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A Quandary Standpoint of Ayurveda on Diabetes with Associated CVDS

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ABSTRACT

Cardiovascular disease (CVD) in persons with diabetes has a significant and growing impact on public health. Patients diagnosed with diabetes mellitus type I or type II are highly susceptible to many heart conditions, including congestive heart failure, peripheral arterial disease, cardiomyopathy, and coronary heart disease. Diabetes demands rigorous control of all cardiovascular risk factors due to its significant risk of cardiovascular morbidity and mortality. According to estimates, the global population with diabetes will increase from 171 million in 2000 to 366 million by 2030, and the global population with hypertension will rise by 60% to reach 1.56 billion by 2025. 65–75% of deaths among diabetics are attributable to cardiovascular disease. The rationale is that cardiovascular illnesses and diabetes mellitus share a number of risk factors. The current medical system is effective in preventing infectious diseases, but it has not been effective in preventing diseases linked to a lifestyle by itself. Ayurvedic medicine is the best at managing and preventing lifestyle problems since it emphasizes a complete lifestyle adjustment for the patient. For those with diabetes and CVD, a special regimen of food (*Aahar*), exercise (*Vihar*), and herbs (*Aushadhi*) can help reduce symptoms and promote overall health. Reviewing the co-morbidity between diabetes mellitus (*Madhumeha*) and its related cardiovascular risks is the goal of this research work.

Key words: Cardiovascular risk factors, Diabetes mellitus, Heart care, Ayurveda

INTRODUCTION

The rise in diabetes incidence is a result of changes in the human environment, behavior, and lifestyle. Patients with diabetes are living longer because to improved care, but this comes with chronic, long-term problems because of hyperglycemia.^[1] The prevalence of heart disease is rising alarmingly in our society as a result of dietary and lifestyle changes brought about by the influence of western civilization and culture.

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According to a study on the present trajectory, there could be a 7.4 crore CVD cases in India by 2020, up from roughly 3.9 crore in 2010. In 2020, the prevalence will be 14.5% in rural areas and higher in urban areas. The prevalence rate among those under 40 and older or higher are probably going to rise as well. Among non-communicable diseases, cardiovascular disease accounts for the biggest percentage.^[2,3]

In 2011, there were 366 million cases of diabetes worldwide; 183 million of these cases are undiagnosed. Globally, there are becoming more and more people with diabetes; by 2030, there will be 552 million cases of the disease. One known risk factor for cardiovascular disease (CVD) is diabetes mellitus (DM). When compared to persons without diabetes, those with type 2 diabetes mellitus (T2DM) have a higher cardiovascular morbidity and mortality as well as a disproportionate amount of cardiovascular disease (CVD).^[4]

Our current era is marked by a rise in mental and physical stress, changes in diet and lifestyle patterns,

pollution, lack of physical activity, and a number of social and environmental changes that have contributed to the development of hypertension, hyperlipidemia, obesity, heart disease, and other illnesses. Individuals with diabetes are commonly found to have this clustering of risk factors, known as the metabolic syndrome, albeit not all individuals with the metabolic syndrome also have diabetes. The metabolic syndrome has a very complicated etiology, as do all of its constituent parts. Major pathophysiological significance is attributed to a triad of low-grade vascular inflammation, insulin resistance, and endothelial dysfunction (driven by pro-inflammatory cytokines and dyslipidemia). This further raises the risk of CVD by causing anti-fibrinolytic state, hypertension, and hyperinsulinemia.^[5]

The majority of diabetic cardiac crises end in death. The use of *Ayurveda* in treating certain disorders has been limited thus far, however authors have noted that some kinds of conditions can be effectively treated using *Ayurvedic* principles. According to other research, the prognosis in these situations varies and is dependent on a number of circumstances; typically, patients with low risk factors have a higher probability of surviving than those with high risk factors. High risk factors for the disease include being overweight, having a metabolic condition, having hypertension, leading a stressful lifestyle, and having a positive family history. Although it is commonly considered that only contemporary medications can treat this kind of sickness, *Ayurveda* can also be very important in treating such a serious condition. The purpose of this review is to draw attention to the importance of CVD risk factors in the context of diabetes mellitus and their role in the pathophysiology of the increased mortality and morbidity associated with CVD in these patients. Understanding that these kinds of risks variably function in concert with one another is crucial.^[5,6]

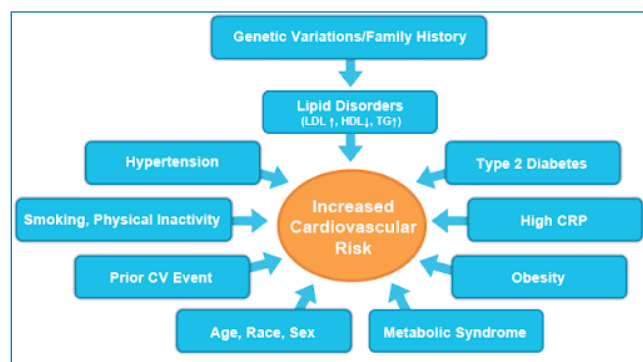
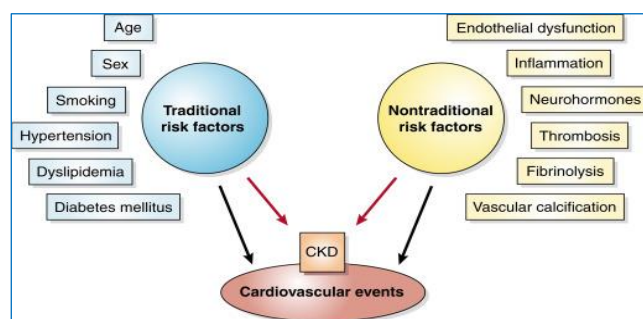
Extent and Magnitude of the Issue

It is estimated that 10.3 million Americans suffer from diabetes mellitus. An estimated 5.4 million people do not have a diabetes diagnosis. Type 2 diabetes affects about 90% of patients with the disease. Type 2

diabetes typically manifests several years before a clinical diagnosis. It is impossible to separate our society's growing rates of obesity and physical inactivity from that of type 2 diabetes. In India, there are an estimated 77 million adults who are overweight or obese. Moreover, just 25% of adult Indians engage in regular exercise or minimal physical activity. Type 2 diabetes is a condition that is predisposed by both high body fat and inactivity. In India, type 2 diabetes is becoming more common due in part to the country's rising ethnic variety, which includes these groups.^[7]

Menace Factors: Conventional and Non-Traditional

Cardiovascular events are causally associated with traditional risk factors. It is less evident how non-traditional risk variables independently contribute to cardiovascular risk at the patient level. Cardiovascular risk variables unique to diabetes-CKD that are relevant to patient-level decision-making are still unknown. A prominent screening measure for CVD risk, high-sensitivity C-reactive protein (hsCRP) is an inflammatory biomarker for dysfunction and is linked to future risk of coronary heart disease, stroke, and mortality from vascular and non-vascular disease. The examples that follow demonstrate the typical and non-traditional risk factors for elevated cardiovascular disease risk in the broader community.^[8,9]



Diabetes and Connected CVD Risk Factors

Diabetic Heart Disease

Diabetic cardiomyopathy, or heightened myocardial dysfunction leading to hastened heart failure, appears to be one cause of the poor prognosis observed in people with both diabetes and ischemic heart disease. Therefore, congestive heart failure is remarkably common in persons with diabetes. Diabetic cardiomyopathy is likely caused by a number of causes, including severe coronary atherosclerosis, autonomic neuropathy, prolonged hypertension, chronic hyperglycemia, microvascular dysfunction, and glycosylation of myocardial proteins. Diabetic cardiomyopathy may be avoided or lessened by better glucose control, better hypertension management, and atherosclerosis prevention with cholesterol-lowering medication. Sulfonyl ureas, which are used to manage hyperglycemia, may be cardiotoxic and aggravate diabetic cardiomyopathy, according to an early clinical research. However, a recent large-scale clinical investigation did not establish this side effect.^[10]

Dyslipidemia and Diabetes

Depressed high density lipoprotein (HDL) cholesterol (<40 mg/dL), raised triglycerides (≥150 mg/dL), and elevated levels of tiny, dense LDL particles—which are further atherogenic due to oxidation and glycation—are the hallmarks of diabetic dyslipidemia. In diabetic dyslipidemia, low-density lipoprotein (LDLC) levels are typically normal or only slightly raised, and they frequently do not differ considerably from non-diabetic individuals' values. However, those with diabetes have a significantly higher relative risk of coronary heart disease (CHD) at any cholesterol level. This is partly because they have lower amounts of the more atheroprotective HDL subfractions and more atherogenic tiny, dense LDL particles. Individuals diagnosed with diabetes frequently have increased amounts of both intermediate density lipoprotein and very low density lipoprotein particles.^[11]

Hypertension and Diabetes

Over 60% of people with diabetes mellitus type II have arterial hypertension. This is directly related to

elevated sympathetic tone, hyperinsulinemia connected to enhance renal reabsorption of salt, and increased activity of the rennin-angiotensin-aldosterone system. The advent of kidney illness, obesity, and aging all contribute to the rise in the prevalence of hypertension. DM and hypertension together increase the risk of CVD. Diabetic patients with hypertension have a quadruple cardiovascular risk, whereas the diagnosis of diabetes doubles the risk for men and more than triples the risk for women.^[12]

Renal disease and diabetes

One common and frequently serious consequence of diabetes is renal failure. About one-third of patients with type 1 diabetes who have had the disease for eighteen years will exhibit diabetic kidney damage. Type 2 diabetes affects up to 35% of newly admitted patients starting dialysis treatment. Diabetes and end-stage renal disease (ESRD) seem to go hand in hand. Death rates for diabetic patients receiving renal dialysis most likely surpass 20% annually. Among patients with ESRD, CVD is the primary cause of death when diabetes is present.^[13]

Obesity and Diabetes

Numerous CVD risk factors are associated with generalized obesity as measured by the body mass index (BMI) and abdominal obesity as measured by the waist circumference (WC). Clinical recommendations don't say if BMI or WC measurements are as useful as non-diabetic patients in predicting cardiovascular risk in people with DM-II. Since obesity increases the risk of cardiovascular disease (CVD) mortality in people with diabetes mellitus type II (DM-II), it is especially important to examine the effects of obesity on atherogenesis and novel procoagulant and prothrombotic cardiovascular risk factors.

When it comes to individuals with diabetes, the coexistence of several factors including the length of their diabetes, the medications used to achieve glycaemic control, lipid profiles, blood pressure, or the presence of risk behaviors like smoking or alcohol use may confound the impact of obesity on the risk of CVD.^[14]

▪ Nicotine and Diabetes

Smoking has been connected to a decline in metabolic regulation in diabetics, which is linked to a higher risk of developing macrovascular and microvascular problems as well as mortality in the disease. It has been demonstrated that administering nicotine affects the autonomic nervous system and raises the amounts of insulin-antagonistic hormones (growth hormone, catecholamines, and cortisol) in the blood. Nicotine reduces insulin sensitivity either directly or indirectly through these and potentially other mechanisms. Additionally, smoking raises the amounts of free fatty acids in the blood, which is detrimental to the uptake of glucose by insulin.^[15]

An Ayurvedic View of Diabetes and Related CVDS

The study of longevity in Ayurveda offers a framework for characterizing the causes and conditions of illness and links them to therapeutic interventions. Because contemporary medicine has a strong scientific basis and can effectively treat the symptoms of both chronic and fatal illnesses, the general public is gravitating toward it. With the use of meta-analyses and systematic reviews, contemporary medications are constantly observed. Unfortunately, even though they may have greater therapeutic potential, traditional medications in our day and age are now ill-prepared to address these issues.

According to Ayurveda, the heart is a key organ that regulates emotions and circulates blood to maintain an individual's health. According to Ayurveda, a changing lifestyle and higher levels of stress are causing arterial hardening or thickening, which can cause angio-obstruction (*Vata Dosha*) and chest pain (*Ruja*).^[16, 17]

Understanding and interpreting *Ayurvedic* writings' descriptions of diabetes mellitus and its complications is becoming easier because to contemporary medicine's efforts to define the pathophysiology of the disease. Comparably, analysis of the medications recommended in the old *Ayurvedic* texts using contemporary scientific methods and instruments shows that they are remarkably applicable even in the present day and have the power to treat illnesses worldwide. This article examines the understanding of

diabetic pathogenesis in both *Ayurvedic* and modern medicine, the therapeutic approach for prevention and treatment, and current perspectives on how *Ayurvedic* medicines prescribed for preventive and therapeutic aspects of this dreaded disease are still relevant in light of recent advances in modern science. Finally, (iii) challenges posed to traditional medicines like *Ayurveda* that have to be seriously addressed in order to have proper perspective.^[18]

When examining the pathophysiology, the most frequent cause of occlusion in any coronary channel is dyslipidemia, followed by atherosclerosis, arteriosclerosis, thrombus, embolus, or plaque. Lipids and macrophages have been linked to atherosclerotic alterations in heart arteries. Reduced availability of blood for Heart muscle is damaged by the myocardium. The myocardium will permanently alter if the blood flow is not restored or if the illness is not treated. It is characterized by shortness of breath and usually spreading chest pain to the left arm and neck. Breathing difficulties (a symptom of *Pranavaha Sroto Dusti*), nausea or vomiting, perspiration, palpitations, chest tightness, etc.^[19, 20]

In *Charaka Samhita*, the concept of diabetic cardiogenic emergency is discussed. According to the description, the patient's death is undoubtedly caused by *Hridya Shoola*, a serious diabetic consequence. It typically manifests as compression-type chest pain, severely disrupted gastric motility from circulatory abnormalities (meal stays undigested for extended periods of time), a sharp decline in physical strength (*Bala* declines), and extreme thirst (*Trishna*). This description of *Hridya Shoola*, which is typically seen in anterior wall infarction, is strikingly similar to severe diabetic cardiac arrest. The muscles of the heart's front wall make up about 70% of its muscles. Therefore, if the anterior wall is impacted, the result is typically deadly. It is made very plain that a doctor shouldn't treat the patient because doing so will undoubtedly result in death.^[21]

Indispensable Ideology in Ayurveda

To preserve proper physiological fuel equilibrium and enable a healthy lifestyle, *Ayurveda* prescribes that all

Tridoshas be balanced and appropriate on both a qualitative and quantitative level. It highlights how vitiation in these *Tridoshas*, whether from exogenous or endogenous overconsumption / accumulation, or vice versa, leads to an imbalance in regular biochemical and physiological processes. This disruption incorrectly triggers the body's defense and self-sustenance systems, which either causes an excessive build-up or depletion of the elements necessary to maintain proper biochemical and physiological balance. Therefore, vitiated homeostasis promotes numerous diseases because it causes disruption in normal physiological activities when necessary corrective actions are not taken. As a result, *Ayurveda* prescribes a variety of herbo-mineral preparations with suitable properties to adjust risk factors (*doshas*) and restore physiological homeostasis to a balanced condition. According to *Ayurveda*, if sufficient measures are not implemented promptly to address these disruptions, the excess build-up or insufficiency of appropriate nutrients at the systemic or tissue level feeds the *Vata* fire (oxidative stress), exacerbating the condition (diabetes mellitus). Treatment then becomes challenging.^[22, 23]

DISCUSSION AND CONCLUSION

As recommended by the Adult Treatment Panel III (ATP III) guidelines of the National Cholesterol Education Program, primary prevention through improved control of risk factors and therapeutic lifestyle modification (including dietary modification, aerobic exercise, and smoking cessation) is a pioneering strategy. The advantages of lifestyle treatments are comparatively greater for individuals who are at high risk for cardiovascular disease and have been shown to be helpful in improving cardiovascular risk factors. The conundrum in preventing DM-II cardiovascular problems, however, is that diabetics are already at a higher risk of developing CVD at the time of diagnosis.

Because of the intricate way that the risk factors in DM-II interact, managing this chronic illness requires a holistic approach. As a result, all cardiovascular risk factors should be modified as part of a complete care plan. Optimizing for several CVD risk factors should

provide the best opportunity to improve CVD outcomes. There is constant evidence that lowering the risk of cardiovascular disease in DM-II patients requires excellent glycemic control in addition to managing hypertension, dyslipidemia, quitting smoking, and losing weight. In individuals with short-term diabetes mellitus and minimal cardiovascular risk, cardiovascular benefits are achieved if traditional cardiovascular risk factors are controlled early. Conversely, this is untrue in older individuals with long-standing diabetes mellitus, a history of prolonged hyperglycemia exposure, and a significant cardiovascular risk. The idea known as metabolic memory, according to which the environment of early glucose intake is imprinted in target organs, leading to long-term protective or deleterious consequences, could account for this advantageous or detrimental effect.

The prevalence of heart disorders has increased in society as a result of today's lifestyle. Diabetes mellitus, obesity, and hyperlipidemia are the three main risk factors for the onset of cardiovascular illnesses. Healthy, balanced living is encouraged by Ayurveda, which sees every person as an individual with a distinct mind-body constitution and set of life circumstances. DM-II is becoming more and more common, mostly due to rising rates of obesity and sedentary lifestyles, which induce a range of CVDs.

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