



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

# IJDR

**International Journal of  
DEVELOPMENT RESEARCH**

*International Journal of Development Research*  
Vol. 5, Issue, 11, pp. 5978-5986, November, 2015

## Full Length Research Article

### CORONARY ARTERY DISEASE: A LIFESTYLE DISORDER TURNING THE LEAD KILLER

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#### ARTICLE INFO

##### Article History:

Received 17<sup>th</sup> August, 2015

Received in revised form

26<sup>th</sup> September, 2015

Accepted 13<sup>th</sup> October, 2015

Published online 30<sup>th</sup> November, 2015

##### Key Words:

Heart diseases, CVD,  
Diet, Prevalence,  
Lifestyle, Death, Obesity,  
Smoking, Kashmir.

#### ABSTRACT

Coronary artery disease is narrowing or blockage of the arteries and vessels that provide oxygen and nutrition to the heart. It is caused by atherosclerosis, an accumulation of fatty materials on the inner lining of the arteries. The resulting blockage restricts blood flow to the heart. When the blood flow is completely cut off, the result is heart attack. CVDs are the number one cause of death globally: more people die annually from CVDs than from any other cause. Worldwide, there are approximately 17 million deaths annually from CVD, 7.2 million due to ischemic heart disease, 5.5 million due to cerebrovascular disease, and 4.0 million due to hypertensive and other cardiac conditions. In addition there are at least 20 million annual survivors of heart attack and strokes. App. 80% of the worldwide CVD mortality occurs in developing countries. By 2020, about 2.6 million Indians are predicted to die due to coronary artery disease. Kashmir's picture is no different from other states of India. A study conducted on prevalence of CAD in Kashmir revealed that overall rural and urban prevalence was 6.80% and 8.37% respectively. It was high in males; 7.88% and slightly lower in females 6.63%. Various researches have explained that low levels of biological risk factors and persons who adhere to healthy lifestyle and diet are at low risk for CHD. It is confirmed that mortality caused by CHD is largely determined by diet and smoking. Further research is needed in this area: Large scale prospective cohort studies, controlled intervention trials need to be carried out to further find out the causal relationship between diet, lifestyle and the occurrence of CAD. There is a need to test combined effect of the most effective dietary and lifestyle intervention in primary and secondary prevention and to monitor their effect on health in general order to trace possible unforeseen negative consequences. Here we review some of the important works done in CAD. Food consumption patterns of various regions should be studied to analyze the risk. Detailed research is needed to know the exact components of diet causing the disease.

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#### INTRODUCTION

Coronary artery disease is narrowing or blockage of the arteries and vessels that provide oxygen and nutrition to the heart. It is caused by atherosclerosis, an accumulation of fatty materials on the inner lining of the arteries. The resulting blockage restricts blood flow to the heart (Krauss, 2003). When the blood flow is completely cut off, the result is heart attack. CVDs are the number one cause of death globally: more people die annually from CVDs than from any other cause (WHO, 2013). An estimated 17.3 million people died from CVDs in 2008, representing 30% of all global deaths, of these deaths an estimated 7.3 million were due to CHD and

stroke CHD is the most common cause of death in UK also. There are 80,000 deaths from CHD in UK each year. According to Clark, (2006) worldwide, there are approximately 17 million deaths annually from CVD, 7.2 million due to ischemic heart disease, 5.5 million due to cerebrovascular disease, and 4.0 million due to hypertensive and other cardiac conditions. In addition there are at least 20 million annual survivors of heart attack and strokes. App. 80% of the worldwide CVD mortality occurs in developing countries. E.D Janus *et al.*, (1996) reported that Indians as a community, are prone to develop CAD at a much younger age. By 2020, about 2.6 million Indians are predicted to die due to coronary artery disease. (WHO 2002) Gupta, (2005) reported that while mortality from CVD is projected to decline in developing from 1970 to 2015, it is poised to almost double in the developing countries.

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He has revealed that the prevalence of CAD in India is increasing exponentially. In urban India populations, the prevalence increased from 1.1.7. (Agra, 1962) & 1.0% Delhi (1962) to 6.6% (Chandigarh, 1968). In recent years, a consistently high prevalence has been reported from Delhi (9.7% 1990) Jaipur (7.8% 1995) Chennai (9.0%, 2001) and Jaipur (8.1% 2002). In rural population, the prevalence has increased from 2.1% (Haryana 1974) and 1.7% (Viadorbha, 1988) to 2.7% (Haryana 1989), 3.10% (Punjab, 1994), 3.5% (Rajasthan, 1994) and 5.0% (Himachal, 2002) Rural, Urban comparison shows that while prevalence has increased 2-fold in rural areas (from 2% in 1970's to 4.1 in the 1990's).

The prevalence in urban area has increased nine fold (1%) in the early (1960's or 9.1 in the mid 1990's) fasting glucose and a high WHR smoking has been identified as most important (Patil 2004). Cigarette or Bidi smoking, BMI > 25 kg/m, WHR, and a history of hypertension, high cholesterol and diabetes were important risk factors among the young survivors of M.I. Rastogi *et al.* (2004) Overall prevalence of CHD in the Kashmiri population studied by all diagnostic measures was 7.154%. The overall rural prevalence was 6.80% and urban prevalence was 8.37%. Kashmiri population although being ethnically distinct. Also have a high predisposition to premature CAD; this population is poorly investigated for the genetic factors conferring the high susceptibility. Prevalence of CHD was high in males; 7.88% and slightly lower in females 6.63 % (Kamili *et al.* 2008), Fischer *et al* (2005) conducted a study on various CAD risk factors like family history, smoking, hypertension and biochemical parameter like plasma lipid estimation was also carried out.

A small proportion (8%) of CAD cases, falling in the age group of 30-45 yr had positive familial history of coronary artery disease, conforming to the genetic element of the disease, as was found in previous studies. Tanzeela *et al* (2012) in her study also reported that smoking was significantly associated with the development of CAD. Of total, 70% were current chain smokers and the rest were former smokers. About 48.5% CAD patients were hypertensive (with men twice as compared to women) and was significantly associated with CAD ( $p < 0.005$ ). The systolic and diastolic blood pressure of cases and controls varied insignificantly. Each lipid parameter was an independent risk factor for CAD and comparison between cases and controls revealed significant ( $p < 0.005$ ) association with CAD. Abnormal levels of plasma lipids characterize the patients with CAD. With all four lipid components varying significantly among the two groups of cases and controls, representing an additional risk to these patients.

During the last 50 years the relationship of diet to the development of CHD has been investigated in a number of population studies. The seven country study was the first showing strong relationship between eating habits of contrasting population and their long term incidence and mortality from CHD. Diet and nutrition have been extensively investigated as risk factor for major CVDs like CAD and stroke and are also linked to CVD risk factor like diabetes, high blood pressure and obesity. The seven major risk factors identified by the Framingham heart study are age, sex, and

blood pressure, total and high density lipoprotein cholesterol, smoking, glucose intolerance, and left-ventricular hypertrophy. Currently there is a great interest in the role of individual food and food pattern beyond that of nutrients (Huijbregtsp.) dietary factors, smoking and alcohol and physical activity are important determinates of the individual risk for CHD (Manson 1999). Joshipura *et al.*, (2009) evaluated the impact of fruit and vegetable intake in 84,251 women and 42,148 men participating in either the Nurses' Health Study or the Health Professionals Follow-up study and of whom were followed for eight consecutive years.

Diet was assessed using food frequency questionnaires. Individuals were divided into quintiles of fruit and vegetable intake. Compared with individuals in the lowest quintile of fruit and vegetable intake, individuals with the highest quintile of fruit and vegetable intake had a relative risk for coronary heart disease of 0.80. In addition, as servings of fruit and vegetables increased by one serving per day, coronary heart disease risk decreased by 4%. Dietary cholesterol raises total blood cholesterol and LDL cholesterol response for changes in saturated fats. (Achu *et al.*, 2007) and that there is an inverse association between whole grain intake and metabolic syndrome, (Rahyon *et al.*, 2006). INTERHEART study identified nine well-known coronary risk factors-abnormal lipids, smoking, hypertension, diabetes, a high WHR, psychosocial factors, low fruit and vegetables consumption, low alcohol consumption and lack of physical activity according to the National Heart, Lung and Blood Institute (NHLBI), citing data from 2002, "The relationship between BP and risk of cardiovascular disease (CVD) events is continuous, consistent, and independent of other risk factors. Liu *et al.* (2007) reported that there is indeed other plant foods, particularly, vitamins, phytoestrogens, phenols, omega-3 fatty acids, resistant starch, and minerals.

Another issue surrounding intake of whole grains is the potential inverse relationship with consumption of sugars and starches with a high glycemic effect, which may have adverse effect on cardiovascular risk. Lichtenstein *et al.* (2006) reported that exercise can help control lipid abnormalities, diabetes and obesity. HSFC (2009) reported that a reduction in total fat will not lower plasma cholesterol or lipoprotein levels and does not have a beneficial effect on CHD or CHD risk factors, independent of its effect on lowering SFA. Internationally, emphasis has shifted away from total fat intake towards SFA classes. Relationship between dietary fat and cardiovascular disease concluded that emphasis should be placed on reducing the consumption of SFA and TFA rather than total fat. Wilcox *et al.* (2008) evaluated interventions to reduce cardiovascular disease risk in women; dietary interventions had a small, but significant, effect on weight reduction and total serum cholesterol levels. The effect was more likely to be significant in studies of women over 50 years of age and those with less than six months follow-up. Strong hearty study (2007) states that trans fatty acids increase LDL and reduce HDL and are more atherogenic and hence increase CVD risk more than 4-5 times of SFAS as shown in a meta-analysis of 4 large prospective studies. (Lichtenstein 1997). TFA also increase the levels of LP (a) TG'S. Concerns have been raised that the consumption of TFA'S might have contribution to the 20<sup>th</sup> country epidemic of CHD.

Lichtenstein (2006) exercise can help control lipid aspects of a healthful diet based on the USDA's 1992 Food Guide Pyramid abnormalities, diabetes and obesity. Lewis (1987) in the study has found that the levels of total LDL cholesterol in people with heterozygous familial hyper-cholesterolemia in China are lower than people with same conditions in affluent western countries. Diets high in monounsaturated fatty acids such as olive oil, peanut oil, or peanuts and peanut butter helped lower total cholesterol and LDL cholesterol, Ignarro *et al.*, (2006) studied the impact of physical activity on cardiovascular health.

Three studies examined showed a reduced rate of coronary heart disease in physically active people. Physical activity is important for overall general health in individuals with and without cardiovascular disease. Limited research exists on the impact that physical activity has a positive effect on cardiovascular health in children. Singh (2005) studied that United States of America, in 1997, the atherosclerotic CAD accounting CAD declined 24.9%. France and Mediterranean regions appear to have a lower incidence of CAD. This phenomenon partly explained by greater use of alcohol, with its possible HDL raising benefit, and the Mediterranean due to consumption of Mediterranean diet, which is less atherogenic. Frank B Hu (2003) stated that Evidence from prospective cohort studies indicates that a high consumption of plant-based foods such as fruit and vegetables, nuts, and whole grains is associated with a significantly lower risk of coronary artery disease and stroke. The protective effects of these foods are probably mediated through multiple beneficial nutrients contained in these foods, including mono- and polyunsaturated fatty acids, n-3 fatty acids, antioxidant vitamins, minerals, phytochemical, fiber, and plant protection. In contrast to the traditional analytic approach used in nutritional epidemiology, which focuses on individual nutrients or foods, dietary pattern analysis considers overall diet. This approach more closely approximates the real world, where people eat meals consisting of a variety of foods instead of isolated nutrients. Thus, it can take into account complicated interactions among nutrients and non-nutrient substances in studies of free-living people. Although numerous studies have examined the relation between intake of individual nutrients or foods and risk of CAD, few data are available on the effects of overall dietary patterns. Frank B Hu (2003) explored an expansion of epidemiologic and clinical research on the role of plant-based foods and eating patterns in the prevention of CVD.

This research has revolutionized our thinking about heart-healthy foods and the biological mechanisms linking dietary factors and CVD. Some foods once deemed to be unhealthy simply because of their fat content (e.g., nuts) have become important parts of diets designed to lower blood pressure and serum cholesterol, to control weight, and to achieve secondary prevention of CAD, besides adding flavor, variety, and texture to dishes. Errikila (2002) examines the relationship between diet and disease risk. Dietary pattern analysis is one of these approaches. It will certainly not replace nutrient or food analysis, but instead serves as a complementary approach to more traditional analysis. Evidence is enhanced when the results from multiple lines of research (i.e. biomarkers of nutrient intake, nutrients, foods, and dietary patterns) are consistent. Clearly, further research is needed to evaluate the

validity of dietary patterns and whether they predict long-term disease risk in diverse populations. The dietary pattern approach would not be optimal if the effect is caused by a specific nutrient (e.g. folic acid and neural tube defect), because the effect of the nutrient would be diluted. High fiber diets, low fat diets and exercise significantly reduced the serum Level of LDL cholesterol for both males and females, (Anderson *et al.*, 2001). The history of studying the CHD and its risk factors dates back to 1916, when a Dutch physician De Langen in his article "cholesterol metabolism and racial pathology" found that cholesterol levels of Dutch immigrants were approximately twice as high as those of native javanese. He hypothesized that these differences were due to difference in diet and elevated levels of cholesterol which was linked with metabolic diseases such as atherosclerosis, diabetes, obesity and nephritis, (De langen1916).

Ancel keys and Salim Yusuf's landmark studies across many cultures and ethnic groups confirmed the universality of the major CVD risk factors. Both scientists overcame significant obstacles to accomplish objectives they believed in passionately. Their results advanced our understanding of the complex interaction between life style and heart diseases. Keys carried out the first international study of the cardiac risk factors, he extended basic research in lipid nutrition to large scale field studies that corroborated the relationship between lipid intake, cholesterol levels and heart disease. Yusuf used the case control field study method on a global scale and demonstrated the same risk factors at work around the world in different ethnic groups. His use of population attributable risk showed the interventions to lower risk could prevent 90% or more of heart attacks. As we try to intervene to reduce the worldwide epidemic of CVD. The work of these two scientific pioneers give hope that prevention is a realistic and achievable goal. Various prospective cross cultural, cohort and intervention studies have been carried out from time to time. Following are a few famous and successful studies:

#### 1948: Framingham Heart Study

Dr. Joseph Mountain, Dr Thomas Dawber, Dr William Kannel, and Dr William Castelli have been studying the population of Framingham, Massachusetts to determine the prevalence and incidence of CVD and factors related to its development. This is the largest epidemiological study of CVD in the world. Initial study participants (n=5209) were healthy adults between 30 and 62 years of age. The study continues today, looking at the children and grandchildren of the cohort. Through this cohort study, the concept of risk factors and prevention was born. Modifiable risk factors not only prevent disease in healthy adults but also contribute to the disease process in those who have atherosclerotic disease.

#### Milestones of the Study:

- 1960: Cigarette smoking found to increase the risk of heart disease.
- 1961: Cholesterol level, blood pressure and electrocardiogram abnormalities found to increase the risk of heart disease, and obesity found to increase the risk of heart disease.
- 1967: High B.P found to increase the risk of stroke
- 1976: Menopause found to increase the risk of heart diseases.

- 1978: Psychosocial factors found to increase the risk of heart disease.
- 1988: High levels of Hdl cholesterol found to reduce the risk of heart disease.
- 1994: Enlarged left ventricle found to increase the risk of stroke
- 1996: Progression from hypertension to heart failure described.
- 2006: Genetic research study begins to identify genes underlying CVD in 9000 participants from three generations.
- 2008: Discovery and publication of four risk factors that raise probability of developing precursor of heart failure, new 30 year risk estimates developed for serious cardiac events
- 2009: Research finds parental dementia may be linked to poor memory in middle aged adults.

In 1971, the Off-Spring study was begun to measure the influence of heredity and environment on the offspring of the original cohort. The younger appears to be more health conscious because they have lower rates of smoking, lower blood pressures and lower cholesterol levels than their parents at the same age. The generation III cohort study of the grandchildren is presently underway.

### 1958: Classic Seven Countries Study

The Seven Countries Study was first to examine systematically the relation among diet, lifestyle, risk factors and rates of coronary heart disease and stroke in populations contrasting in diet, especially dietary fat. The idea arose in the minds of investigators who integrated clinical, laboratory, and early population evidence into questions about the cultural origins and possible prevention of mass cardiovascular diseases.

## MATERIALS AND METHODS

Ansel Keys gave the study its scope, design, and direction and coordinated the program from Minnesota, with field surveys beginning in 1957 in the U.S., Italy, Greece, Yugoslavia, the Netherlands, Finland, and Japan. Repeat surveys for characteristics and morbidity were made at 5 and 10-year anniversaries and follow-up of mortality is complete for 45 years, with excellent response rates throughout. Standardized methods were developed for measurements and diagnoses; teams were centrally trained, and data were blinded and centrally analysed. The populations were predominantly rural and engaged in traditional agricultural (or fishing, logging) pursuits. Due to the rarity worldwide of CVD among women in the 1950s, the study was confined to men ages 40-59. The study has been extended to include elderly cohorts in Finland, the Netherlands, and Italy, and enhanced by new dietary surveys and analyses. Multivariate analyses of single and combined measurements are now mainly by Cox hazard ratio analysis.

## RESULTS

The Seven Countries Study provided evidence confirming the original hypotheses, that elevated mean blood cholesterol levels and intake of saturated fatty acids is a major and

apparently necessary factor in the population burden of atherosclerotic diseases. Populations with saturated acid intake less than 10 percent of daily energy have little coronary heart disease or thrombotic stroke despite widely varying total fat intake or usual levels of blood pressure or high rates of tobacco use. Multivariate analysis of population rates and risk factors reveal that diet and smoking "explain" most of the differences in population rates and that the "standard" CVD risk factors operate universally within populations.

## Discussion /Conclusions

The main implications of the Seven Countries Study are that the mass burden and epidemic of atherosclerotic diseases has cultural origins, is preventable, can change rapidly, and is strongly influenced by the fatty composition of the habitual diet. The study implies the universal susceptibility of humans to CVD but that the frequency of susceptible phenotypes is greatly reduced in favourable environments. It suggests there may be other and important protective elements in the diet and lifestyles of Crete and Japan.

### 2000: Monica-(Multinational Monitoring of Trends and determinants in Cardiovascular Disease)

Multinational Monitoring of Trends and Determinants in Cardiovascular Disease, known as the WHO MONICA Project, aimed to study trends in coronary heart disease events, coronary care, stroke, and risk factors in multiple defined geographical populations, contemporaneously across the world. MONICA began in 1979 and enrolled investigators from 26 countries, of which 21 completed the full study. MONICA took place mainly in Europe, but included centers in the US, Canada, China and Australasia. The task was enormous - collection of ten years of standardized data in areas of varying resources and disease patterns. That MONICA succeeded in collecting quality data is a tribute to the sponsors and investigators. The methods are still used and applicable today and many of the centers continue this work, confirming MONICA's importance.

### 1982: MRIFT (The Multiple Risk Factor Intervention Trial)

A randomized primary prevention trial to test the effect of a multifactor intervention program on mortality from coronary heart disease (CHD) in 12,866 high-risk men aged 35 to 57 years. Men were randomly assigned either to a special intervention (SI) program consisting of stepped-care treatment for hypertension, counseling for cigarette smoking, and dietary advice for lowering blood cholesterol levels, or to their usual sources of health care in the community (UC). Over an average follow-up period of seven years, risk factor levels declined in both groups, but to a greater degree for the SI men. Mortality from CHD was 17.9 deaths per 1,000 in the SI group and 19.3 per 1,000 in the UC group, a statistically non-significant difference of 7.1% (90% confidence interval, -15% to 25). Total mortality rates were 41.2 per 1,000 (SI) and 40.4 per 1,000 (UC).

### 1967: CHA (Chicago Heart Association)

This project began in 1967 with a screen of 40,000 employees from 100 Chicago firms, about a 55 percent response.

It began with a cross-sectional analysis of risk variables and has published 25-year follow-up data of 8,816 middle-aged men and other subgroup analyses. The data have been extensively mined for particular issues of predictability of blood pressure and pulse pressure, for identification of low-risk groups within a U.S. population, for smoking relations at different other risk factor levels, for risk factors for peripheral arterial disease and "distant" mortality and health costs, and for relations of disease and mortality to race and glucose intolerance, resting heart rate, and gender.

#### **1976: Us Nurses Health Study**

Examined the incidence of coronary heart disease in relation to cigarette smoking in a cohort of 119,404 female nurses who were 30 to 55 years of age in 1976 and were free of diagnosed coronary disease. During six years of follow-up, 65 of the women died of fatal coronary heart disease and 242 had a nonfatal myocardial infarction. The number of cigarettes smoked per day was positively associated with the risk of fatal coronary heart disease (relative risk = 5.5 for  $\geq 25$  cigarettes per day), nonfatal myocardial infarction (relative risk = 5.8), and angina pectoris (relative risk = 2.6). Even smoking 1 to 4 or 5 to 14 cigarettes per day was associated with a twofold to threefold increase in the risk of fatal coronary heart disease or nonfatal infarction. Overall, cigarette smoking accounted for approximately half these events. The attributable (absolute excess) risk of coronary heart disease due to current smoking was highest among women who were already at increased risk because of older age, a parental history of myocardial infarction, a higher relative weight, hypertension, hypercholesterolemia, or diabetes. In contrast, former smokers had little, if any, increase in risk. These prospective data emphasize the importance of cigarette smoking as a determinant of coronary heart disease in women, as well as the markedly increased hazards associated with this habit in combination with other risk factors for this disease. (N Engl J Med 1987; 317:1303-9.)

#### **1980: Oslo trail**

The study deals with 412 men, aged 30 to 64 years, randomized 1 to 2 years after a first myocardial infarction. For the experimental group a diet low in saturated fats and cholesterol, and high in polyunsaturated fats was recommended. After 5 years, as reported previously, the incidence of fatal and nonfatal myocardial reinfarction was found to be significantly reduced. "Sudden death" was uninfluenced. Major coronary heart disease (CHD) relapses, including fatal and nonfatal events (MI), were significantly reduced ( $P = 0.05$ ). After 11 years, death from all causes had occurred in 101 of the original dieters and 108 controls.

A significantly reduced myocardial infarction mortality in the original diet group was found (32 versus 57,  $P = 0.004$ ). The total number of coronary deaths (fatal myocardial infarction and sudden death) was 79 in the diet group and 94 in the control group ( $P = 0.097$ ). The CHD mortality was correlated with age, serum cholesterol level, blood pressure, body weight, smoking habits, and a combination of these risk factors.

#### **1995-1996: WOSCOPS (West of Scotland coronary prevention study)**

The average serum at entry into the trial was 7mmol/l. In this trial pravastatin was used to lower serum cholesterol. Reduction of the average serum cholesterol level in that trial by 20% to 5.6mmol/l was associated with 31% reduction in coronary events. Therefore it can be assumed that a healthy diet, anti-smoking advice, and use of a statin there would be a substantial reduction in major coronary events.

#### **1989: DART- (The Diet and Reinfarction Trail)**

A randomized controlled trial with a factorial design was done to examine the effects of dietary intervention in the secondary prevention of myocardial infarction (MI). 2033 men who had recovered from MI were allocated to receive or not to receive advice on each of three dietary factors: a reduction in fat intake and an increase in the ratio of polyunsaturated to saturated fat, an increase in fatty fish intake, and an increase in cereal fiber intake. The advice on fat was not associated with any difference in mortality, perhaps because it produced only a small reduction (3-4%) in serum cholesterol. The subjects advised to eat fatty fish had a 29% reduction in 2 year all-cause mortality compared with those not so advised. This effect, which was significant, was not altered by adjusting for ten potential confounding factors. Subjects given fibre advice had a slightly higher mortality than other subjects (not significant). The 2 year incidence of reinfarction plus death from ischemic heart disease was not significantly affected by any of the dietary regimens. A modest intake of fatty fish (two or three portions per week) may reduce mortality in men who have recovered from MI.

#### **1990: Diet heart study**

Approximately half of 600 men and women included in the French study who had a first heart attack were advised to eat a Mediterranean-style diet that was rich in fruits, vegetables, fish, cereals and beans. The Mediterranean diet included more oleic and alpha-linolenic fatty acids, which are the omega-3 fatty acids found in canola, olive and certain nut oils. Those in the study who followed the "Western diet" consumed more linoleic or omega-6 fatty acids found in soy and sunflower oils. Otherwise, the groups were very similar: 30% of calories in the Mediterranean diet came from fat, 8% from saturated fat. The Western diet obtained 34% of total calories from fat and almost 12% from saturated fat. The intake of dietary fiber was higher in the Mediterranean group, about 3 grams, indicating a higher intake of antioxidants and B vitamins found in fruits and vegetables. The investigators assessed the effect of these diets on three outcomes: cardiac death and nonfatal myocardial infarction; this first outcome in addition to major secondary end points (unstable angina, stroke, and heart failure, pulmonary or peripheral embolism); and these first two outcomes plus minor events requiring hospital admission.

#### **Results of study**

After 36 months, the participants in the study were similar in body fat, blood pressure and in the number of smokers in each

group. However, those who followed the Mediterranean diet had statistically significant reductions in each of the outcomes studied -- lower prevalence of cardiac death and nonfatal myocardial infarction, fewer major secondary events such as stroke and pulmonary embolism, and reduced hospitalizations. Interestingly, the Mediterranean diet did not appear to alter the relationships between major risk factors (e.g., total cholesterol and systolic blood pressure) and protective factors (e.g., female sex and aspirin use) vs. recurrence of myocardial infarction. Therefore, the investigators concluded that a comprehensive strategy to decrease cardiovascular morbidity and mortality should include primarily a cardio protective diet combined with other options to reduce modifiable risk factors.

### 1993: Dash Trail

Showed that dietary patterns can and do affect blood pressure in the high normal BP to moderately hypertensive adult population (systolic < 180 mm Hg & diastolic of 80 to 95 mm Hg). Respectively, the DASH or "combination" diet lowered blood pressures by an average of 5.5 and 3.0 mm Hg for systolic and diastolic, compared with the control diet. The minority portion of the study sample and the hypertensive portion both showed the largest reductions in blood pressure from the combination diet against the control diet. The hypertensive subjects experienced a drop of 11.4 mm Hg in their systolic and 5.5 mm Hg in their diastolic phases. The fruits-and-vegetables diet was also successful, although it produced more modest reductions compared with the control diet (2.8 mm Hg systolic and 1.1 mm Hg diastolic).

In the subjects with and without hypertension, the combination diet effectively reduced blood pressure more than the fruits-and-vegetables diet or the control diet did. The data indicated that reductions in blood pressure occurred within two weeks of subjects' starting their designated diets, and that the results were generalizable to the target sample of the U.S. population. At the end of the intervention phase, 10.1, 5.4 & 4.0 percent of the subjects reported this problem for the control, fruits-and-vegetables and combination diets, respectively, showing that the fruits and vegetables and combination diets reduce constipation. Apart from only one subject (on the control diet) who was suffering from cholecystitis, other gastrointestinal symptoms had a low rate of incidence.

### 1999-2007: Euroaspire I, II, III

The first EUROASPIRE survey among patients with established CHD in nine countries in 1995–96 showed substantial potential for risk reduction. A second survey (EUROASPIRE II) was done in 1999–2000 in the same countries to see whether preventive cardiology had improved since the first. The proportion of patients in both studies who achieved the lifestyle, risk-factor, and therapeutic goals recommended by the Joint European Societies report on coronary prevention were compared. EUROASPIRE I, II, and III were designed as cross-sectional studies and included the same selected geographical areas and hospitals in the Czech Republic, Finland, France, Germany, Hungary, Italy, the Netherlands, and Slovenia. Consecutive patients (men and

women  $\leq 70$  years) were identified after coronary artery bypass graft or percutaneous coronary intervention, or a hospital admission with acute myocardial infarction or ischemia, and were interviewed at least 6 months later.

### Findings

3569 and 3379 patients were interviewed in the first and second surveys, respectively. The prevalence of smoking remained almost unchanged at 19.4% vs 20.8%. The prevalence of obesity (body-mass index  $\geq 30$  kg/m<sup>2</sup>) increased substantially from 25.3% to 32.8%. The proportion with high blood pressure ( $\geq 140/90$  mm Hg) was virtually the same (55.4% vs 53.9%), whereas the prevalence of high total cholesterol concentrations ( $\geq 5.0$  mmol/L) decreased substantially from 86.2% to 58.8%. Aspirin or other antiplatelet therapy was as widely used in the second survey as the first (83.9% overall), and reported use of  $\beta$ -blockers, angiotensin-converting-enzyme inhibitors, and especially lipid-lowering drugs increased.

### Interpretation

The adverse lifestyle trends among European CHD patients are a cause for concern, as is the lack of any improvement in blood-pressure management, and the fact that most CHD patients are still not achieving the cholesterol goal of less than 5 mmol/L. There is a collective failure of medical practice in Europe to achieve the substantial potential among patients with CHD to reduce the risk of recurrent disease and death. 3180 patients were interviewed in the first survey, 2975 in the second, and 2392 in the third. Overall, the proportion of patients who smoke has remained nearly the same (20.3% in EUROASPIRE I, 21.2% in II, and 18.2% in III; comparison of all surveys  $p=0.64$ ), but the proportion of women smokers aged less than 50 years has increased. The frequency of obesity (body-mass index  $\geq 30$  kg/m<sup>2</sup>) increased from 25.0% in EUROASPIRE I, to 32.6% in II, and 38.0% in III ( $p=0.0006$ ). The proportion of patients with raised blood pressure ( $\geq 140/90$  mm Hg in patients without diabetes or  $\geq 130/80$  mm Hg in patients with diabetes) was similar (58.1% in EUROASPIRE I, 58.3% in II, and 60.9% in III;  $p=0.49$ ), whereas the proportion with raised total cholesterol ( $\geq 4.5$  mmol/L) decreased, from 94.5% in EUROASPIRE I to 76.7% in II, and 46.2% in III ( $p<0.0001$ ). The frequency of self-reported diabetes mellitus increased, from 17.4%, to 20.1%, and 28.0% ( $p=0.004$ ).

### 2005: Interheart

Although more than 80% of the global burden of cardiovascular disease occurs in low-income and middle-income countries, knowledge of the importance of risk factors is largely derived from developed countries. Therefore, the effect of such factors on risk of coronary heart disease in most regions of the world is unknown.

### Methods

A standardized case-control study of acute myocardial infarction in 52 countries, representing every inhabited continent. 15152 cases and 14820 controls were enrolled.

The relation of smoking, history of hypertension or diabetes, waist/hip ratio, dietary patterns, physical activity, consumption of alcohol, blood apolipoproteins (Apo), and psychosocial factors to myocardial infarction are reported here. Odds ratios and their 99% CIs for the association of risk factors to myocardial infarction and their population attributable risks (PAR) were calculated.

### Findings

Smoking (odds ratio 2.87 for current vs never, PAR 35.7% for current and former vs never), raised ApoB/ApoA1 ratio (3.25 for top vs lowest quintile, PAR 49.2% for top four quintiles vs lowest quintile), history of hypertension (1.91, PAR 17.9%), diabetes (2.37, PAR 9.9%), abdominal obesity (1.12 for top vs lowest tertile and 1.62 for middle vs lowest tertile, PAR 20.1% for top two tertiles vs lowest tertile), psychosocial factors (2.67, PAR 32.5%), daily consumption of fruits and vegetables (0.70, PAR 13.7% for lack of daily consumption), regular alcohol consumption (0.91, PAR 6.7%), and regular physical activity (0.86, PAR 12.2%), were all significantly related to acute myocardial infarction ( $p < 0.0001$  for all risk factors and  $p = 0.03$  for alcohol). These associations were noted in men and women, old and young, and in all regions of the world. Collectively, these nine risk factors accounted for 90% of the PAR in men and 94% in women.

### Interpretation

Abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial factors, consumption of fruits, vegetables, and alcohol, and regular physical activity account for most of the risk of myocardial infarction worldwide in both sexes and at all ages in all regions. This finding suggests that approaches to prevention can be based on similar principles worldwide and have the potential to prevent most premature cases of myocardial infarction.

### DISCUSSION

The conclusion of the review of above material has shown that nine easily modifiable risk factors are associated with more than 90% of the risk of an acute myocardial infarction. These results are consistent across all geographical regions and ethnic groups of the world, men and women, and young and old. Although priorities can differ between geographical regions because of variations in prevalence of risk factors and disease and economic circumstances, our results suggest that approaches to prevention of coronary artery disease can be based on similar principles throughout the world. Therefore modification of currently known risk factors has the potential to prevent most premature cases of myocardial infarction worldwide (Micheal *et al.*).

Various researches have explained that low levels of biological risk factors and persons who adhere to healthy lifestyle and diet are at low risk for CHD. These studies confirm that mortality caused by CHD is largely determined by diet and smoking. All the studies reveal that further research is needed in this area: Large scale prospective cohort studies, controlled intervention trials need to be carried out to

further find out the causal relationship between diet, lifestyle and the occurrence of CAD. Numerous studies have proven that healthy eating reduces risk for CHD in both free living high risk person and in cardiac patients. There is a need to test what the most effective dietary interventions are? There is a need to test combined effect of the most effective dietary and lifestyle intervention in primary and secondary prevention and to monitor their effect on health in general order to trace possible unforeseen negative consequences. Food consumption patterns of various regions should be studied to analyze the risk. Detailed research is needed to know the exact components of diet causing the disease.

### Recommendations

As the incidence of cardiovascular disease is largely explained by modifiable risk factors (serum cholesterol and reduced high-density lipoprotein (HDL) cholesterol, blood pressure and cigarette smoking), reducing risk factors through health promotion focusing on lifestyles is a logical way of preventing disease. Randomized controlled trials of the effectiveness of multiple risk factor intervention using counselling and education in addition to, or instead of, pharmacological treatments to modify major cardiovascular risk factors have been carried out in primary care and in the workplace. The findings of these trials have been equivocal; effectiveness in reducing cardiovascular disease incidence appears to be associated with the degree of risk factor control achieved (Editorial 1982a; Editorial 1982b; Appel 2004). Taken with evidence from quasi experimental studies, such as the North Karelia project (Puska 1976; Puska 1981) and the Stanford Heart Disease Prevention Programme (Farquhar 1977; Farquhar 1990; Fortmann 1993), it is widely believed that multiple risk factor intervention using counselling and educational methods is both effective and cost-effective and should be expanded. Recently this idea has been extended to people with diabetes (Davey Smith 2005)

### REFERENCES

- Achu, G. Rajeev, 2009. Lifestyle factors in CHD, prevention in India, cardiology.
- Am. J Epidemiol, 2007. All cause mortality and CVD mortality in three American Indian Population aged (45 - 74) 1984-1988. The strong heart study (11): 995-1008.
- Anderson *et al.*, 2001. High levels of dietary fiber intake, were associated with lower level of CVDS.
- Appel, 2004. Appel LJ. Lifestyle modification: is it achievable and durable? Journal of Clinical Hypertension 2004; 6(10):578-81.
- Burr, M.L., Fehily, A.M., Gilbert, J.F., *et al.* 1989. Effects of changes in fat, fish and fibre intakes on death and myocardial re-infarction: Diet and Re-infarction Trial (DART). Lancet. 2: 757-761.
- Clark, T Luther 2008, "cardiovascular disease and diabetes) Tata Mc Graw -Hill publishing house.
- Davey Smith 2005 Davey Smith G, Bracha Y, Svendsen KH, Neaton JD, Haffner SM, Kuller LH for the Multiple Risk Factor Intervention Trial. Incidence of type 2 diabetes in the randomized multiple risk factor intervention trial. Annals of Internal Medicine 2005; 142:313-35



- De langen CD. Cholesterol metabolism and racial pathology [in Dutch]. *Genseek Tijdschar Nederl Indie*. 1916; 56:1-34. Menotti A, Kromhout D, Blackburn H, et al, for the Seven Countries Study Group. Food intake patterns and 25-year mortality from coronary heart disease: cross-cultural correlations in the Seven Countries Study. *Eur J Epidemiol*. 1999; 15: 507-515
- De Logeril, M., Salen, P, Martin JL, et al. 1999. Mediterranean diet, traditional risk factors and the rate of cardiovascular complications after myocardial infarction: final report of the Lyon Diet Heart Study. *Circulation*. 1999; 99:779-785
- Errikila and associations, 2002 examined effects of dietary fatty acids on CV health.
- Euroaspire I&II Group. 2001. Clinical reality of coronary prevention guidelines: a comparison of EUROASPIRE I&II in nine countries. *Lancet*. 2001; 357:995-1001.
- Euroaspire III. 2010. Management of cardiovascular risk factor in asymptomatic high-risk patients in general practice: cross sectional survey in 12 European countries. *European journal of Preventive Cardiology*. 2010; 17; 530-540.
- Farquhar 1990. Farquhar J, Fortmann S, Flora J, Taylor B, Haskell W, Williams P, et al. Effects of communitywide education on cardiovascular disease risk factors. The Stanford Five-City Project. *JAMA* 1990; 264: 359-65. [MEDLINE: 90300579].
- Farquhar, 1977. Farquhar J, Wood P, Breitrose H, Haskell W, Meyer A, Mac Coby N, et al. Community education for cardiovascular health. *Lancet* 1977; 192-5. [MEDLINE: 77191418].
- Fischer, M., Broeckel, U., Holmer, S., Baessler, A., Hengdenberg, C., Mayer, B., Erdmann, J., Klien, G., Riegger, G., Jacob, H.J., Schunkert, H. 2005. "Distinct heritable patterns of angiographic coronary artery disease in families with myocardial infarction. " *Circulation* vol.111, pp.855-862, 2005.
- Fortmann, S., Barr Taylor, C., Flora, J., Jatulis, D. 1993. Changes in adult cigarette smoking prevalence after 5 years of community health education: the Stanford Five-City Project. *American Journal of Epidemiology*; 137:82-96. [MEDLINE: 9316723].
- Gupta, R. Gupta, V.P 1996. "Metanalysis of coronary heart disease prevalence in India. " *Indian heart J.*, vol .48, PP. 241-5.
- HSFC, 1998. Effective management of diabetes can decrease the risk of CVD. *Indian council of Medical Research*. www.icmr.nic.in.
- Hu F.B., Willett, W.C., 2003. Optimal diets for prevention of coronary heart disease, 288: 256 - 784)
- Huijbregts, P, Feskens, E., Rasanen, L., Fidanza, F., Nissinen, A., Mennotti, A., 1997. Kromhout, Dietary pattern and 20 year old mortality in elderly men in Finland ,Italy and The Netherlands: Longitudnal cohort study. *Brit Med J* 1997; 315-13-17.
- Ignarro, J.L, Balestrieri, L.M. and Napoli, C. 2006. Nutrition, physical activity, and cardio vascular disease: *An Update. Elsevier, Cardiovascular Research*, 73, 326 - 340
- Iqbal, R., Anand, S., Ounpuu, S., Zhang, X., Rangarajan, S., Chifamba, J., Al-Hinai, A., Keltai, M., Yusuf, S, 2008. on behalf of the INTERHEART Study investigators .Dietary patterns and the risk of Acute Myocardial Infarction in 52 countries :results of the INTERHEART \study .*Circulation* 2008;118:1929-1937.
- Janus, E.D., Postglione, A., Singh, R.B., Lewis, B. 2002. "The Modernization of Asia Implications for Coronary heart diseases" " *Circulation* vol.'94, pp2671-73, 1996. World Health Organization .The World Health Report. Geneva, Switzerland, 2002.
- Joshiyura, K.J., HUFB,, Manson, J.E., Stampfer, M.J., Rimm, E.B., Speizer, F.E., Colditz, G., Ascherio, A., Rosner, B., speigelman, D and Willet, W.C., 2009. The effect of fruits and vegetables intake on risk for coronary heart disease. *Annals of Internal Medicine*, 134(12), 1106-1114.
- Kamili, M.A., Dar, I.H., Ali, G., Wazir, H.S., Hussain, S., 1994. "Prevalence of coronary artery disease in Kashmir." *Genet Epidemiol.* vol.11, pp 255-264, 1994.
- Krause's et al., 2004. "Food nutrition and Diet Therapy" Elsevier publishing house, USA
- Kuulasmaa, K., Tunstall-Pedoe, H., Dobson, A., et al, 2000. for the WHO-MONICA project. Estimation of the contribution of changes in classic risk factors to trends in coronary event rates across WHO-MONICA Project populations. *Lancet* 355: 675-687.
- Lewis, B. 1987. Disorders of Lipid Transport, the Oxford textbook of medical (D.J Weatherall, J.G.G Leadingless and D. Awarrell, eds) Oxford University Press. Oxford 1987.
- Lichtenstein, A.H., Apple, L.J., Brands, M., et al. 2006. Dietary and lifestyle Recommendation revision. A scientific statement from American Heart associated nutrition committee - *circulation* 2006; 114; 82.
- Liu, S. willet, W.C., Stamfer, M.J. 2006. A prospective study of dietary glycemic load, carbohydrate intake ,and risk of CHD in US women. *Am J Clin Nutr* 2006 ;71-145.
- Manson, J.E., Stamfer, M.J. ?. HU FB primary prevention of coronary heart disease to women through diet and lifestyle *NEJM*, 343: 16.
- Michael, C. Right, W 2011. MD The cardiovascular specialist Hyammnia ,MA. journal of clinical lipidolgy 5,434-440 biographical notes on Ancel Keys&Salim Yousuf,origins and significance of the seven countries study and the INTERHEART study.
- National Cholesterol Education Program, second report of the expert panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (adult treatment panel II).Bethesda, Md:National institute of health, National ,Heart, Lung and Blood Institute; 1993.NH Publication No.93-3095
- Patil, S.S., Joshi, R., Gupta, G., 2004. "Risk factors for acute M.I in a rural population of Central india:Hospital based case control study. *NatMedJ*. India: 17:189-94
- Puska, 1981. Puska P, Tuomilehto J, Salonen J, Nissinen A, Koskela K, Vartiainen E, et al. Community control of cardiovascular diseases. The North Karelia Project. Copenhagen: World Health Organization, 1981:1-351.
- Rahyoun, N.R., Jacques, P.F., Zharg, X.L. 2006. Whole grain intake is inversely associated with metabolic syndrome in middle age an d old adults. *Am J clin Nutr*;83:124.
- Rastogi, T.,Reddy, K.S. vaz M. 2005. "Bidi and Cigarette smoking and risk of acute myocardial infarction among males in urban India. *Tobb. Control* 2005; 14:356-8.
- Sacks, F.M., Svetkey, L.P., Vollmer, W.M., et al. 2001. For the DASH-Sodium Collaborative Research Group. Effects



- on blood pressure of reduced dietary sodium and the Dietary Approaches to Stop Hypertension (DASH) diet. *N Engl J Med.* 2001; 334: 3–10.
- Singh, N.V 2005. Risk factors associated with Coronary Artery Disease.
- Tanzeela, K., Falak, Q., Saba, R., Saba, R., Samia, R., Qulsum, A., Masood, A., Bashir Ahmad, G., Genetic Variants at the Apo-A1 Gene IN Association with Coronary Artery Disease. *International Journal of Sciences: Basic and Applied Research (IJSBAR)* Volume 5, No1, pp33-42.
- WHO, 2013. Cardiovascular diseases (CVDs) html.
- Wilcox, S., Parra – Medina, D., Thompson – Robinson M, 2008. Will J Nutrition and physical activity interventions to reduce cardiovascular disease risk in health care settings: a quantitative review with a focus on women, 59, 197 – 214.

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