Impact of Diabetes on Heart

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Abstract

Diabetes is sometimes described as the "coronary equivalent." A coronary equivalent refers to a condition or risk factor that increases the likelihood of developing coronary artery disease (CAD), a condition characterized by the narrowing or blockage of blood vessels supplying the heart. Identifying and managing these coronary equivalents is crucial for preventing and mitigating the severity of CAD". These illnesses are regarded as coronary equivalents since they have been linked to a higher risk of CAD and would need the same therapies and management techniques as CAD. Diabetes has the potential to significantly affect the heart and circulatory system. Additionally, diabetes patients are more likely to smoke, be obese, be inactive physically, and have other heart disease risk factors. some diabetic treatments, including insulin, and sulfonylureas, might raise the danger of hypoglycemia, which can cause heart rhythm problems and even sudden death. The risk of heart disease can be decreased by preventing and controlling diabetes by lifestyle modifications like consistent exercise, a balanced diet, and weight management, as well as with the use of the proper medical care. Diabetes complications, especially impact on heart and circulatory system, must be prevented and managed by closely monitoring blood sugar, blood pressure, and cholesterol levels.

Lowering cardiovascular risk factors and treating the illness he high frequency of health issues and death from cardiovascular disease in those at risk for and with diabetes has made this a more crucial and all-encompassing component of diabetes care. Additionally, there are drugs that can aid in lowering risk factors and the prevalence of heart-related illnesses. With precise guidelines, more attention is placed on lowering the likelihood of developing heart and kidney issues and safeguarding these organs from harm. For patients with atherosclerotic cardiovascular disease (ASCVD) and/or those at high risk for heart and kidney disease, heart failure, and chronic kidney disease, the recommendations center on selecting drugs properly. SGLT2 inhibitors or GLP-1 receptor agonists are typically the recommended treatments. More than ever, there are drugs available now that help treat or prevent these additional illnesses as well as blood glucose levels.

The Standards synchronized the blood pressure target with other significant organizations that established these recommendations. A systolic blood pressure of less than 130 mmHg or a diastolic blood pressure of less than 80 mmHg (130/80 mmHg) is now considered high blood pressure.

For adults with diabetes and risk factors for ASCVD who are 40 to 75 years old, the target LDL-cholesterol level is 70 mg/dL, and for those who already have ASCVD, the target LDL-cholesterol level is 55 mg/dL. In addition, if the goal level is not reached, it is advised to achieve an LDL reduction of 50% or more from the beginning point LDL with a high intensity statin drug and then use a different drug, such as ezetimibe or a PCSK9, if necessary. This emphasizes the significance of managing and preventing cardiovascular disease.

Keyword*;* Diabetes, cardiovascular disease, CAD ,CVD prevention, modern lifestyle.

INTRODUCTION

Impact of Diabetes on heart is likely to have certain risk factors, high blood pressure or raised cholesterol, that develops the problem heart attack or a stroke. Diabetes's elevated blood glucose levels can harm your blood vessels and the nerves that regulate your heart's circulation. Over time, this damage can lead to heart disease in the form of heart attack or cardiac muscle weakness and cardiomyopathy. People with diabetes usually develop heart disease earlier in life than people without the condition. Compared to those without diabetes, those with diabetes have a nearly twofold increased risk of heart disease or stroke. Compared to individuals without diabetes, adults with diabetes have a cardiovascular risk that is two to four times higher, and this risk increases as glycemic control deteriorates. Adult death rates have been linked to a 75% increase in diabetes, with cardiovascular disease contributing significantly to the excess mortality. The reduced quality of life, disability, and early death linked to diabetes are caused by macrovascular and microvascular complications related to the disease, such as coronary heart disease, cerebrovascular disease, heart failure, peripheral vascular disease, chronic renal disease, diabetic retinopathy, and cardiovascular autonomic neuropathy.. Maternal diabetes mellitus (Mat DM) is associated with up to a fivefold increased risk of having an infant with CHD.

In recent 4 years there is 44% fast rate of diabetes Increments. people's need to be aware about their normal glucose level, pre-Diabetic and Diabetic for their better improvement and to control their problem.[1]

Table 1: 2023 ICMR study reports claims:

YEAR's	DIABETIC RANGE
2019	Around 7 million peoples are Diabetic
2023 (June)	Increments of 44% from last 4 years

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More than 10 million peoples are diabetic. Nowadays Diabetes is exploring at very fast rate. Some State have high percentage expanding rate which actually need to be control.[2]

Table 2: Diabetes blood sugar level

	Fasting Plasma Glucose	Haemoglobin A1c	2-Hour Oral Glucose Tolerance Test(OGTT)
Normal	70-99 mg/dl	<5.7%	<140 mg/dl
Prediabetes	100-125 mg/dl	5.7%-6.4%	140-199 mg/dl
Diabetes	>125 mg/dl	>64 %	>199 mg/dl

CLASSIFICATION

Types of Diabetes includes MODY, Type I, Type II, Gestational diabetes.
• MODY stands for maturity onset diabetes of the young <25 years though may go undetected. Typical

body weight is normal to overweight, C-peptide level is normal. There is no such presence of antibody.

- Type I diabetes is also known as juvenile diabetes which is an autoimmune disorder in which the immune system attacks and destroys the insulin -producing cells in the pancreas. These are Insulin dependent diabetes, typically it occurs <30 years but may occur at any age.

- Type II diabetes used to be called non-insulin-dependent or adult-onset diabetes. About 90% peoples have diabetes type II. Typical body is obese or overweight and the age of onset is >25 years but increasingly seen in children/teens/young adults.

- Gestational diabetes is generally Insulin resistance which is a side effect of pregnancy. If this occurs, it's called gestational diabetes. In late or middle pregnancy, doctors frequently detect it. In order to safeguard the growth and development of the fetus, gestational diabetes must be under control because the mother's blood sugars pass through the placenta to the unborn child. [3]

Table 3: 2023 ICMR study reports claims: Percentage Ratio of State with Diabetic and Pre-Diabetic range are as follows:

STATE	PRE DIABETIC	DIABETIC
GOA :	20.3%	26.4%
PONDICHERRY :	25.8%	26.3%
KERALA :	18.3%	25.5%
CHANDIGARH :	15.6%	20.4%
DELHI :	18%	17.8%
TAMIL NADU :	10.2%	14.4%
BENGAL :	23.5%	13.7%
SIKKIM :	3.13%	12.8%
PUNJAB :	8.7%	12.7%
HARYANA :	18.2%	12.4%

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**MAJOR CAUSE FOR DIABETES:**

- **High blood pressure**

People with HTN usually seen insulin resistance and have more chances to suffer with diabetes. The combined factor of HTN including diabetes will enhance the risk of cardiovascular disease, eye problem, kidney disease, stroke, heart attack.

- **Smoking**

Heart disease is more likely to occur among smokers. If you have diabetes, it is important to stop smoking, because both smoking and diabetes narrow blood vessels

NOTE: Each puff has 7000 toxins.

Figure 1: Diabetes Complication
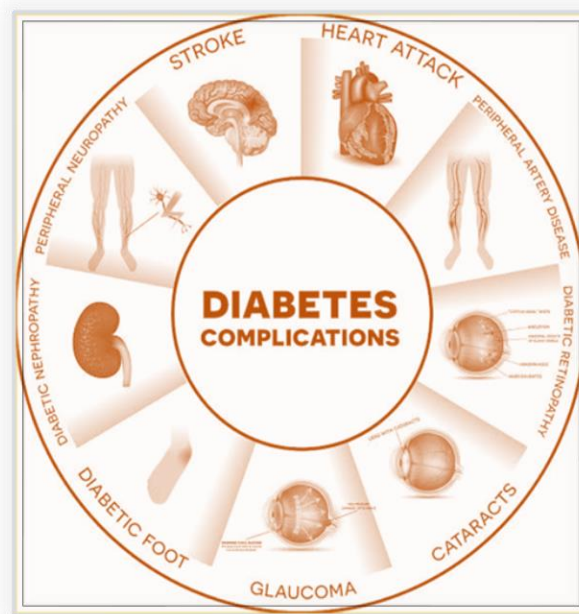
- **Abnormal cholesterol levels**

Cholesterol is a type of fat, produced by your liver and found in your blood. The risk of heart disease can also be increased by triglycerides, another form of blood fat. LDL, or "bad" cholesterol, can accumulate and obstruct your blood vessels. Your risk of heart disease is increased by high LDL cholesterol levels. "Good cholesterol" is another term for HDL. Reduced risk of stroke and heart disease is associated with higher levels of HDL.

- **Obesity and belly fat**

Being overweight or having obesity can make it harder to manage your diabetes and raise your risk for many health problems, including heart disease and high blood pressure. People's who are obese layer of fats deposit on their Liver, Pancreas and also on the coronary arteries (Atheroma) and this deposition is called 'Atherosclerosis.

Figure 2: Body Mass Index Chart
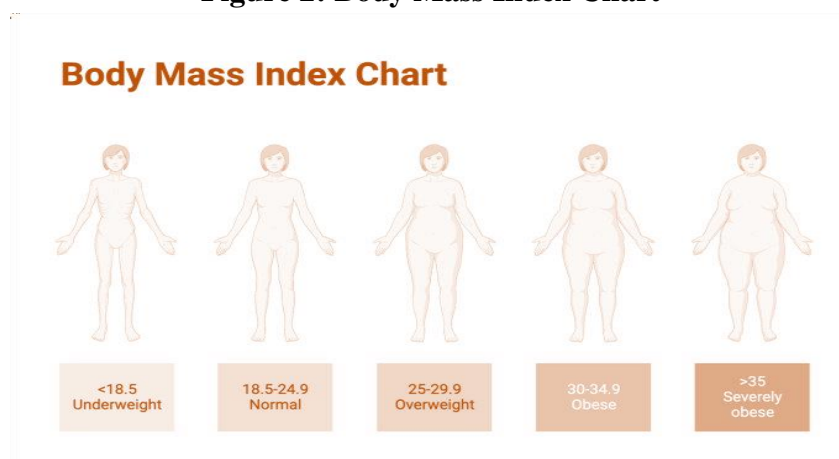
NOTE: You have excess belly fat if your waist measures more than 40 inches and you are a man more

than 35 inches and you are a woman.

- **Chronic kidney disease**

Having diabetes is a risk factor for developing kidney disease, which affects about 40% of people with diabetes. A family history of renal failure and high blood pressure are additional risk factors for kidney disease development.[5]

- **Cause Of Death In Diabetes**

CARDIOVASCULARDISEASE:70%, RENAlFAILURE:10%, CANCER:10%, Infection: 6% DIABETIC KETOACIDOSIS: 1%, Others : 1%. [6]

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Figure 3 : Patient's Observation

Patient's Name/ Sex/Age	Obesity	Investigation	Diagnosis
MR. OPD Male/ 65years.	76Kg. Obese. (Non tobacco)	Glucose In urine -3+, HbA1c - 11.3 Cholesterol -199 mg/dl. LDL-105.72mg/dl, HDL-39.80 mg/dl. Triglycerides-267.40mg/dl, Fatty liver	T2DM(last 20 years), HTN.
MRS. SV Female/ 68Years.	70kg. Obese. (Ex tobacco)	HbA1c- 8.3 ECG- RBBB. USG Abdomen — KUB	T2DM, HTN. AORTIC CALCIFICATION. History include : Colonic Cancer.
MR. DT Male/ 66Years	61kg. Obese. (Non tobacco)	HbA1c- 8.3, Urea serum– 48. Creatinine - 1.1, Cholesterol-156 mg/dl. LDL -98 mg/dl, HDL - 44 mg/dl. Triglyceride -68 mg/dl.	T2DM, HTN. EF - 50%. Calcified aortic valve.
MRS. BB Female/ 55years.	Obese (Non tobacco)	HbA1c-.2 mg/dl, Cholesterol - 115 mg/dl. LDL -45.6 mg/dl, HDL - 46mg/dl. Triglycerides-228 mg/dl.	T2DM(last 09years). HTN, CAD.
Mr. RB Male/ 62years	Obese (Smoking) Last 30years, Currently ; less intake but didn't quit	ECG-Atrial ectopic systole, Peripheral arterial disease, CIMT-RICA(50%),LICA(50%).	T2DM (Last 22yrs), HTN, COPD, CAD, CO, PAD.
Mr.SK Male/ 49years.	(Smoking) Currently; Still dependence on Nicotine Intake.	2022 EF -50% (31st May2023).	T2DM/TRIOPATHY HTN, CAD, COPD, ED,CAD-PCI (2017), HYPOKALEMIC. RWMA, Pulmonary Koch's

Abbreviations:

HTN(Hypertension),CAD(Coronary artery disease), COPD(Chronic obstructive pulmonary disease), RWMA (Regional wall motion abnormality), EF(Ejection fraction), ED(Erectile dysfunction), CIMT (Carotid intima-media thickness), RICA (Right internal carotid artery), LICA (left internal carotid artery), BP (Blood pressure), HTN (Hypertension), PAD (Peripheral arterial disease), T2DM (Type 2 diabetes mellitus).

Figure 4: Diabetes effect on Various Body Organs :
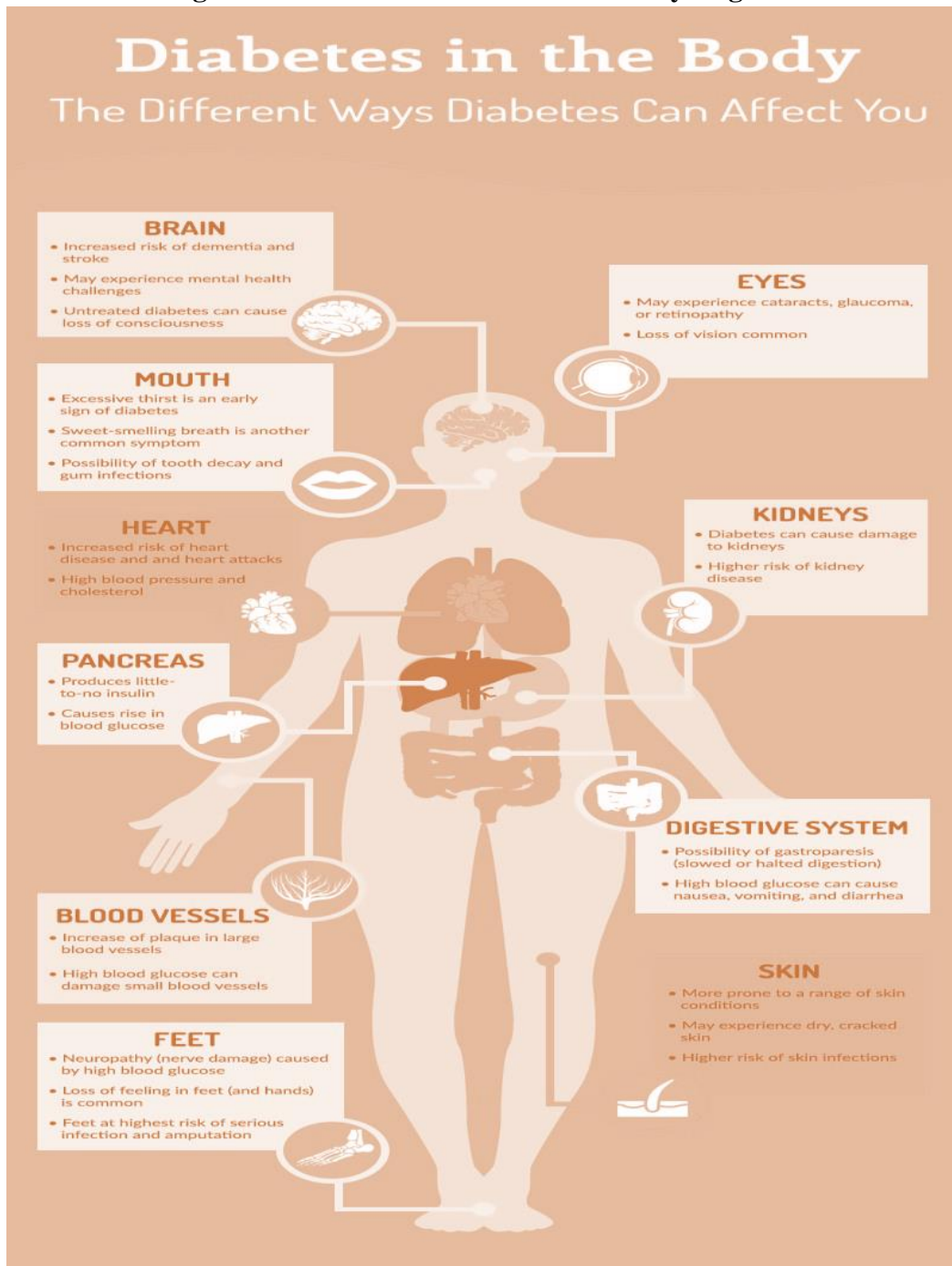
Important Points:

Diabetes Risk factors for increased morbidity and mortality are -Duration of diabetes, Proteinuria, Early age at onset of disease, Bad Habits including smoking, Tobacco intake, LDL consumption, Alcoholic, High glycated hemoglobin (HbA1c), Raise Blood pressure, Obesity [7]. We can control Diabetes by some of the measure taken in our day-to-day lifestyle including Healthy Diets, Exercise, and excluding things like Stress, Cholesterol, obesity can help a lot to maintain a Healthy Diabetic Free Life without the involvement of Stevia.

A/C to ICMR Research Report, persons with high metabolic rate will remain pre-diabetic but persons with weak metabolism will turn to be diabetic. In pandemic life saver Steroid, which had some affect that justify the research but we cannot totally rely to this statement as people who have maintained a healthy lifestyle, cutoff the junk, avoided intake of processed food, exercise. Somehow, cope up with the situation. In fact, healthy lifestyle is the ultimate key to live a healthy life.

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MODERN LIFESTYLE:

Actual definition of Modern Lifestyle involves a Healthy Stress-free life, with physical and mental wellbeing. Nowadays, Maintaining Healthy life is very easy by making some changes and adapting some important step in life we can easily reach goal to maintain a healthy lifestyle. Some of these steps are:

Go for a morning Brisk walk, inhale the natural morning fresh air, enjoy the peace of the nature, live in the joy by seeing the sun rising, do Meditation, yoga it will not only calm the soul but also boost the concentration power. Eat plant based diet to achieve good health.

Live Stress-free life because Stress can affect the sugar level [8].

Figure 5: ICMR Survey Based On 1lakh People's
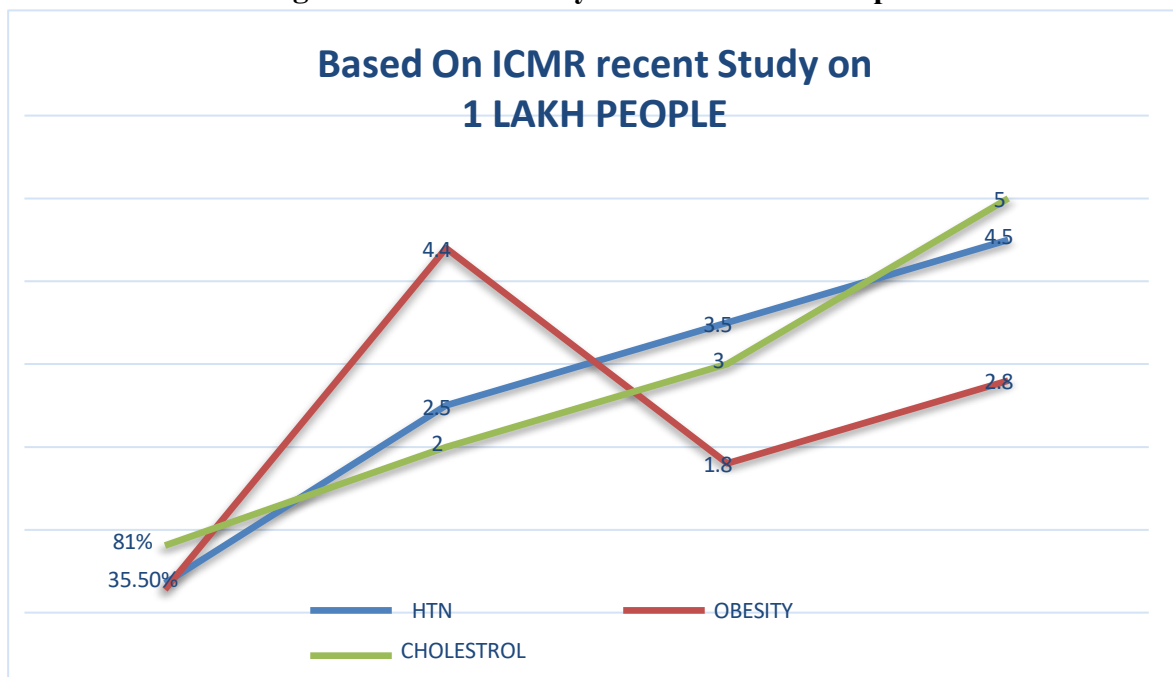
As per the ICMR report where majority of people detected with high cholesterol level and were suffering from HTN they were obese as-well [9]. we've already discuss in above these are the common factor's for affecting a healthy lifestyle and one can suffer from major health issues like Diabetic, Heart problem,

syncope etc., therefore , we can now understand how one problem can lead to prolongation with another hence, all we need to take healthy step in our life by correcting initial life step including good activities in life then only we can survive a happy Modern lifestyle. [10] [11]

Interestingly:

Canada is the first nation to mandate that health warnings be put on individual cigarettes, having just passed a rule requiring just that implement a programmed like this, with the goal of reducing tobacco use to less than 5% by 2035. [12]

Figure 6 : Warning on Cigarettes

Manage your diabetes ABCs:

- A is for the HA1C test
- B is for blood pressure
- C is for cholesterol
- S is for stop smoking. [13]

CONCLUSION

Diabetes is a complicated disease process, and in order to achieve maximum health, quality of life, and productivity, a broad multidisciplinary care team as well as the active participation of persons with diabetes and their families are required for long-term management. Develop or maintain healthy lifestyle habits. Physical activity can help you manage your diabetes and lower your stress level

- **Quitting bad habits and restarting new healthy life is a wise decision.**

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