

# Primary Prevention of Coronary Heart Disease

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## Introduction

The rise and fall in the CAD mortality in the western world in the latter half of the 20th century, correlates directly with changes in lifestyle in the society rather than changes in the genetic pool. In India, a similar life style transformation with enormous significance is taking place; the middle class is undergoing tremendous changes in lifestyle and socioeconomic factors such as acquiring cars and consuming increasing amounts of alcohol and tobacco. Eating patterns are also changing rapidly with greater use of fast foods, meats and fats. These changes are leading to sedentary habits and increased consumption of unhealthy foods. An epidemic of CAD is already underway in India because of these factors. There is also an age related increase in CAD in India. The onset of CAD in younger aged individuals is a cause of concern. Genetic factors that are modified by environment could be important.

## Primary Prevention

The World Health Organization (WHO) has defined primary prevention of coronary heart disease (CHD) as prevention of the first events of these diseases beginning early in childhood and continuing through out childhood, youth and adult life.

What is primary prevention?

- Educating people about risk factors and lifestyle changes to reduce risk.
- Identifying and altering risk factors to prevent the onset of cardiovascular diseases leading to heart attack or stroke.

## AHA Recommendation

The decline in death rates from cardiovascular disease is probably largely due to the public adopting a healthy life style. This

underscores why it's important for the medical profession to advocate prevention strategies.

## Primordial Prevention

Primordial prevention is defined as prevention of risk factors themselves beginning with the social and environmental conditions in which the major risk factors are observed to develop, and continuing for high risk children, adolescents and young adults.

## Cardiovascular risk factors

The 27th Bethesda Conference on Matching the Intensity of Risk Factor Management with the hazards for Coronary Disease Events is a landmark document that offers clear guidelines for management of risk factors.

## CARDIOVASCULAR RISK FACTORS BASED ON PRIORITY FOR INTERVENTION

**Class 1** : Factors for which interventions have proved to lower coronary artery disease risk.

- Cigarette smoking
- High LDL cholesterol
- High fat/cholesterol diet
- Hypertension
- Left Ventricular Hypertrophy
- Thrombogenic factors

**Class 2** : Factors for which interventions are likely to lower coronary artery disease risk.

- Diabetes Mellitus
- Physical inactivity
- Low LDL cholesterol
- High triglycerides; small dense LDL
- Obesity
- Postmenopausal status (women)

**Class 3** : Factors that if modified might lower coronary artery disease risk

- Psychosocial factors

- Lipoprotein (a)
- Homocysteine
- Oxidative stress
- No alcohol consumption

**Class 4** : Factors that cannot be modified or for which modification would be used would be unlikely to lower coronary artery disease risk.

- Age
- Male Gender
- Low socioeconomic status
- Family history of early onset CVD

## Guide to Primary Prevention of Heart Diseases

### Diet

The results of 50 years of intensive research support the conclusion that diet is the major environmental cause of atherosclerosis and cardiovascular diseases. A high caloric density of diet due to high fat content combined with limited physical activity contributes to obesity, insulin resistance and dislipidemia. All these abnormalities increase the risk of CAD. Salt intake in susceptible persons is associated with elevated blood pressure, the foremost risk factor for stroke.

### Cholesterol Management

#### PRIMARY GOAL -

LDL cholesterol less than 160 mg/dl if there is no more than 1 risk factor or LDL less than 130 mg/dl, if there are 2 or more risk factors.

#### SECONDARY GOAL -

HDL cholesterol greater than 35 mg/dl.  
Triglycerides less than 200 mg/dl.

#### RECOMMENDATION -

The American Heart Association Step I Diet - no more than 30% of calories as fat, 7-10% of calories as saturated fat and less than 300 mg of dietary cholesterol per day.

If LDL cholesterol is 160 mg/dl or greater with no more than one risk factor or is 130 mg/dl

or greater on 2 occasions with two or more risk factors, then AHA Step II Diet - less than 30% of calories as fat, no more than 7% of calories as saturated fat and less than 200 mgs per day of dietary cholesterol- as well as weight control. The secondary causes of high LDL cholesterol (liver function tests, thyroid function tests, uric acid) should be ruled out.

If LDL cholesterol is 160mg/dl or greater with 2v risk factors, or 190 mg/dl or greater, or 220 mg/dl or greater in men under age 35 or in premenopausal women, then drug therapy can be added on to the Step II Diet.

### Smoking

GOAL-Complete cessation

#### RECOMMENDATIONS

- Ask about smoking status as part of routine evaluation. Reinforce nonsmoking status.
- Strongly encourage patient and family to stop smoking.
- Provide counseling, nicotine replacement and formal cessation programs as appropriate.

### Blood Pressure Control

GOAL- less than 140/90 mm of Hg in people with diabetes, heart failure or renal insufficiency.

#### RECOMMENDATIONS

- Measure blood pressure in all adults every 2-2 1/2 years.
- Promote lifestyle modification: weight control, physical activity, moderation in alcohol intake, moderate sodium restriction.
- If blood pressure is greater than 140/90 mm Hg: Add blood pressure medication to patient's other requirements and characteristics.

### Physical Activity

GOAL - Increase amount; exercise regularly; 3 to 4 times per week for 30-60 minutes

## RECOMMENDATIONS

- Ask about physical activity status and exercise habits as part of routine evaluation.
- Encourage at least 30-60 minutes of vigorous, dynamic exercise 3 or 4 times per week as well as increased physical activity in daily life habits for persons who are inactive.
- Encourage regular exercise to improve conditioning and optimize fitness levels.
- Advice medically supervised programs for those with low functional capacity and health problems.
- Promote environmental factors conducive to health.

### Weight Management

GOAL - Achieve and maintain desirable weight (body mass index 18.5-24.9 kg/m<sup>2</sup>)

#### Recommendations :

- Measure patients' weight and height, body mass index (BMI), and waist circumference at each visit as part of routine evaluation.
- Start weight management and physical activity as appropriate. Desirable BMI range : 18.5-24.9 kg/m<sup>2</sup>. People with a BMI of 25-29.9 are considered overweight, while people with a BMI of 30.0 or higher are considered obese; desirable waist circumference 88 cm (35 inches) or less for women, 102 cm (40 inches) or less for men.

### Trials on Primary Prevention :

Two important large primary trials that have been done are the following :

**4S. The Scandinavian Simvastatin Survival Study (4S)** examined whether cholesterol reduction with simvastatin in persons with CHD and elevated cholesterol would reduce total mortality. A total of 4,444 patients with angina or prior MI whose total cholesterol level was between 212 and 310 mg/dL were randomized to simvastatin

or placebo. The simvastatin dose was initially 20 mg/day and was titrated to 40 mg/day in an attempt to reduce the total cholesterol level to less than 200 mg/dL. Patients were followed for a mean of 5.4 years. There were 111 deaths in the simvastatin group and 189 in the placebo group, resulting in a highly significant 30% relative reduction in total mortality ( $p < .0001$ ). The relative risk of a major coronary event was reduced by 34% ( $p < .00001$ ). Revascularization procedures, such as coronary bypass surgery and percutaneous transluminal coronary angioplasty, were also significantly decreased by 37%. An economic analysis based on the 4S data concluded that in the United States, the reduction in hospital costs alone as a result of simvastatin treatment would offset the entire cost of the medication. An interesting finding was that it was not only patients with the highest cholesterol levels who benefitted from treatment; the quartile with the lowest low-density lipoprotein (LDL) cholesterol levels at baseline had proportionately as much benefit from treatment as the highest quartile.

**WOSCOPS.** The first was the landmark WOSCOPS. This study included 6,595 healthy Scottish men from 45 to 64 years of age with a fasting total cholesterol level greater than 252 mg/dL and an LDL cholesterol level ranging from 174 to 232 mg/dL. Although none of the study participants had documented CHD, 5% had a positive Rose questionnaire indicative of probable angina. Patients were randomized to pravastatin, 40 mg/day, or placebo, and followed for a mean of 5 years. The primary end point of the study was nonfatal MI or CHD death.

There were 248 (7.9%) definite events in the placebo group and 174 (5.5%) definite events in the pravastatin group, resulting in a 31% reduction in the relative risk of nonfatal (first) MI (Figure 2) or CHD death ( $p < .001$ ) in the pravastatin group. In addition, there was a significant 32% reduction in cardiovascular mortality ( $p < .033$ ) and a 37%

reduction in revascularization procedures ( $p < .009$ ). There was no significant difference in non cardiovascular mortality, indicating that cholesterol reduction with pravastatin did not increase the risk of death from other causes. In fact, the relative risk of death from any cause was reduced by 22% in the pravastatin group over the entire duration of the trial. This study clearly established the benefit of cholesterol-lowering treatment, even in persons without prior evidence of CHD. A pharmaco-economic analysis suggested that treatment can be highly cost-effective, especially if it is targeted to individuals at the highest risk of acute coronary events.

### **Coronary Risk Factors Greater in Urban Indians**

Sedentary lifestyle

Hypertension

Body-mass index, obesity

Waist:hip ratio, truncal obesity

Total and LDL cholesterol, hypercholesterolaemia

Triglycerides levels

Fasting insulin levels, insulin resistance

### **Conclusions**

In summary, coronary heart disease in India can be prevented by controlling intake of tobacco, salt, saturated fats, and calories; by increasing both work-related and leisure-time physical activity; increasing consumption of heart healthy foods such as fruits and vegetables, high fiber cereals, oils containing balanced amounts of polyunsaturated and monounsaturated fats (e.g., canola (genetically engineered mustard-rapeseed) oil, soyabean oil), and spices and cereals with high flavonoid content. Stress management techniques especially yoga may be important. Reverting to traditional Indian social lifestyles (joint families, small families, and good education) is also important.

Before embarking on an ambitious prevention program it is essential to realize the problems in its implementation. Barriers to a national

cardiovascular disease prevention policy are : competing priorities with infectious diseases, lure of technology-based interventions in cardiology which relegate preventive cardiology to the periphery, inadequate CHD epidemiological data in the form of cohort studies, poor presentation of message to policy-makers and the media who do not realize that CHD is preventable, discordant messages released by various vested interests, failure to recognize the importance of prevention and its cost-effectiveness, lack of peer recognition for prevention efforts, economic and social constraints, vested interests of food-groups and tobacco companies, and lack of community mobilisation. The need to contain the epidemic as well as combat its impact and minimize the cardiovascular diseases toll in Indians is obvious and urgent. National strategies to meet this objective must be developed and effectively implemented. Regional and global initiatives by international agencies concerned with health care are required. Physicians have key roles in this regard. This group of health care workers can interact with other community sectors and spread the message of prevention at various levels (Table 4). However, as always, the need for prevention should come from within the population. A large number of social issues that are determinants of health behavior must be considered. These are high levels of illiteracy, nuclear family structure, breakdown of traditional family system, improper peer influence and guidance, caste system, social hierarchy, lack of media awareness, and unwillingness to change. Increasing levels of affluence and acculturation leads to greater recognition that preventive measures of chronic diseases are useful and cost-effective.