorbidities, and the patient's physical characteristics.

When revascularizing a diabetic patient, some things you should keep in mind are as follows:

When it comes to diabetic patients who have multivessel disease, CABG may be a better option than PCI. In this patient population, CABG treatment yields better long-term results.

Patients who suffer from diabetes and have substantial blockage in their left main coronary artery may find that CABG surgery is beneficial to their condition.

Before deciding how to move on with the revascularization process, it is important to take into account the patient's age, level of renal function, and personal choice.

CONCLUSION

The most significant thing that can be learned from this research is that individuals who have a previous history of coronary heart disease or diabetes are at a significantly higher risk than individuals who do not have such a previous history for acquiring various phenotypes of peripheral vascular disease. people diagnosed with diabetes had a lower risk of developing PAD and CAS compared to people diagnosed with CHD. Although this difference has a high level of statistical significance, it is extremely improbable that it will have any real-world impact on the treatment of patients.

REFERENCES

1. Carneiro, António. (2014). Coronary heart disease in diabetes mellitus: Risk factors and epidemiology. Revista portuguesa de cardiologia : orgão oficial da Sociedade Portuguesa de Cardiologia = Portuguese journal of cardiology : an official journal of the Portuguese Society of Cardiology. 23. 1359-66.

2. Aronson, Doron & Edelman, Elazer. (2014). Coronary Artery Disease and Diabetes Mellitus. Cardiology Clinics. 32. 10.1016/j.ccl.2014.04.001.

3. Al-Nozha, Mansour & Ismail, Hussein & Al Nozha, Omar. (2016). Coronary artery disease and diabetes. Journal of Taibah University Medical Sciences. 11. 10.1016/j.jtumed.2016.03.005.

4. Newman, Jonathan & Rockman, Caron & Kosiborod, Mikhail & Guo, Yu & Zhong, Hua & Weintraub, Howard & Schwartzbard, Arthur & Adelman, Mark & Berger, Jeffrey. (2016). Diabetes Mellitus is a Coronary Heart Disease Risk Equivalent for Peripheral Vascular Disease. American Heart Journal. 184. 10.1016/j.ahj.2016.09.002.

5. Buyken, Anette & von Eckardstein, Arnold & Schulte, Helmut & Cullen, Paul & Assmann, Gerd. (2017). Type 2 diabetes mellitus and risk of coronary heart disease: Results of the 10-year follow-up of the PROCAM study. European journal of cardiovascular prevention and rehabilitation : official journal of the European Society of Cardiology, Working Groups on Epidemiology & Prevention and Cardiac Rehabilitation and Exercise Physiology. 14. 230-6. 10.1097/HJR.0b013e3280142037.

6. Haffner, Steven. (2000). Coronary Heart Disease in Patients with Diabetes. The New England journal of medicine. 342. 1040-2. 10.1056/NEJM200004063421408.

7. Jinnah, Chaklader & Aminul, Md & Morshed, Golam & Rahman, Md & Arslan, M.. (2014). Diabetes Mellitus in Patients with Coronary Heart Disease. Medicine Today. 25. 10.3329/medtoday.v25i2.17923.

8. Howard, Barbara & Best, Lyle & Galloway, James & Howard, William & Jones, Kristina & Lee, Elisa & Ratner, Robert & Resnick, Helaine & Devereux, Richard. (2006). Coronary Heart Disease Risk Equivalence in Diabetes Depends on Concomitant Risk Factors. Diabetes care. 29. 391-7. 10.2337/diacare.29.02.06.dc05-1299.

9. Fox, Caroline. (2010). Cardiovascular Disease Risk Factors, Type 2 Diabetes Mellitus, and the Framingham Heart Study. Trends in cardiovascular medicine. 20. 90-5. 10.1016/j.tcm.2010.08.001.

10. Dehghan, Abbas. (2010). Novel Risk Factors for Type II Diabetes Mellitus and Coronary Heart Disease. World Journal of Surgery - WORLD J SURGERY.

11. Cosmin Mihai, Vesa & Zaha, Dana & Loredana, Popa & Cismaș-Pruteanu, Petrișor & Mădălina, Moisi & Mircea, Popescu & Mekereș, Florica & Daina, Lucia & Maghiar, Adrian & Amorin, Popa. (2018). Cross - Sectional Study on a Population of Diabetes Mellitus Newly Diagnosed Patients. Relative Risk of Coronary Heart Disease (CHD) Morbidity Using UKPDS Risk Engine. Internal Medicine. 15. 7-15. 10.2478/inmed-2018-0001.

12. Rosengren, Annika & Welin, Lennart & Tsipogianni, A & Wilhelmsen, Lars. (2019). Impact of cardiovascular risk factors on coronary heart disease and mortality among middle aged diabetic men: A general population study. BMJ (Clinical research ed.). 299. 1127-31. 10.1136/bmj.299.6708.1127.

13. Balouch, Iram & Shaikh, Ali & Makwana, Dayaram & Rehman, Fazal & Chachar, Tarique & Sultana, Riffat & Publication, Professional. (2012). TITLE PAGE Impact of diabetes on cardiovascular disease risk and all-cause mortality in older men: influence of age at onset, diabetes duration, and established and novel risk factors. Türk Fizyoterapi ve Rehabilitasyon Dergisi/Turkish Journal of Physiotherapy and Rehabilitation. 32. 35234-35244.

14. Aggarwal, Rohan & Mittal, Shweta. (2020). Diabetes and cardiovascular disease: inter-relation of risk factors and treatment. Future Journal of Pharmaceutical Sciences. 6. 10.1186/s43094-020-00151-w.

15. Koo, Bo & Oh, Sohee & Kim, Yoon & Moon, Min Kyong. (2018). Prediction of Coronary Heart Disease Risk in Korean Patients with Diabetes Mellitus. Journal of Lipid and Atherosclerosis. 7. 110. 10.12997/jla.2018.7.2.110.

16. Yadav, Paras & Mangalesh, Sridhar & Dudani, Sharmila & Nagpal, Muskaan. (2020). Diabetes and Coronary Heart Disease: Risk Factors in Indian Scenario. Clinical Cardiology. 42. S26-S27. 10.1002/clc.23236.

17. Soedamah-Muthu, Sabita & Fuller, John & Mulnier, Henrietta & Raleigh, Veena & Lawrenson, Ross & Colhoun, Helen. (2016). High Risk of Cardiovascular Disease in Patients With Type 1 Diabetes in the U.K.: A cohort study using the General Practice Research Database. Diabetes care. 29. 798-804. 10.2337/diacare.29.04.06.dc05-1433.

18. Katsiki, Niki & Banach, Maciej & Mikhailidis, Dimitri. (2019). Is type 2 diabetes mellitus a coronary heart disease equivalent or not? Do not just enjoy the debate and forget the patient!. Archives of Medical Science. 15. 10.5114/aoms.2019.89449.

19. Rana, Jamal & Liu, Jennifer & Moffet, Howard & Jaffe, Marc & Karter, Andrew. (2015). Diabetes and Prior Coronary Heart Disease are Not Necessarily Risk Equivalent for Future Coronary Heart Disease Events. Journal of general internal medicine. 31. 10.1007/s11606-015-3556-3.

20. Chukwuma Sr, Chrysanthus. (2019). Coexistence of Type 1 Diabetes Mellitus and Risk Factors of Coronary Heart Disease.