

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of mortality worldwide¹. Indians for the reasons given in Table 1 are more prone to CAD². Rapid urbanization, change in dietary pattern, sedentary habits, and increased stress of modern living have made the Indians particularly vulnerable to CAD. An epidemic of CAD is brewing in the Indians³ and therefore it is important that appropriate preventive measures are instituted in time to stem the tide. I would be here discussing only those measures for which we have ample evidence of their effectiveness in the prevention of CAD.

Table 1: Reasons for high incidence of CAD in Indians

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| <ul style="list-style-type: none"> • Genetic predisposition • Sedentary habits • Abdominal obesity/Metabolic syndrome • Indian dyslipidemia • Increased prevalence of DM • Elevated Lp (a) |
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RISK FACTORS FOR CAD

In more than 90% cases, symptomatic CAD is caused by atherosclerotic narrowing of the coronary arteries. The major risk factors for atherosclerosis⁴ are broadly classifiable into modifiable and non-modifiable risk factors (Table 2). It is, therefore, the modifiable risk factors that have to be aggressively targeted for the prevention of CAD.

Table 2: Major risk factors for atherosclerosis

<i>Modifiable</i>	<i>Non-modifiable</i>
<ul style="list-style-type: none"> • Smoking • Hypertension • Dyslipidemia • Diabetes mellitus 	<ul style="list-style-type: none"> • Age • Sex • Family H/O
	CAD

IS ATHEROSCLEROSIS REVERSIBLE?

Previously atherosclerosis was regarded as largely irreversible. However, this has now been conclusively shown to be not true^{5,6}. Early atherosclerotic lesions can completely regress with appropriate treatment. Advanced lesions such as fibrotic plaques may not regress much. Nevertheless active treatment of risk factors esp. hypercholesterolemia halts the progression of the lesions and converts an unstable plaque into a stable plaque thereby minimizing the risk of acute cardiovascular events⁷.

PREVENTIVE STRATEGY**1. Weight control**

Obesity is the bane of modern civilization. About 60% of adults in western countries are overweight or obese (BMI > 25). Obesity has a number of consequences besides accelerating the atherosclerotic process (Table 3). Therefore, the first and foremost thing is to advise weight reduction in overweight individuals. Even a small reduction in weight has considerable beneficial effects. Each unit weight loss decreases ischemic cardiac events

Table 3: Risks associated with obesity

1. Hypertension
2. Glucose intolerance
3. Dyslipidemia
4. Cor. art. disease
5. Pulm. Hypoventilation
6. Non-alcoholic steatohepatitis
7. Gallstones
8. Male hypogonadism
9. Cancer
10. Osteoarthritis

by approximately 9%. Reduction in weight has benefits beyond reduction in CAD. The weight loss should be gradual and very rapid reduction in weight by using very low calorie diets (VLCD) is hazardous and is to be avoided. Increased physical activity and regular exercise are very helpful in reducing weight. Some of the simple ways to increase activity if you cannot exercise regularly are given in Table 4. Dancing can be a very useful form exercise. Dancing involves aerobic exercises and also relieves stress.

Table 4: Simple ways to increase physical activity

1. Walk down to the office
2. Park car away from the office
3. Take the stairs rather than the elevator
4. Gardening /Household chores
5. Play games with children
6. Dancing

2. 'Heart Friendly' Diet

Over 40 years of age, it is advisable to take a prudent diet though the earlier it is adopted the better it is. Important measures for a prudent diet are – reduce saturated fat in diet to < 2%, increase amount of monosaturated and polysaturated fatty acids, use of whole meal flour, avoidance of fast foods, plenty of fruits and vegetables and supplementation with marine products if possible. Increased intake of fruits and vegetables lowers blood pressure independent of weight loss, reduces blood cholesterol levels and also loss of weight. The DASH diet is similar to the and also helps to reduce the blood pressure⁸.

The American Heart Association recommends two types of diets in CAD—Step I diet and Step II diet (Table 5) for various degrees of hyper-cholesterolemia⁹.

Table 5: Dietary approach to treatment of hyperlipidemia

	Step I	StepII
• Total fat	< 30%	< 30%
• Saturated fats	< 10%	< 7%
• Polyunsaturated/ monounsaturated fatty acids	1:2	1:2
• Cholesterol (mgm/d)	< 300	< 200
• Carbohydrates	65%	65%
• Fiber (gm/d)	10-25	10-25

3. Control of Risk Factors

It is important to control the risk factors for prevention of atherosclerotic complications. The value of stoppage of smoking is well established. Though hypertension is a greater risk factor for stroke, control of hypertension is also beneficial in preventing coronary events. Control of hypertension reduces the coronary events by approximately 20%^{10,11}. The HOT trial has shown that the optimal level of diastolic blood pressure is between 82-85 mm of Hg¹².

If diabetes mellitus is present, strict control of the blood sugar levels should be maintained and the HbA_{1C} should be kept < 7%.

In dyslipidemia, appropriate measures should be instituted. The ATP III guidelines based on low density cholesterol levels (LDLc) are shown in Table 6⁹. In cases with manifest CAD or coronary equivalents the recommended target for LDLs is <100 mgm/dl. Recently in the revised ATP III guidelines, in very high risk patients it is recommended that LDLs should be targeted to < 70 mgm/dl¹³. The initial drug of choice for dyslipidemia is a statin. It is important to prescribe them in appropriate dose and know the equivalent dosages of the various statins (Table 7)¹⁴.

Lipoprotein (a) is an important risk factors in Indians.² The level of Lp(a) is genetically determined. There is as yet no satisfactory treatment for raised Lp(a) levels. Therefore, in these the primary target is the LDLs level.

Some of the risk factors for CAD that are under active investigation are homocystinemia, fibrinogen levels, the 'Infective' hypothesis of atherosclerosis and others. Homocystinemia as a risk factor in Indians is not established and routine screening for it is not yet recommended^{15,16}. The value of antioxidants in CAD is also not yet proven¹⁷. In a recent trial, oral hormone replacement in postmenopausal women has not been shown to be beneficial and on the contrary deleterious¹⁸.

Table 6: LDL cholesterol goals and cutpoints for therapeutic lifestyle changes (TLC) and drug therapy in different risk categories

Risk category	LDL goal	LDL level at which to initiate therapeutic lifestyle changes (TLC)	LDL level at which to consider drug therapy
CHD or CHD risk equivalents (10-year risk > 20%)	< 100 mg/dL	≥ 100 mg/dL	≥ 30 mg/dL (100-129 mg/dL: drug optional)*
2+ Risk factors (10-year risk ≤ 20%)	< 130 mg/dL	≥ 130 mg/dL	10 year risk 10-20%: ≥ 130 mg/dL 10 year risk < 10 % ≥ 160 mg/dL
0-1 Risk factor**	< 160 mg/dL	≥ 160 mg/dL	≥ 190 mg/dL (160-189 mg/dL: LDL-lowering drug optional)

*Some authorities recommend use of LDL lowering drugs in this category if an LDL cholesterol < 100 mg/dL cannot be achieved by therapeutic lifestyle changes. Others prefer use of drugs that primarily modify triglycerides and HDL e.g., nicotinic acid or fibrate. Clinical judgement also may call for deferring drug therapy in this subcategory.

**Almost all people with 0-1 risk factor have a 10-year risk < 10%, thus 10-year risk assessment in people with 0-1 risk factor is not necessary.

Table 7: Equivalent doses of statins (mgm)

Atorvastatin	5
Simvastatin	10
Lovastatin	20
Pravastatin	20
Fluvastatin	40

4. Others measures

Amongst the other measures that are useful in prevention of CAD is use of ace inhibitors in high risk individuals¹⁹. The beneficial effect of ace inhibitors in these is independent of its blood pressure lowering effect and is due to the so called pleiotropic effects of ace inhibitors.

Considering the high mortality due to CAD and the overwhelming beneficial effects of ace inhibitors and statins it has been proposed to combine these and aspirin in a “polypill” for convenience of the patients. The polypill will be available over the counter and can be obtained without a prescription of a doctor. This has however, not been acceptable to all and the issue is still heavily debated.

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