

# Cardiovascular Diseases: Major Mortality Factor in Modern Era

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## ABSTRACT

Cardiovascular diseases (CVD) is the disease of heart and blood vessels which include mainly coronary artery disease (CAD), angina pectoris and myocardial infarction (Heart attack). CVD also include stroke, heart failure, hypertensive heart diseases, rheumatic heart disease, cardiomyopathy, abnormal heart rhythms, congenital heart disease, valvular heart diseases, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, venous thrombosis. But most of the people die due to coronary artery diseases which is due to Atherosclerosis caused by the accumulation of fat in the inner wall of the large and intermediate artery called atheromatous so it prevent from blood flow that leads to blockage. Today it is biggest reason of increase the mortality rate of people worldwide. Some important factor responsible for CVD are Physical inactivity, Food habit, Alcohol consumption and smoking. All these factors cause high level of plasma triglycerides, low level of HDL (high density lipoprotein) and LDL (low density lipoprotein), higher amount of cholesterol deposition in artery. Deposition of cholesterol in artery causes endothelial dysfunction, myocardial infarction, alters insulin sensitivity, blood lipid and lipoprotein profile, body composition, systemic inflammation, increase blood pressure, decreases functional capacity of heart, weakening of the heart muscles which lead to cardiomyopathy and sudden heart failure.

**KEYWORDS:** *Physical inactivity, Food Habit, Alcohol consumption, Smoking*

## INTRODUCTION

Cardiovascular disease (CVD) is heart and blood vessels diseases which include mainly coronary artery disease (CAD) such as angina pectoris and myocardial infarction (Heart attack). CVD also include stroke, heart failure, hypertensive heart disease, rheumatic heart disease, cardiomyopathy, abnormal heart rhythms, congenital heart disease, valvular heart diseases, carditis, aortic aneurysms, peripheral artery disease, thromboembolic disease, venous thrombosis. But most of the people die due to coronary artery diseases which is due to Atherosclerosis caused by the accumulation of fat in the inner wall of the large and intermediate artery called atheromatous. When the cholesterol in the blood plasma is high then it start to accumulate in the form of small crystal in the intima and smooth muscle of the artery. This cholesterol in artery called low density lipoprotein (LDL). LDL accumulates in the artery wall in form of small crystal but after long time they come together to form crystal beds on artery wall and then fibers and smooth muscles associate with it to form bigger plaque which reduce the diameter of the lumen artery. Plaque surrounded by fibrous cup which reapture and form blood clot so it reduce blood flow and it completely blocks artery. Calcium calcified plaque into bony hard plate now cholesterol called very low density lipoprotein which contain triglycerides.

Heart attack occur when coronary artery is completely blocked while half blocked artery restricts blood flow which cause angina pectoris.

Atherosclerosis is major cause of CVD and ischemic disease and it is most common form of arteriosclerosis.

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Atherosclerosis also increase the risk of the stroke. When plaque is present in one of the arteries in the brain which cause blood clot that block blood supply called thrombotic stroke. Blood supply via artery to the brain stop so brain not working properly. Heart failure occur when heart can't pump enough blood to the body's need.

In whole world CVD is major cause of the death of the people and responsible factor which increases the risk of the CVD are Physical inactivity, Food Habit, harmful use of alcohol, tobacco use, hypertension, diabetes, obesity, hyperlidaemia.

## STUDY

In the modern era cardiovascular disease is one of the major cause of death of the people worldwide. These following factors increase the risk of CVD in people. I Think these factors are highly responsible to develop CVD in people.

### Physical Inactivity (PI)

Minimum physical activity is required to keep body fit and fine. At least 30 minutes of moderate activity is essential for healthy daily life.. Moderate activities include pleasure walking, climbing stairs, gardening, yard work, moderate to heavy house work, dancing, home exercise. More vigorous aerobic activities such as brisk walking running, swimming, bicycling, roller, skating and jumping rope 3 to 4 times in a week for 30-60 minutes improve fitness of heart. Physical activity (PA) prevents from the risk of development of diabetes and also maintain weight loss, reduce hypertension which is the factor of increasing the risk of CVD. Physical activities reduce the blood pressure as much as 4 to 9 mm Hg and it boost the level of good cholesterol.

PI cause impaired glucose metabolism that cause activation of serine/threonine kinases that leads to endothelial dysfunction and increase risk of CVD. PI also responsible for conduit arterial stiffness and reduced endothelium dependent dilation (flow mediated dilation) and endothelial cell activation and increase endothelial cell apoptosis. It also cause oxidative stress which dysfunction endothelial, so the uncoupling of endothelial nitric oxide synthase that reduce nitric oxide and increased production of superoxide. Both these radicals exposed to one another and undergo diffusion limited radical-radical reaction to form peroxy nitrite anion that degrades nitrate and nitrite and the production of oxygen derived free radicals increased 4-fold in patients with heart failure. After the long time of endothelial dysfunction that affect the vascular compliance and then finally give elevated loads on the left ventricle (LV) results to LV stiffening, chamber remodeling, and increases the risk of Heart Failure.

PA balance calcium level by sarcoendoplasmic reticulum calcium transport Atpase and increase expression of the mRNA. It reduce the C-reactive protein which protect from inflammation myocardial fibrosis and dysfunction. All these help to improve compliance, reduce stiffness, and afterload, finally reduce risk of future cardiac dysfunction. It improve Cardiorespiratory fitness (Peak Vo2). PA reduce blood pressure, systemic inflammation and myocardial oxygen demands, visceral adiposity, myocardial infarction and improved heart rate variability, endothelial function, sleep, increase insulin sensitivity, capillary density, mitochondrial density.[1] PA higher the aerobic capacity. PI produce glucose intolerance and rapidly decrease CRF (cardiorespiratory fitness) so decreases VO2max, loss of insulin sensitivity so accumulation of lipid intermediate in skeletal muscles, reduced lean mass, increase visceral adipose tissue. PI causes lower CRF which alters insulin sensitivity, blood lipid and lipoprotein profile, body composition, systemic inflammation, blood pressure, autonomic nervous system. PI associated with morbidity and mortality. PI increases the risk of CVD and CHD upto 59% and 36% (respectively) more than normal. But PA reduce the risk of CVD and CHD upto 41% and 64% respectively.[2]

Regular physical activity reduces myocardial infarction, stable angina pectoris and increases functional capacity of heart. People who lives in developed countries do most of the work by machine which make their life comfortable but physical inactive. They always work with machine and working most of time in setting position. In developed countries, technology makes people life sedentary that affect their health very badly which is the major cause of diseases like diabetes, obesity, CVD etc.

In the past people are much more physically active than the recent so they are more healthy than today's modern people.. But it is also very important to change with time and it is technological time so we have to follow this routine but health is more important than everything so we must do some physical activity.

#### **Food Habit**

Poor diet contains high refined grains, added sugar, salt, unhealthy fats and animal source foods and lower whole grains, fruits, vegetables, legumes, fish, nuts. In recent people take in their diets, more and more snack, fried and processed

food, animal meat, refined carbohydrate, starchy staples such as noodles. High Refined carbohydrates such as polished white rice, corn starch, white wheat flour ,increase risk of CVD disease and also cause type 2 diabetes, obesity etc. High glycemic food (such as refined carbohydrates, desserts, snacks, soft drink) which increases low density lipoprotein, increasing the risk of myocardial infarction, coronary heart disease (CHD) etc.

Vegetables oil made of mono and polyunsaturated fat alpha linolenic acid. These are cardioprotective substances. Recently vegetable oil has replaced by Hydrogenated fats which is main source of trans fatty acids and bleached oils which increases risk of CVD.

Non vegterian food like poultry food and meat contains high amount of protein, iron, zinc, vitamin B, high amount of cholesterol, saturated fatty acid that raise low density lipoprotein, cholesterol and triglyceride. This type of food product (poultry food, meat) also contains heme iron which increase formation of N-nitroso compound that leads oxidative stress. Processed meat consumption increase risk of CHD. Eggs are source of dietary cholesterol (medium eggs has 225mg of cholesterol) that increase the risk of CVD.

Fermented dairy products such as yogurt, cheese, thick fermented milk that also increase of CVD.[3] In modern period or recent period, people are making distance from healthy foods like nuts, vegetables, whole grains, fruits ,healthy oils, fish such as Mediterranean diet which have anti-inflammatory properties and turning towards western diet or unhealthy food or junk food fast food because these foods are very tasty and take very short time to consume it but these contains high amount of salt, trans-fats (like baked goods, fried food) that cause lower level of HDL. Fast food, red meat, high calorie foods have proinflammatory properties, that leads to hypertension, CHD, stroke, heart attack. Over consumption of these food cause over weight, high blood pressure, and high cholesterol which play major role in increasing the risk of CVD.

A/Q to Swedish study on 43396 women shows that increasing protein intake by 10% (5g protein) while decreasing carbohydrate intake by 10% (20g carbohydrate) increase risk of CVD. [4]

Insulin resistance lead to the development of dyslipidemia, high level of plasma triglycerides, low level of HDL (high density lipoprotein) and LDL(low density lipoprotein) which cause endothelium dysfunction that help in atherosclerotic plaque formation.

Food Play a major role to live a healthy life. In these modern era we play with our life because we are habituated of taking junk foods and we do not follow the proper diet that is one of the big reason to develop various type of diseases like diabetes, obesity, CVD.

#### **Alcohol consumption and Smoking**

Excess alcohol consumption raise the level of fats (triglycerides) in body. A high triglyceride level combined with high LDL(bad) cholesterol and low HDL (good) cholesterol has been associated with fatty buildup in the artery walls that increase the risk of heart attack, stroke. Excessive drinking lead to high blood pressure,

cardiomyopathy, cardiac arrhythmia and even death from alcohol poisoning. Five or more drinks for men and four or more for women in 2 hours cause higher risk of atrial fibrillation, an irregular or quivering heart beat that can lead to blood clots, stroke, heart failure. It also causes weakening of the heart muscles which lead to cardiomyopathy and sudden heart failure.

Alcoholic drinks contain calories and many mixtures added to alcoholic drinks like soda, juice, cream. Added sugar in the form of simple syrup, liqueurs. A beer or glass of wine contains around 100 to 150 calories and a cocktail has 100 to 500 calories.

Alcohol consumption decreases coagulation factors like fibrinogen which play a proinflammatory role in the development of CVD including vascular wall disease and atherosclerosis. Alteration of platelet responses (such as increased platelet activation/aggregation) which help in blood clot formation in some conditions of CVD and daily alcohol consumption increases platelet aggregation and reactivity and also a high level of oxidative stress which results in alcoholic cardiomyopathy. It also creates sarcoplasmic reticulum dysfunction that leads to systolic dysfunction as well as thickening of the heart muscle that makes ventricles large, called cardiac hypertrophy and depressed disturbed myofibrillar ATPase activity, that affects muscle contraction and decreased myofibrillar calcium sensitivity, which affects contractile force generation in the heart. It is also the reason for the fatty acid accumulation in the heart tissue.

Regular ethanol consumption up to 4 to 16 weeks causes mitochondrial dysfunction that leads to decreased myocardial contractility and it also decreases the expression of many mitochondrial proteins like NADH dehydrogenase, long chain specific acyl-CoA dehydrogenase, protein within the citric acid cycle which results in cardiac ischemic-reperfusion injury which is the common cause of CVD.[5]

CVD which develops due to smoking is responsible for approximately 140,000 premature deaths annually. Cigarette smoke contains mainly three components: nicotine, carbon monoxide (CO), and oxidant gases. After smoking, the level of nicotine in the arterial blood becomes 40 to 100 ng/ml. The level of nicotine increases in arterial blood with increasing frequency of smoking. Excess nicotine in the blood increases heart rate, blood pressure, myocardial contractility. These are the contributing causes of CVD. Nicotine also leads to endothelial dysfunction, lipid abnormalities, insulin resistance. CO causes a higher level of carboxyhaemoglobin and it binds with haemoglobin that carries oxygen. Due to the binding of CO with haemoglobin, the oxygen content becomes very low in the blood. It is believed that, if these conditions persist for a long time, it can cause angina pectoris.

Oxidant gases such as oxides of nitrogen and many free radicals from the gas and tar phase of a cigarette reduce the level of antioxidants, blood level of vitamin C, increase the level of lipid peroxidation products in plasma, which produce acrolein that causes atherosclerosis. Cigarettes contain many metals like aluminum, cadmium, copper, lead, mercury, nickel, zinc that catalyze the oxidation of cellular proteins which is responsible for structural damage, endothelial dysfunction, detachment of endothelial cells from the walls of the blood vessels. It influences the CVD factors such as glucose intolerance and low serum levels of HDL cholesterol. It helps in the development of atherosclerotic plaque and ventricular dysfunction. Smoking also plays a great role in the development of the risk of CVD.[6]

## CONCLUSION

All these factors described above are very important which help in the development of the risk of cardiovascular diseases. Today it is a big problem around the world and needs to be overcome. We have to change our lifestyle, food habit, should avoid alcohol, smoking, fast food, unhealthy food, excess oil and fats etc and think more about health than other things so we live a healthy life.

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