CHAPTER TWO

REVIEW OF LITERATURE
The review of literature involves only those studies which have relevance and relation with the variables of the present study. The main variables of the present study are coronary artery disease risk factor, coping strategies, and attitude towards life.

In the following sections many of the very important studies concerning these variables have been reviewed.

**Coronary Artery Disease Risk Factors**

A large numbers of studies have thrown light on the role of various conventional and emerging risk factors in the occurrence of and maintenance of coronary artery diseases. This section presence some of the relevant studies conducted during the late 20\textsuperscript{th} and early 21\textsuperscript{st} century.

Davis et al. (1995) analyzed the changes from 1980 to 1990 in the knowledge of acquired cardiovascular risk factors perceived knowledge of risk reduction strategies; and interest in risk modification by socio economic status (SES) using level of education. The study population included 2,455 women and men (aged 25-74yrs) from three population-based cross-sectional surveys in two northern California cities. Significant differentials were found in baseline knowledge that widened over the 10 year study period, resulting in larger disparities across educational group at the final survey in 1990. From 1980
to 1990, individuals with under 12 years of education experienced only slight improvement in their knowledge of cardiovascular risk factors; those with 16 years of education experienced twice as much improvement. There were similar time-effect disparities in knowledge of risk reduction strategies. In contrast, interest in risk modification was high for all educational groups and remained uniform across time.

Kuczmierczyk et al. (1996) investigated risk for cardiovascular disease in 38 patients with general anxiety disorder (GAD), as well as the effects of comorbid major depression (MD). Predrug-trial serum cholesterol and triglyceride levels were assessed in subjects with pure GAD and compared with those of 21 patients with mixed GAD and comorbid MD. Significantly higher cholesterol and triglyceride levels were found in the GAD group. It was concluded that increased noradrenergic activity may be responsible for elevations in lipid levels in patients with pure GAD.

Smith et al. (1996) explored the relations between psychological factors and coronary heart disease. Measures included were the Beck Ratings Scale of mood disorders, the Beck Depression Inventory, and the Jenkins Activity Survey for Type A Behaviour Pattern (TABP). Subjects were 94 angina patients, 47 non-cardiac patients, and 217 adults randomly
sampled from the general population. Result indicated that anxiety and depression scores were significantly higher in angina patients than in each of the other two groups. Angina patients' scores for the hard-driving and competitive component of the TABP were also significantly higher than in the general population. The Diagnostic and Statistical Manual of Mental Disorders III (DSM-III) criteria for anxiety and depression were reported more often by angina patients than by subjects in the other groups. Anxiety was reliably correlated with depression in all the three groups.

Fana Maurizio et al. (1996) assessed the possible relationship between coronary artery disease (CAD) risk factors and anger and anxiety in a sample of 138 outpatients (18-65 years) diagnosed with major depressive disorder. Measurement instruments included the Anger Attacks Questionnaire and the Hamilton Rating Scale for Depression among others. Results show that patients with higher state anxiety scores had a profile of greater CAD risk compared with the patients with low anxiety scores, as cholesterol levels were associated with increased anxiety scores. The depressed patient group as a whole had cholesterol levels within the normal range, but patients with anger attacks tended to have higher cholesterol levels than the patients without these attacks. Findings partially
support the hypothesis that hostile or anxious depressed patients and at greater risk for CAD than other depressed patients.

Cotiporic-Veselica et al., (1996) examined the prevalence of type-A behavior indicated on Bartner's (1969) scale and the Emotion Profile Index in 134 male and 56 female patients (aged 23-70 years) with acute coronary heart disease (ACHD), assessed at hospital admission and discharge, and 1,084 control subjects. Type A classification was significantly more common for ACHD patients than for controls. ACHD patients also scored lower on Distrust and Dyscontrolled emotions. Patients with unstable angina (UA) had significantly higher mean scores on Bartner's scale than patients with acute myocardial infarction and recurrent myocardial infarction (RMI) at hospital discharge. RMI patients scored lower on District and higher on Timid than UA patients at hospital admission and discharge. Results suggest an association between type A behavior, emotions, and different types of ACHD. They suggested the addition of counseling for type A behavior to the standard cardiac counseling.

Weidner et al. (1997) studied certain standard coronary risk factors (plasma lipids and lipoproteins, blood pressure, heart rate, age, body mass index) and psychosocial variables (job strain, Type-A behavior, hostility, illnesses, medical and
psychological symptoms, health damaging behavior) in a community sample of 324 employed men, 203 employed women and 155 female homemakers. Employed women reported less hostility and fewer illnesses than homemakers and had lower cholesterol levels than homemakers and men. Job characteristics were unrelated to standard coronary risk factor levels in both sexes, but predicted medical symptoms and health damaging behavior in men. These findings suggest that employment is associated with enhanced medical and physical well being among women and point to possible behavioral and psychological pathways by which job strain may adversely influence men’s health.

Milligan et al. (1997) examined relationships between cardiovascular risk factors and behaviors, specifically physical activity, smoking and drinking alcohol. Subjects were first studied at the age of 9 years, and continued to be surveyed at 3 year intervals. Anthropometry, blood pressure, non-fasting serum cholesterol, and physical fitness were measured in 301 male and 282 female Australian 18 years olds. Usual physical activity, smoking and drinking habits were assessed by questionnaire. Systolic Blood Pressure (SBP) related positively to weight, height, age and unsafe drinking and negatively to fitness and birth weight. Total cholesterol, which was positively
associated with waist-hip ratio and negatively with fitness was higher in females than in males. In 24% males and 48% of females, usual levels of physical activity were low, consistent with lower scores on fitness tests in females. 30% of males and 24% of females regularly drank at unsafe levels while 26% of males and 29% of females smoked. Smoking was associated with unsafe drinking.

Jennings et al. (1997) conducted a study in which they asked whether cardiovascular responses to psychological challenge changed with age and whether such changes were intrinsic to aging or could be attributed to the influence of disease and medications. Cardiovascular reactivity to mental challenge was examined in 902 men ranging in age from 46-64 years who participated in the Kuspio Ischemia Heart Disease Risk Factor Study. A battery of 4 tasks was used to induce cardiovascular responses. Current disease status, age, and medication use were entered into hierarchical regression analysis to assess their relation with measures of cardiovascular reactivity. Age and hypertension contributed independent, approximately equal, but small amounts of variance in the cardiac and vascular reactivity indexes. Medications also influenced reactivity independently of age and disease. Performance on the tasks was more consistently altered by age.
than by disease or medication. Cardiac and vascular reactivity increased with increasing age and the presence of hypertension. They conclude that both age and diseases state must be considered when examining cardiovascular reactivity as a risk factor for disease.

Gupta et al. (1997) determined the prevalence of coronary heart disease (CHD) and the risk factors in the elderly (age 60-85 years) and young (age 50-59 years). A sample of 2,212 urban and 3,148 rural subjects was subjected to a clinical examination, ECG, and administered the Rose Questionnaire. Risk factors were hypertension, diabetes, smoking, obesity, low physical activity, truncal obesity, and blood lipid levels. CHD was present in 10.3 percent of the elderly. The prevalence of CHD was higher in the elderly as compared to the younger age groups of both sexes and in both urban and rural population. CHD was more common among urban than among rural men and women. While the risk factors of CHD were same for the elderly as well as for the younger subjects, the prevalence of these risk factors was higher in urban than in rural population. There was no significant difference in the prevalence of leisure time physical activity and mean cholesterol levels.

Schmidt et al. (1998) conducted coronary risk factor analysis comprising anthropometry, blood pressure, fasting
plasma lipids and lipoproteins, glucose, and body composition, and documented self-disclosed physical activity (PA) patterns for primary and secondary school children (aged 6-18) in Singapore. Subjects were 730 boys and 849 girls. A PA and leisure pursuits self reported survey was used to group subjects into five categories ranging from “inactive” to “vigorous” activity. The self-reported questionnaire also recorded individual responses to exercise behavior, leisure activities, and participation in organized games and sports. Body weight body mass index (BMI), and percent body fat were compared by age and gender. Results show that PA was correlated with total cholesterol and triglycerides for boys, and with body fat and BP were greater for each age 10-14 years, after which there was less recorded body fat for boys. Comparing by gender and age, significant differences were found between PA groups and total cholesterol and body fat. Although few children were at risk for heart diseases, this study provides baseline coronary risk and physical activity data for further longitudinal analysis in this population.

Fried et al. (1998) reported the independent, joint contributions to total mortality over 5 years of sub clinical, clinical, and end stage disease measures of frailty, impairments of physical and cognitive function, and sociodemographic
characteristics, including sex, health habits, and cardiovascular disease risk factors, in a multicenter study of community-dwelling men and women aged 65-101 years at baselines. 5, 201 subjects completed standardized interviews and an extensive examination at the field center and were reinterviewed every 6 months for 4.5-5.5 years of follow up, there were 646 deaths representing 12% of the population. Mortality rates increased with age for both men and women, while survivorship was substantially higher for women in each age group. Death rates declined with increasing education and income, with the lowest rates for those with high school education or more for those with annual incomes of $50,000 or more. The strongest predictions of mortality included noninvasive objective measures of both sub clinical and clinical chronic diseases such as ECG, EKG, and cognitive function education.

Lilla et al. (1998) studied psychological factors in the development of coronary artery disease in two aspects: rigidity and type A behavior pattern, and the connections between them. Subjects were myocardial infarct patients, patients with psychosomatic disorders, and healthy subjects. Rigidity of type A patients was assessed with measures such as the Jenkins Activity Survey (JAS) and was found to be significantly higher than of type Bs. Psychosomatic and healthy subjects did not
differ from each other in their type A scores. Findings suggest that type A behavior measured by the JAS does not distinguish patients with infarction from other patients or healthy subjects. Rigidity may be a basic component of psychological factors in the development of coronary artery disease.

Kopp et al. (1998) assessed the differences between two psychosocial risk indicators (depressive symptoms and vital exhaustion) for coronary artery disease (CAD) in a nation-wide sample of 12,640 Hungarians aged 16+ years, and analyzed whether these risk indicators are differentially related to several illness behaviors (including history of cardiovascular treatment and cardiovascular sick days), cognitions, mood states, and socioeconomic characteristics generally associated with increased CAD risk. Results showed that vital exhaustion and depressive symptomatology are differentially associated with relevant external criteria, vital history of cardiovascular treatment, whereas depressive symptomatology was more closely connected to disabilities and complaints related to alcohol, drug, and congenital-disorder, and to dysfunctional cognitions and hostility.

Dressler et al. (1998) examined cultural influences in the relationship between SES and health. Cultural definitions of material lifestyles were investigated as a correlate of disease
risk in an African American community in the rural south. A new technique called "cultural consensus analysis" – was used to test for a cultural model of lifestyles indicative of success. Survey data on a sample of 600 individuals (aged 25-65 years) randomly selected from the community were then used to operationalize the degree to which individuals adhere in there own behavior to that cultural model; this measure is referred to as "cultural consonance in lifestyle". The present analysis is based on 48 key informants, representing 4 SES clusters in the African American Community. Cultural consonance in lifestyle was more strongly associated with hypertension and smoking (but not serum lipids) than were conventional measures of SES (occupation, income, and education). Results suggest that, the extent to which individuals are unable to live in accordance with cultural norms regarding lifestyle mainly contribute to the risk of coronary heart disease in the African American Community.

Mein & Winkleby (1998) conducted five focus groups with 20-76 year old Hispanic women (primarily of Mexican American heritage) from low-income neighbourhoods in San Jose, California, to learn about their knowledge of cardiovascular disease (CVD) risk factors, the relative importance of risk factors, and ideas about effective CVD risk-reduction programs. Despite language barriers and economic disadvantages, women
were highly aware of heart disease and described it as a health priority. However, they articulated many misconceptions about CVD and experienced multiple barriers to healthy lifestyles. The most frequently mentioned risk factor was poor nutrition, especially high dietary fat. The next most frequently mentioned risk factors were physical inactivity, obesity, and smoking. Few women viewed CVD as a progressive, chronic process; few associated obesity with heart disease; and few emphasized the importance of diabetes and hypertension as primary CVD risk factors.

Bosma et al. (1998) examined the association between two alternative job stress models, the effort-reward imbalance model and the job-strain model, and the risk of coronary heart disease (CHD) among male and female British civil servants. The logistic regression analyses were based on a prospective cohort study (Whitehall II Study) comprising 6,895 men and 3,413 women (aged 35-55 years). Three indicators of CHD were analyzed: angina pectoris, doctor-diagnosed ischemia, or either of these outcomes. Baseline measures of both job stress models were related to new reports of CHD over a mean 5.3 years of follow-up. The imbalance between personal efforts (competitiveness, work-related overcommitment, and hostility) and rewards (poor promotion prospects and a blocked career)
was associated with a 2.15-fold higher risk of new CHD. Job strain and high job demands were not related to CHD, however, low job control was strongly associated with new disease.

Kochar et al. (1999) attempted to angiographically evaluate the severity of CAD and to see its relation with risk factors in Indian subjects. Sixty-seven consecutive patients with mean age of 52 ± 9 years and non-conventional risk factors were analyzed. They were matched with 30 age-and sex-matched controls who had no previous CAD. Mean age of the controls was 51 ± 6 years. The risk factors studied were – smoking, emotion, hypertension, diabetes, dyslipidemia, previous CAD, BMI, W/H ratio, and Lp(a). It was observed that all the risk factors were significantly higher in patients as compared to controls. However, only Waist-Hip ratio correlated with severity of CAD.

Kumar, Kaur, and Singh (1999) studied the risk factor pattern of 1026 selected cases of CAD alongwith their dietary and behavioral pattern. Of the total 1026 cases, 680 (66.3%) were males and 346 (33.7%) females; 572 (55.7%) were from rural and 454 (44.3%) from urban population. Diabetes was present in 19.7 percent of the total cases (17.6% male, 23.9% female) and 84/572 (14.6%) in rural versus 119/545 (26.2%) in urban cases. Hypertension was seen in 306/1026 (29.8%) of the
total cases (29.3% male, 30.9% female; 20.9% in rural, 40.9% in urban cases). Cigarette smoking was observed in 20.4 percent of total cases (30.0% male, 1.4% female; 15.0% in rural, 27.1% in urban cases). Significant obesity by definition was present in 314/1026 (30.1%) cases (27.6% male, 36.4% female; 23.1% rural, 40.0% urban). Significant hyperlipidemia was observed in 346/1026 (33.7%) cases (32.9% male, 35.2% female; 26.2% rural, 43.1% urban). Higher alcohol consumption was observed in 549/1026 (53.5%) cases (56.1% in rural, 50.2% in urban cases; 78.4% male, 4.6% female). On the basis of detailed questionnaire, 696/1026 (67.8%) had type A personality and 330/1026 (32.2%) had type B personality (male 76.4%, female 50.8% of type A personality, and male 23.6%, female 49.2% of type B personality). Out of the total 1026,760 (74.1%) cases were non-vegetarian and 266 (25.9%) vegetarian (69.9% non-vegetarian, 30.1% vegetarian in rural and 79.3% non-vegetarian, 20.7% vegetarian in urban cases). 86.9 percent male and 48.8 percent female cases were non-vegetarian and 13.1 percent male and 51.2 percent female cases were vegetarian. It was concluded that, in a selected group of 1026 cases of CAD in Punjab, the conventional risk factors of diabetes, hypertension, obesity and hyperlipidemia were more frequent in urban than in the rural population. Smoking is less common than that seen in other
parts of the country whereas the consumption of alcohol and non-vegetarian diet shows much higher trends than in the rest of the country.

Marisic et al. (1999) investigated biological and psychosocial risk factors in groups of 187 male ischemic heart disease (IHD) patients (mean age 56.8 years) and 187 controls. A multivariate logistic regression was used to compare the two groups on 11 standard biological and 7 suggested psychosocial risk factors. The multivariate regression model supported 9 risk factors for IHD; 5 individual ones with sensitization among them and 4 interactions of risk factors including a synergistic one between neuroticism and smoking. Next, a principal component analysis of all 18 was used to extract 4 biopsychosocial and 2 biological correlates of IHD risk factors. They concluded that psychosocial coronary proneness plays an important role in predicting IHD, even after taking into account the main biological risk factors.

Achari and Thakur (1999) conducted a study on a sample of 3832 patients (3301 males, 531 females) with stable IHD who attended Patna Medical College Hospital & Heart Hospital between 1992-1997 were assessed for the presence of major modifiable risk factors, namely, hypertension, dyslipidemia, smoking and diabetes mellitus. All the patients had complete
clinical did biochemical data; 4591 individuals who attended these hospitals for routine check-up or for non-specific cardiac symptoms but in whom major medical or cardiovascular disease was ruled out by appropriate investigations, served as controls. The mean total cholesterol level was higher in the IHD group (194.67 mg/dl vs. 190.13 mg/dl) as compared to controls as was the mean total cholesterol /HDL ratio (4.65 vs. 4.47); both these differences were significant (p=0.01). The mean HDL, LDL, and triglyceride levels were not significantly different in the two groups. When the lipid levels were classified according to the National Cholesterol Education Program (NCEP) guidelines, 1425 patients (37.18%) had hypercholesterolemia as compared to 1480 controls (32.49%), this was also significant as was the prevalence of low HDL cholesterol in the IHD group (27.1% vs. 18.2% in controls; p<0.01). The most common form of dyslipidemia was an abnormal total cholesterol/HDL ratio which was found in 2235(58.3%) of the IHD population as compared to 2034 (44.3%) of the controls (p=0.01). Six hundred and ninety eight (18.2%) patients were hypertensives; most had stage-I hypertension; 1188 (31.01%) had a history of smoking, this was more common than in the control group (19.45%) (p<0.01) and was particularly common in young patients (<40 yrs) with IHD; 509 (13.28%) were diabetic. When all the risk factors were
analyzed 3380 (88.2%) patients (<40 yrs) with IHD; 509 (13.28%) were diabetic. When all the risk factors were analyzed 3380 (88.2%) patients had at least one modifiable risk factor. They concluded that dyslipidemia was the most prevalent risk factor in this series, followed by smoking, hypertension, and diabetes mellitus, and therefore, these factors, particularly; dyslipidemia and smoking need intensive control and treatment.

Iriyo et al. (1999) followed 2,722 women from the Cardiovascular Health Study (CHS), who were free of baseline CVD and provided baseline and annual information on their depressive mood, for a median of 6 years for the development of CHD, stroke and total mortality. It was found that depression is an independent risk factor for the development of CAD, stroke and all-cause mortality.

Gupta et al. (1999) carried out a case control study to assess the relative importance of various cardiovascular risk factors in Indian women. Forty-eight consecutive female patients with a mean age of 57.5 ± 6.6 years presenting with acute MI were taken up for the study. Twenty-nine age-matched controls with mean age of 56.0 ± 8.9 yrs were also included in the study. Various risk factors were evaluated including lipoprotein (a). They found that the presence of hypertension, diabetes and raised levels of total cholesterol triglycerides,
LDL-c and Lp(a) correlated directly with increased risk of cardiovascular events. A positive correlation was found between increased Lp(a) levels and high total cholesterol and LDL-c among cases, but not in controls. There was no significant difference in BMI between the cases and controls; however, apple-shaped body habitus was present more in cases as compared to controls. They concluded, that it is important to identify as many modifiable risk factors as possible in Indian women, so as to institute a comprehensive stage for prevention of cardiovascular risk.

Data from several recent studies have focused on the seasonal impact on cardiovascular mortality. Sheth et al. (1999) analyzed 159,884 deaths from acute MI and 136,157 deaths from stroke in the Canadian mortality database from 1980 to 1982 and 1990 to 1992. They found that acute MI deaths were highest in January and lowest in September, producing a relative risk difference of 18.6%. This seasonal variation in acute MI between winter and summer increased with age from 5.8% for < 65 years old to 15.8% for > 85 year old. The investigators suggested that environmental factors accompanying the cold weather may play a major role in triggering these acute CV events or determining their outcome.

Kloner et al. (1999) analyzed 222,265 reports from the
monthly death certificate data in Los Angeles County for death
due to CAD from 1985 through 1996. The mean number of
deaths was 33% higher in December and January than between
June and September. During December and January, there was
an increase in deaths that peaked around the holiday season and
then fell. These deaths could not be explained solely on the
basis of daily temperature, but factors other than temperature,
such as superimposed respiratory infection, behavioral changes
around the holiday time, including increased food, salt, and
alcohol consumption, and emotional and psychological stress,
contributed to the increased in death in December and the fall
after January.

Khurana, Wander and Singh (1999) studied the coronary
risk factor profile in 80 individuals. Forty individuals (25
males, 15 females) aged 30 years or above were compared to
their respective siblings of the same age group who had
migrated to urban areas and had been residing there for at least
a period of 8-10 years. Only such subjects were selected from
rural areas in Ludhiana district whose one sibling was residing
in Ludhiana city. It was observed that the prevalence of
important coronary risk factors like sedentary lifestyle, body-
mass index (BMI), and central obesity were significantly higher
in urban siblings as compared to their rural counterparts. The
difference in BMI in the two groups was statistically significant. Prevalence of obesity was 45% in urban vs 22.5% in rural group and central obesity was 75% in urban vs 40% in rural group. Waist-hip ratio (WHR) was significantly higher in urban as compared to rural group. The prevalence of hypertension and diabetes mellitus was 30% vs 20% and 7.5% vs 5% in urban and rural subjects, respectively. Similarly, HDL-cholesterol levels were higher in rural subjects and triglyceride levels were higher in urban group. Thus, the whole coronary risk factor profile was found to be worse in urban as compared to rural siblings. The study showed that urban migration in Indian situation worsens the coronary risk factor profile in individuals and environmental factors play a significant role in coronary risk factor profile of rural and urban siblings.

Hazra et al. (1999) conducted a study to determine the significance of Lp(a) and lipid profile in young patients (upto 40 years) with MI. A total number of 27 young infarcts with 29 age-matched controls were included in the study (control group 17 to 40 years, mean 27 ± 7 years; infarct group 17 to 38 years, mean 31 ± 3.7 years). Fasting blood samples were taken within 24 hrs of AMI and subjected to analysis for Lp(a) and complete lipid profile. The results indicated that Lp(a) level was significantly higher in the infarct group, whereas HDL-
cholesterol was low in infarction patients. Triglyceride levels were also significantly higher compared to the control group. They concluded that Lp(a), HDL-cholesterol, and triglycerides are important risk factors in young infarct patients.

Raghu et al. (1999) determined the association between various haemostatic factors and CAD. Eighty patients with angiographically proven CAD were compared with 20 age-matched controls without CAD. The prevalence of various traditional risk factors, i.e., diabetes, hypertension, dyslipidemia, smoking and obesity were similar in both the groups. The levels of factor VIII, factor V, and fibrinogen were estimated. Patients with CAD had higher levels of factor V and fibrinogen but this was not statistically significant. The level of factor VII coagulant activity were not different between the two groups, even through the patients with CAD had lower levels. They suggested that larger prospective controlled studies are needed to determine the prevalence and significance of various non-conventional risk factors in the Indian setting.

Espnes et al. (1999) carried out a study to investigate the presence of negative emotions and Type -A behavior in a group of 102, 40 year old men and women. The National Institute of Public Health in Norway carried out the data-collection as a part of their CHD risk factor screenings. The correlation between
hostility and total cholesterol is negative as is that between systolic blood pressure and the feeling of guilt for women. There was no further support for earlier findings of relationships between either Type-A behavior pattern and negative emotions or Type-A and elevated cholesterol values.

Murberg et al. (1999) evaluated the relationship between depressed mood (depression, emotional distress) disease-specific subjective health symptoms and mortality risk among patients with congestive heart failure. Proportional hazard models were used to evaluate the effects of selected biomedical subjective health and psychological variables on mortality among 119 clinically stable patients (71.4% men; mean age 65.7 years.) with symptomatic heart failure, recruited from an outpatient cardiology practice. 20 deaths were registered during the 24-month period of data collection, all from cardiac cases. The results indicated that depressed mood was a significant predictor of mortality. In contrast, subjective health was not a significant predictor of mortality. The results indicate that depressed mood is significantly related to increased mortality risk among heart failure patients.

Moller et al. (1999) studied anger as a trigger of acute MI and explored potential affect modification by usual behavioral patterns related to hostility. Exposure in the period immediately
preceding MI was compared with exposure during a control period for each case. From April 1993 to December 1994, 699 patients admitted to coronary care units in Stockholm County were interviewed. During a period of one hour after an episode of anger, with an intensity of at least “very angry”, the relative risk of MI was 90. In patients with premonitory symptoms, the time of disease initiation may be misclassified. When restricting the analyses to those without such symptoms, the trigger risk was 15.7. The possibility of examining effect modification was limited by a lack of statistical power (8 exposed cases). Results of the analyses suggested, however, an increased trigger effect among subjects reporting non-hostile usual behavior patterns, non overt strategies of coping with aggressive situations (not protesting when being treated unfairly), and non use of β blockers. The hypothesis that anger may trigger MI is further supported with an increased risk lasting for approximately 1 hour after an outburst of anger.

Bages et al. (1999) conducted a study in which 32 first MI cases (mean age 50.69 years) and 42 healthy controls (mean age 47.76 years) were compared with respect to vital exhaustion (VE), a state characterized by loss of energy, increased irritability, and feelings of demoralization. This state has been found to precede the onset of cardiac events. Subjects also
responded to questionnaires on Type A behavior; anger expression (Anger In, Anger Out, and Anger Control), and positive and negative self-concept. The results show that VE discriminated well between MI patients and controls even when controlling for age, smoking, and exercise. The odds ratio decreased to 12.34 when controlling for SES. Groups also differed in Anger In but not in Anger Out, Anger control, negative or positive self-concept. Anger In was correlated to VE in all subjects pointing to the relevance of withholding emotions in relation to exhaustion. Exhaustion was strongly associated with negative self-concept in the MI case group only but significantly discriminated between cases and controls when adjusted for negative self-concept.

Gabhainn et al (1999) examined CHD attitudes in 74 adults of varying backgrounds and employed by a local government organization or a local teaching hospital. Group discussion questions were based on a number of models of health behavior, and constructed to examine subject's knowledge and views about control and change. Results show that subjects displayed significant knowledge about the disease, but exhibited mixed Loci of control and low motivation to change behaviors. Men were generally less motivated to change than women; older men considered it too late to make positive
changes, while young men considered it too soon.

Terris et al. (1999) presented a paper in which they pointed out that social class differences have been largely ignored in the development of programs to prevent coronary heart disease. They gave specific recommendations to correct this glaring defect, including giving priority to the reduction of risk factor prevalence among low-income blue collar and white collar workers, strengthening regulatory taxation, and other measures that directly impact all classes of the population, reversing the declining living standards of large segments of the US population which result from current economic and political policy, and greatly expanding the resources available for public health programs from their grossly inadequate level at the present time.

Winkleby et al. (1999) analyzed data taken from 10,029 black, Mexican-American, and White females and males, ages 25-64 from a large national survey to examine the independent associations of two indicators of socio-economic status (SES) (education and income) and ethnicity with six primary cardiovascular disease (CVD) risk factors. They then used data on smoking that reflected a temporal sequence to examine the extent to which SES and ethnicity influenced smoking at three different time points, from smoking onset, to a serious quit
attempt, to successful quitting. These analyses provide an understanding of the relationship between SES, ethnicity, and CVD risk factors and suggest that if the timing, focus, and content of intervention programs take pathways into account they will result in more successful outcomes.

Pickering (1999) discussed the gradient between the prevalence of cardiovascular disease (CVD) with socio economic status (SES). He points out that people from lower SES have more disease. Several studies have examined the roles of major CVD risk factors for explaining this gradient. There is a strong SES gradient for smoking which parallels the gradient in disease, but the gradient for hypertension and cholesterol are weak or absent. Central obesity and physical inactivity may also be contributory factors. In the US, there is a strong association between SES and race, and it is suggested that the higher prevalence of hypertension and cardiovascular disease in blacks may be attributed to psychosocial factors, including those related to SES. The possible pathways by which SES affects CVD include effects of chronic stress mediated by the brain, differences in lifestyles and behavior patterns, and access to health care. At the present time, the second of these is the strongest candidate, while the effects of stress have been little studied.
Peter and Siegrist (1999) presented an effort-reward imbalance model to identify particular work related stressors and coping characteristics that are likely to elicit sustained strain reactions and thus, in the long run, to impair the health of exposed individual. The model focuses on cardiovascular disease (CVD), as disease where health-adverse behaviors and psychosocial stress, in addition to genetic and physico-chemical determinants, were shown to have a direct impact on the development of other sclerosis and thrombosis as well as on the development to important somatic risk factors, such as hypertension.

Varma, et al. (2000) aimed at comparing stressful life events, self-efficacy beliefs and psychological distress of acute myocardial infarction patients admitted in a coronary care unit, with those at coronary risk (two or more major coronary risk factors) and normal controls. The normal controls were drawn from general population on the basis of a psychological screening test. The subjects of coronary risk and normal controls were age-and sex-matched for baseline characteristics with myocardial infarction patients. All the patients were subjected to psychometric tests including Presumptive Stressful Life Events Scale, Self- Efficacy Scale and General Health Questionnaire – 28 (GHQ). The trends of this study including 15
consecutive myocardial infarction patients, 15 coronary risk subjects and 15 normal controls show that myocardial infarction patients and those at coronary risk have higher Stressful Life Events score and psychological distress levels as compared to normal population (p<0.01). The three subgroups do not differ in their self-efficacy beliefs.

Parale et al. (2000) carried out a study on 60 cases of acute coronary syndrome admitted in General Hospital, Solapur. The age group was 25 to 80 years (mean 52.5 years). The sample included 43 males and 17 females. Thirty-eight patients had anterior wall acute myocardial infarction (AMI). 15 had inferior wall AMI; 4 had non Q infarction and 3 had unstable angina. A detailed history of happenings in 48 hours prior to index episode was elicited so as to know whether a particular factor could have triggered it. A questionnaire developed by Holmes and Rahe was used to study life changes events in each case. A score of more than 150 is indicative of 37 percent chance of illness in the next year. Type of personality in each case was assessed. Thirty-two (53.3%) patients had definite triggering factors out of which 9 patients gave history of traveling, 5 gave history of quarrel, 8 had history of financial problems, 7 patients gave history of physical strain and 3 had history of emotional stress. In more than 50 percent of the cases, a triggering factor can be
identified which could have led to acute coronary syndrome. A triggering factor is more likely to be present in the group of patients with type A personality, significant Rahe's Scale score and with risk factors than in other patients. A better understanding of these triggers can help in preventive strategies in acute coronary syndromes.

Abraham et al. (2000) carried out a prospective cohort study of 4493 elderly Americans (≥ 65 years), who were enrolled in the Cardiovascular Health Study. These participants were free of CVD at baseline and provided annual information on their depressive status, which was assessed using the Depression Scale of the Center for Epidemiological Studies. These subjects were followed for 6 years for the development of CHD and mortality. The cumulative mean depression score was assessed for each participant up to the time of event (maximum 6-year follow-up). Among participants with the highest cumulative mean depression scores, the risk of CHD increased by 40% and risk of death by 60% compared with those who had the lowest mean scores. It was concluded that among elderly Americans, depressive symptoms constitute an independent risk factor for the development of CHD and total mortality.

Mayou et al. (2000) investigated emotional distress immediately after MI as a predictor of physical, psychological,
and social outcomes and resource use. Demographic and cardiological data were obtained for 347, 30-79 year olds who had an MI. Hospital survivors were interviewed and completed self-report assessment of mental state and quality of life at baseline and 3 months and 1 year later. 15% of patients scored as probable cases of anxiety and depression. They were more likely than noncases to report pre-MI distress and poor adjustment. There was an improvement at 3 months, but little overall or individual change after that time. Anxiety and depression (measured with the Hospital Anxiety and Depression scale) did not predict subsequent mortality but did predict poor outcome at 1 year on all dimensions of the 36-item short form quality of life measure and on specific measures of every day activity and reports of chest pain, use of primary care resources, and secondary prevention lifestyle changes. Subjects who are distressed in the hospital are at high risk of adverse psychological and quality of life outcomes.

Sher (2000) discussed the role of psychological factors in occurrence of heart disease in his paper. Studies of psychiatric patients, community samples, and patients with known heart disease demonstrated that depressive disorders, stressful life events, and poor social support are associated with increased incidence, morbidity, and mortality of atherosclerotic heart
disease. Considerable evidence suggests that depression is an independent risk factor in the pathophysiologic progression of CVD. Although depression, stress, and poor social support are risk factors, the exact mechanism by which they affect heart disease is not as yet well understood. She proposes that the immune system may be involved in the effects of psychological factors on the cardiovascular system.

Kubzansky and Kawachi (2000) considered the nature and function of emotion, reviewed epidemiological evidence for an association between three negative emotions (anger, anxiety, depression) and CHD, discussed the mechanisms by which emotions may be linked to CHD, and considered this evidence in light of theoretical insights provided by mainstream psychological research. The authors collected articles published between 1980-1999 on the relationship between each negative emotion and CHD. Review articles or chapters published during the same time period that considered mechanisms by which emotions may increase CHD risk were also collected. The results show that anxiety is involved in the onset of CHD, whereas evidence for an association between anger and CHD is limited but suggestive. Although depression has consistently been linked to mortality following a MI, evidence for its role in the onset of coronary disease is quite mixed. They concluded
that numerous unresolved issues leave the current understanding of the emotion-health relationship incomplete. Psychological theories of emotion are considered to help address gaps in knowledge. Growing evidence indicates that negative emotions may influence the development of CHD.

Weilgosz and Nolan (2000) examined the development of current thinking on the relationship between behavioral factors and ischemic heart disease with the latter being viewed as an epidemic. A nonsystematic review of the subject was conducted. The results show that atherogenic components of the coronary prone on type A behavior pattern, including hostility, cynicism, and suppression of anger as well as stress, reactivity, depression, and social isolation, are emerging as particularly significant behavioral characteristics although their pathophysiology is not yet fully understood. The authors maintain that effective patient management, particularly for lifestyle modification, requires an appreciation of an individual's stage in their readiness to change. They concluded that the control and prevention of CVDs depend on a multidisciplinary approach that recognizes the importance and intricacies of lifestyle behaviors.

Mahajan, Mohan, and Sehgal (2000) studied the role of psychological risk factors, e.g. personality, stress, anger
expression, styles and hostility in addition to classical risk factors like heredity, cholesterol, smoking and blood pressure in coronary artery disease (CAD). The sample comprised of 100 patients (50 males and 50 females) of CAD and of 100 matched healthy controls. Results gave an overwhelming support to the aetiological role of psychosocial factors in CAD. Further, it was revealed that they play more toxic role in female patients. Search from type A behavior has moved to the role played by anger, hostility, and aggression triad.

Whiteman et al. (2000) wrote about the periodic reviews and meta-analyses which reinforce the importance of prospective, longitudinal studies for revealing causal directions and identified the specific relationship between Type A traits or expressive hostility and CHD. In the Edinburgh Artery Study (EAS), hostility related traits and data on CV events were collected over 5 years for 55-74 year olds (809 men and 783 women). Two EAS studies investigated possible biological pathways by analyzing personality in relation to physical risk factors. Follow-up EAS studies focused on the temporal relationship between personality traits and incident CV events (both clinical detectable and sub clinical levels of disease). Results showed that (1) hostility-and dominance-related personality traits related to CV risk factors, and (2) these traits
also related to incident CV disease outcomes.

Fleet et al. (2000) reviewed existing literature examining the relationship between panic disorder (PD) and CAD. The authors specifically sought answers to the following questions: (1) what is the prevalence of PD in CAD patients? (2) what is the directionality of the relation between PD and CAD? (3) what mechanism may mediate the link between PD and CAD? Medline and Psychlit searches were conducted for the years 1980-1998. The results show that the prevalence of PD in both Cardiology outpatients and patients with documented CAD ranges from 10-50%. The association between PD and CAD appeared strongest in patients with atypical chest pain or symptoms that could not be fully explained by coronary status. There is some evidence linking phobic anxiety but not PD per se to CAD risk, but little evidence linking CAD to PD risk. Studies of the mechanisms linking PD to CAD are still in their infancy, but there is preliminary evidence linking PD to reduce heart rate variability and myocardial ischemia, to pathophysiological mechanisms related to CAD. They concluded that PD is prevalent in CAD patients, but the extent to which PD confers risk for and/or exacerbates CAD is unclear.

Jeejeebhoy et al. (2000) examined panic disorder’s cardiovascular symptoms and treatment in patients with and
without organic heart disease. Patients with Syndrome X, CAD and/or palpitations, in addition to panic disorder all present to Cardiologists. However, many patients go undiagnosed and ultimately place large costs on the health care system as a result. They concluded that panic disorder is a treatable condition and cardiologists could easily identify patients with panic disorder and intake appropriate therapy.

Appels et al. (2000) investigated the association between sudden cardiac arrest (SCA) and the behavioral factors of exhaustion and non expression of emotions. 99 victims of SCA (aged 36-70 years) and 119 coronary controls (mean age 60.9 years) participated in this study. With each case, information was collected from ambulance personnel, general practitioners, and/or family members or other witnesses about age, gender, circumstances surrounding SCA, and whether and by whom SCA had been witnessed. Information about the mental and physical state of cases and controls was collected by means of structured hetero anamnestic interviews and from the clinical records of general practitioners. The results show that victims of SCA were more often assessed as exhausted and closed by their family members than controls. A significant interaction between exhaustion and closeness on the risk of SCA was observed. Those who were exhausted and did not express their emotions
Siegman et al. (2000) investigated the relationship between antagonistic behavior, dominance, attitudinal hostility, and Coronary Heart Disease (CHD). 101 men and 95 women (mean age 55.2 years) referred for thallium stress testing were administered the Structured Interview and the Cook-Medley Hostility Scale. The Hostile Behavior Index (HBI) served as an index of antagonism and the frequency with which interviewees interrupted their interview served as a measure of dominance. On the basis of their medical history and thallium stress test results, 45 subjects were classified as having and 99 as not having CHD. Multivariate logistic regression revealed that both the HBI and dominance were independent risk factors for CHD. Of the two HBI component scores, indirect challenge and irritability, only the latter correlated significantly with CHD. Separate logistic regressions for men and women suggest that subtle, indirect manifestations of antagonism confer CHD risk in women and that more overt expressions of anger confer risk in men.

Davis et al. (2000) tested the hypotheses that high hostile
(HH₀) individuals show enhanced vascular responses and that low hostile (LH₀) individuals show enhanced myocardial responses to social stress, by examining hemodynamic responses of a low-anger interpersonal stressor. 40 male and 40 female undergraduates (age 18-30 yrs.) were categorized as high or low in hostility on the basis of median splits on the MMPI-derived Cook-Medley Hostility Scale. Subjects discussed a controversial topic with a confederate who disagreed with them and hemodynamic responses were assessed with impedance cardiography. HH₀ subjects exhibited greater increases in diastolic BP and total peripheral resistance and smaller increases in cardiac output during the interpersonal stressor than did LH₀ subjects. Systolic BP and heart-rate increases were greater among HH₀ relative to LH₀ females and comparable among LH₀ and HH₀ males. Affective responses (anger and anxiety) and task perceptions were generally similar for HH₀ and LH₀ subjects, but the relationship between task perception and hemodynamic responses varied on the basis of hostility level. Findings suggest that hostility in both men and women is associated with heightened vascular and dampened cardiac responsivity to interpersonal stress.

Smith et al. (2000) tested the hypotheses concerning the relationship of gender, hostility, and their interaction to blood
pressure (BP) and heart rate. 48 high and low hostile male and female college students were selected on the basis of the Cook Medley Hostility Scale. BP and heart rate were then recorded during a series of three experimental tasks: a physical stressor, a combined physical/emotional stressor, and a cognitive task. It was found that men had consistently higher BPs than women, while women had higher heart rates on two of the three stress tasks. High and low hostile subjects differed in heart rate and systolic BP under the cognitive and combined physical/emotional stress conditions. Moreover, hostility and gender interacted to affect heart rate. Results are discussed in terms of possible implication for the earlier development of CVD in men and women and the role of hostility in these disorders.

Rankin-Esquer et al. (2000) describes the physical expression of CHD, discusses non modifiable and modifiable risk factors, and focuses on the role of couple functioning in both the development of CHD and the recovery from a cardiac event. The effects of a cardiac event on the couple and family functioning are also described.

Weidner (2000) discussed the biological, behavioral, and psychosocial contributions to the gender gap in CHD. CHD is the No. 1 cause of death for both sexes in the industrialized
world, however, CHD mortality rates between these countries are larger than those between men and women, suggesting that biological factors are not the sole influences on the gender gap in CHD. Traditional coronary risk factors cannot explain the rapid increase in CHD mortality among middle-aged men in many of the newly independent states of Eastern Europe. However, Eastern European men score higher on stress-related psychosocial coronary risk factors (e.g. social isolation, vital exhaustion) than men living in the West. Comparisons between the sexes also reveal gender differences in psychosocial and behavioral coronary risk factors, including excessive alcohol consumption and smoking, favoring women. Overall, it appears that men’s coping with stressful events may be less adaptive physiologically, behaviorally, and emotionally, contributing to their increased risk for CHD.

Roger et al. (2000) tested the hypothesis that female sex was negatively associated with the care delivered to and the outcome of persons diagnosed in the emergency department (ED) with stable angina. Between 1985 and 1992, 2,271 residents of Olmsted County, Minnesota (1,306 men and 965 women), were seen in the ED for chest pain meeting criteria for unstable angina. Outcome measures included procedure used within 90 days after ED visit, all-cause mortality, and cardiac
events. There was an association between female sex and lesser use of cardiac procedure that could not be explained by measured sex differences in baseline characteristics. 88 percent of subjects receiving an ED diagnosis of unstable angina were classified as intermediate or high risk according to the Agency for Health Care Policy and Research guidelines and their survival was significantly worse than expected survival. This indicates that unstable angina partends a poor prognosis irrespective of sex. In survival analyses and after adjustment for age and other baseline characteristics, men were at increased risk for cardiac events and death.

Kumar et al. (2000) carried out a case-control study to assess the relative importance of various cardiovascular risk factors in Indian women. Sixty consecutive female patients (mean age 56.5 ± 6.2 years) presenting with acute myocardial infarction were taken up for the study. Fifty age-matched controls (mean age 56±6.5 years) were also included in the study. Several risk factors were included. It was observed that presence of hypertension, diabetes mellitus, elevated total cholesterol, raised LDLC, raised triglycerides and decreased HDLC correlated directly with increased risk of cardiovascular events. Apple-shaped obesity was present in more patients with acute MI. They concluded that it is important to identify as
many modifiable risk factors as possible in Indian women, so as to institute comprehensive measures to prevent cardiovascular risk.

Grover, Talwar, Bahl, and Ramamurthy (2000) examined data on 210 women, aged less than 49 years who were referred for coronary angiography, while being evaluated for chest pain during the period January 1996 to January 2000. Out of these, 124 (59%) patients had disease (group A) whereas 85 (41%) patients had insignificant disease or normal coronary arteries (group B). A review of their previous clinical records revealed that 35 patients had history of acute myocardial infarction. Group A patients had CAD on angiography and Group B patients had no CAD. A comparison of risk factors between the two groups revealed that there was a higher prevalence of hyperlipidemia (70.2% vs. 40%), diabetes mellitus (43% vs. 15%), hypertension (44% vs. 2.18%) in group A patients. Overall incidence of smoking was very low in all the 210 patients. 198 (94.2%) were subjected to treadmill test (TMT) prior to coronary angiography. TMT was positive for ischemia in 93 (75%) patients in group A and 56 (65%) in group B. Of the 124 patients with significant CAD, 70 percent patients had single vessel disease; 25 percent had double vessel disease; and only 5 percent had triple vessel disease.
Panigrahi, Baruah, Srinivas, and Abbayi (2000) set up the objective of their retrospective study to find out angiographic pattern of CAD in Indian women and to correlate it with the clinical and angiographic spectrum of CAD in men. Out of 1019 patients with angiographic evidence of CAD, 121 (12%) were female and 898 (88%) male. The mean age was 62±6.7 years (female) and 56±5.8 years (male). In females, more patients were referred for acute coronary syndrome [unstable angina (40%), myocardial infarction (39%)] than for chronic stable angina (21%). In males, referral pattern was equally distributed among all three subsets (unstable angina 33%; myocardial infarction 36%, and chronic stable angina 36%). At presentation, left ventricular dysfunction was less frequently seen in females than in males (11% vs 23%; p<0.05). Twenty six percent of total female patients were premenopausal in whom myocardial infarction was the commonest presentation (55%) and hypertension and hyperlipidemia were common risk factors (36% each). In the entire female population, hyperlipidemia was the commonest predisposing factor compared to male (55% vs 36%; p<0.01). The angiographic findings in female vs males were: 1-vessel disease (40% vs 32%), 2-vessel disease (31% vs 16%), 3-vessel disease (26% vs 38%), left main stenosis (2% vs 12%), coronary ectasia (0.9% vs 2%) and cogenital anomaly.
Gupta and Gupta et al. (2000) conducted two epidemiological studies in Jaipur. The first was performed in 1992-1994 and the second in 1999-2000. Subjects aged 20 years or older in randomly selected municipal blocks using voters' lists for enrollment were examined. Details of smoking or tobacco use, physical inactivity, hypertension, diabetes, and dyslipidemia were obtained. In the first study, 2112 subjects (1415 men, 797 women) were examined. In the second study, 632 subjects (346 men, 286 women) were examined. The study shows that there was a significant increase in prevalence of smoking or tobacco use, physical inactivity, diabetes, truncal obesity, and population cholesterol, low density lipoprotein, and triglyceride levels in an urban Indian population.

Hemingway et al. (2000) determined the impact of SES on CHD mortality in people with and without prevalent CHD at baseline. 17,907 male civil servants (aged 40-69 years) participated in this cohort study with a 25 year follow-up. SES was defined by four civil service employment grades. The main outcome measure was CHD mortality (2,695 deaths). Results show that SES was inversely associated with CHD mortality in civil servants with and without prevalent CHD at baseline.

Farooqi et al. (2000) identified key issues relating to
knowledge of and attitudes to lifestyle risk factors for CHD amongst South Asians aged over 40 years in the UK. A qualitative focus group analysis was carried out using randomly selected South Asians from general practitioner (GP) lists and South Asians attending community centers. Group discussions were taped, translated and transcribed. Participants expressed a range of attitudes to and different levels of knowledge of lifestyle risk factors for CHD. Barriers to improving lifestyle with respect to diet and exercise were identified, including lack of information (e.g. of how to cook traditional Indian food more healthily) and cultural barriers, such as lack of "women-only" exercise facilities. Participants perceived stress as an important cause of CHD, and stress directly related to ethnic minority. Status was described frequently. Language was identified as a key barrier to accessing health services. It is concluded that health professionals need to provide individually tailored health promotion for South Asians which avoids stereotyping, but recognizes potential cultural obstacles to change.

Ford, Ahluwalia, and Galuska (2000) examined the association between the frequencies of organizational and individual relationships and cigarette smoking, not having had a BP check during the proceeding 12 months, not having had a cholesterol check, not engaging in physical activity, and eating
fruits and vegetables fewer than five times per day among men and women (aged 18-70+ years). After adjusting for age, sex, race, educational attainment, marital status, and employment status, increases in organizational relationships were associated with decreases in all five behaviors; significant inverse linear trends were noted only for smoking and physical activity. For individual relationships, significant inverse linear trends were noted for not having a BP check, not having had a cholesterol check, and inadequate fruit and vegetable consumption. For physical inactivity, the shape of the relationship approximated threshold responses. For smoking, a significant positive linear trend was present. Results indicate that social relationships have a beneficial effect on several behaviors that directly or indirectly affect the risk of CHD.

Wamala et al. (2000) examined the occupational gradient in CHD risk in relation to job stress and other traditional risk factors in currently employed women. Data were used from the Stockholm Female Coronary Risk Study, a population based case-control study, comprising 292 women with CHD aged 65 years or younger and 292 age-matched healthy women (controls). An inversely graded association was observed between occupational class and CHD risk. Compared with the highest (executive/professional), women in the lowest
occupational class (semi/unskilled) had a four-fold increased age-adjusted risk for CHD. Simultaneous adjustment for traditional risk factors and job stress attenuated this risk to ≥ 45. Neither job control nor the Karasek demand-control model of job stress substantially explained the increased CHD risk of women in the lowest occupational classes. It is likely that lower occupational class working women face multiple and sometimes interacting sources of work and non-work stress that are mediated by behavioral and biological factors that increase their CHD risk.

Sarma and Sarma (2000) conducted a study on a total of 500 asymptomatic people from the Occupational Health Centre of Refinery Hospital and examined and looked for their various coronary risk factors like smoking, obesity, hypertension, family history of CHD, diabetes, dyslipidemia, body mass index, and sedentary lifestyle. These findings were compared with 400 people outside used as controls. The patients were in the age group 30 to 58 years. Smoking was found in 50 (10%) in study group and 60 (24%) in the control group; obesity in 24 (4.8%) in study group and 50 (12.5%) in control; family history of CHD in 22 (4.4%) in study group and 14 (3.5%) in controls; diabetes was found in 88 (17.6%) in study group and 8 (0.2%) in controls. In the lipid profile study, hypercholesterolemia (> 200
mg%), hypertriglyceridemia (>250 mg%), and low HDL (35 mg%) were found in 120 (24.0%), 66 (13.2%), and 15 (3.0%) in the study group as compared to 64 (16%), 52 (12.4%), and 9 (2.2%) in the control group. Sedentary lifestyle was seen in 400 (80%) subjects in the study group and 44 (11%) in the control group. Association of hypertension and sedentary lifestyle was found in 106 (21.2%), hypertension and diabetes in 45 (9.0%).

This study shows that sedentary lifestyle along with a high prevalence of hypertension and dyslipidemia constitute the three major risk factors in the industrial population for the development of CAD. Combination of two or three risk factors is more commonly encountered in the industrial population.

Molokhia et al. (2000) investigated cardiovascular risk factors and Dundee risk rank in Afro-Caribbeans attending one inner city general practice, and which methods of health promotion patients preferred. The authors assessed cardiovascular risk, including systolic and diastolic blood pressure, in 98 patients (aged 15-79 years) of Afro-Caribbean origin. Fifty percent of the patients had at least two risk factors for cardiovascular disease. Focus groups suggested that the barriers to effective health promotion included lack of risk awareness, cultural and lifestyle influences, time restrictions and language difficulties.
Lynch (2001) discussed how socioeconomic (SE) factors influence important behavioral and psychosocial risk factors for CAD. The first point of reference is to recognize that CVD itself is not randomly distributed among the population and the important risk factors for CVD are also not randomly assigned. Greater awareness of SE differences in these behavioral and psychosocial risk factors is important because they are the focus of many public health intervention efforts. Conceptualizations of the psychosocial and behavioral correlates of low SE position can be located somewhere on a continuum, with one end defined by the view that these psychosocial and behavioral characteristics are essentially maladaptive phenomena that result from poor lifestyle management and as such are amenable to cognitive, emotional, and behavioral modification. The other end of the continuum is represented by the idea that although these psychosocial states and health behaviors may be maladaptive in terms of health and longevity, they must be viewed primarily as responses to adverse conditions imposed by broader social and economic structures acting over the entire life course.

Albert et al. (2001) compared the risk of sudden death during and up to 30 minutes after an episode of vigorous exertion with that during periods of lighter exertion or none.
The study then evaluated whether habitual vigorous exercise modified the risk of sudden death that was associated with vigorous exertion. In addition, the relation of vigorous exercise to the overall risk of sudden death and non sudden death from CHD was assessed. During 12 years of follow up, 122 sudden deaths were confirmed among the 21,481 male physicians (aged 40-84 years) who were initially free of self-reported CVD and who provided information on their habitual level of exercise at baseline. The relative risk of sudden death during and upto 30 minutes after vigorous exertion was 16.9. However, the absolute risk of sudden death during any particular episode of vigorous exertion was extremely low (1 sudden death per 1.51 million episodes of exertion). Habitual vigorous exercise attenuated the relative risk of sudden death that was associated with an episode of vigorous exertion. The baseline level of exercise was not associated with the overall risk of subsequent sudden death.

Praveen et al. (2002) have identified patterns of Acute Coronary Syndromes (ACS) in India. Demographic and clinical data were recorded in hospital and at 30 days. There were 3092 males (77%; mean age 56.6±11.82 years) and 989 females (23%; mean age 61.84 ±10.49 years). Subjects ≤ 50 years of age comprised 29%. There were 1546 (37.8%) with unstable angina (UA) and 2535 (62.2%) with acute MI (AMI). Lower middle
class and poor patients comprised 68.7%. Demographic characteristics, risk factors and time profile of subjects with UA and AMI were analyzed. Current smokers were 1110 (27.2%). Significantly more women had a history of hypertension (53% vs 30.1%; p<0.0001) and diabetes (40% vs 26.8%; p<0.0001). At 30 days, mortality was higher in those with known hypertension (6.2% vs 4.2%; p<0.05), diabetes (6.6% vs 4.1%; p<0.01) and previous MI (6.3% vs 4.5%; p=0.052). This study has shown that Indian patients with ACS are younger, are from a poorer socioeconomic background, and have high rates of hypertension and diabetes. Proven therapies were being prescribed to patients for risk factors. Patients with previous hypertension, diabetes and MI had higher mortality at 30 days.

Yadav et al. (2002) examined conventional and non-conventional risk factors in 100 acute myocardial infarction (AMI) patients. Conventional risk factors like smoking, hypertension, diabetes, and dyslipidemia were studied in addition to some non conventional risk factors like lipoprotein (a) [Lp(a)] , homocysteine and hemostatic factors. They concluded that patients with AMI had a higher Lp(a) concentration than controls without AMI with a statistically significant difference. A significant number of patients (24%) were younger than 40 years of age and Lp(a) has a strong
association with AMI as an independent risk factor. Also an elevated plasma homocysteine level is an independent risk factor for AMI, and treatment with folic acid can decrease it effectively. This study highlights the importance of identifying as many modifiable risk factors as possible amongst conventional and non-conventional risk factors so as to evolve a comprehensive strategy for the prevention of cardiovascular risk.

Chandra and Dash (2002) have reported that 10 percent of the adult population in India is expected to suffer from coronary artery disease (CAD). The aim of their study was to determine the percentage of people harboring conventional risk factors of CAD which they were unaware of, in an asymptomatic healthy population. Five hundred healthy executives working in NTPC were screened for conventional risk factors. Their age range was 35 to 66 years (mean age 46.9 ± 5.0 years) and gender distribution was 446 males and 54 females. The body mass index was calculated and 45% of the study population was found to be obese (BMI>25). Hyperuricemia (uric acid>7.8) was found in 2.8%, hyperglycemia was found in 18.8% and hypertension in 28.6%. Increased total cholesterol (> 200 mg/dl) was found in 32.0 and low HDL cholesterol (< 30 mg/dl) was found in 3.4% high
triglycerides (>150 mg/dl) were found in 47.6% and increased LDL cholesterol (>150 mg/dl) in 10.0%. The commonest association was obesity (45%). Of the total number of people screened, 73.2% of patients were suffering from at least one risk factor; 22.3% had two and 26.8% had three or more risk factors for the development of CAD.

Achari, Thakur, and Sinha (2002) assessed five hundred twelve diabetics (335 males, 177 females) for the presence of coronary artery disease (CAD) by appropriate invasive and non-invasive methods (ECG, TMT, and coronary angiography when necessary) as well as for risk factor profile. Two hundred eighty-eight (56.25%) tested positive for CAD. Patients with CAD were older than those without CAD (mean age 59.4 vs 52.14 years; p<0.01) and also had a longer duration of diabetes (mean 10.99 vs 7.21 years in those without CAD, p=0.038). Hypertension was present in 118 with CAD (41%) as compared to 84 without CAD (37.5%) (p<0.01). Diabetes with CAD was more commonly seen in current or ex-smokers, 100 (34.7%) as compared to 45 without CAD (20.1%) (p<0.001). Obesity was commoner in diabetics with CAD (159 of 288, 55.2% as against 99 out of 224, 44.2%, without CAD) (p<0.001). Mean lipid levels showed slightly higher total cholesterol and LDL cholesterol: 205.3± 31.7 mg/dl and 121.6 ± 31.8 mg /dl in
diabetics with CAD vs 196.7 ± 32.8 mg/dl and 113.2 ± 32.4 mg/dl in patients without CAD (p<0.05). HDL, triglycerides, and lipoprotein (a) levels were not significantly different in the two groups. Microalbuminuria was present in 102 diabetic patients with CAD (35.4%) as compared to 65 patients without CAD (29.1%) (p<0.001). When these data were subjected to multivariate logistic regression analysis, only four factors were found to be strongly significant: age, obesity, microalbuminuria, and smoking. The importance of hypertension and dyslipidemia was eliminated. These findings suggest that apart from age, obesity and microalbuminuria may be better markers for diabetic CAD than traditional risk factors.

Patil et al. (2002) studied 152 women with Acute MI (AMI) for risk factors complications and mortality. Of these, 16 were pre-menopausal and 136 were post-menopausal. The mean age was 60.08 years. Hypertension (48.6%) and diabetes (30.9%) were the commonest risk factors; 21.3% had a previous history of MI, of whom 8.8% were on aspirin therapy and 14% were on beta-blocker therapy. Complications and mortality were more common in post-menopausal women. It was concluded that age and duration of post-menopausal period have a direct correlation to complications and mortality in women.

Kumbkarni et al. (2002) have reported that an epidemic of
Coronary artery disease (CAD) is engulfing the northern Indian population. However, to formulate effective preventive strategies to check this disease, the epidemiological data are deficient. They present the data of 383 (325 males, 58 females) consecutive healthy urban individuals who attended the executive health check-up program in the past six months. The mean age group of the individuals was 50.2±11 years. Sixty-one individuals (16%) were detected to be hypertensive while 56 (14.6%) were detected to have fasting blood sugar of more than 120 mg%. Two hundred seventy-five individuals (71%) were overweight (BMI>25) and 102 (27%) were obese (BMI>30). Mean cholesterol of the population was 188±38.75 mg% and the mean HDL was 45.25±9.77 mg%. One hundred fourteen individuals had HDL less than 40 mg%. LDL more than 100 mg% was present in 223 individuals (58.2%). Hypertriglycerideremia was present in 130 individuals (33%). Thirty-eight individuals (10%) were smokers in the study. They concluded that healthy urban individuals of Punjab are at high risk for developing CAD.

Gupta et al. (2002) examined the association of educational level as a marker of socio-economic status, with coronary risk factor prevalence in an Indian urban population. They performed surveys in randomly selected individuals aged ≥
20 years. One thousand one hundred twenty-three subjects (550 males, 573 females) were studied. Details of major coronary risk factors, i.e., smoking, physical inactivity, hypertension, diabetes, body mass index (BMI), waist-hip ratio and blood pressure were determined. Fasting blood was examined for glucose and lipid levels in 1082 (532 males, 550 females). Educational status was classified into group O (no formal education); group I (1-10 years); group II (11-15 years); and group III (≥16 years). In men, smoking/tobacco use was seen in 36.6%, physical inactivity in 28.5%, hypertension in 36.4%, history of diabetes or fasting glucose >125 mg/dl in 13.1%, obesity in 24.5%, and truncal obesity in 57.4%. In women, these were 11.7%, 22.6%, 37.5%, 11.1%, 30.2%, and 68.4%, respectively. In men low HDL-cholesterol (<40 mg/dl) was seen in 54.9%, high total cholesterol (≥ 200 mg/dl) in 37.4%, high LDL-cholesterol (≥130 mg/dl) in 37.0%, and high triglycerides (≥150 mg/dl) in 32.3%; while in women these were in 55.1%, 43.1%, 45.8%, and 28.6%, respectively. A significant inverse correlation of educational level was seen with smoking, fasting glucose, total cholesterol, LDL-cholesterol, and triglycerides. Positive correlation was seen with BMI, waist hip ratio, and hypertension prevalence. This study shows a significant burden of traditional coronary risk factors of smoking, obesity, truncal
obesity, diabetes, hypertension, high total and LDL-cholesterol and triglycerides and low HDL-cholesterol in the urban Indian population. Illiterate and low-education status subjects who are socio-economically disadvantaged have a greater prevalence of smoking, diabetes, and dyslipidemias.

Xavier et al. (2002) studied 4040 subjects, of which 3092 (76.5%) were males (mean age 56.6±11.82 years) and 948 (23.5%) were females (mean age 61.84±10.49 years). Of the total, 1157 (28.7%) were ≤ 50 years of age; 1546 (38.7%) had unstable angina; and the rest acute myocardial infarction (AMI). There were more smokers in the younger age group. Interventions were more common in the ≤ 50 years age group. Death was lower in the younger group. Other outcomes such as reinfarction, stroke, shock and cardiac arrest were not different. There are two key messages from this study: first, younger patients smokes more, were more aggressively managed and had better outcomes. Second, with such a large proportion of young patients (almost 30%), definitive measures for primary and secondary prevention must be instituted at the earliest, especially anti-smoking measures.

Singh, Arora, Nayyar, Arora, and Singh (2002) have studied the clinical profile and risk factors for MI in a young population. Fifty cases of acute MI of either sex, less than 45
years of age were studied. The diagnosis of MI was based upon clinical spectrum, ECG and rise in the level of the cardiac enzyme. The risk factors for CAD, site of MI and its complications were evaluated. Forty-two patients were male and 8 female. The mean age was 36.85 years. Thirty six patients had anterior, two had posterior, and 15 had inferior wall MI. Twenty had history of smoking; 19 were hypertensive; 12 were obese; 5 had diabetes mellitus; 19 had dyslipidemia; 17 had a positive family history of IHD whereas 5 did not have any risk factors. Three (5.55\%) of the patients expired. They concluded that MI can occur at a younger age. The incidence was maximum in the fourth decade and there was a male preponderance. Anterior wall MI was more common than inferior and posterior wall MI. Complications were more in those who had a previous history of IHD. Smoking, dyslipidemia, hypertension, obesity and diabetes mellitus were the leading risk factors, either single or in combination, but in 10\% no risk factor could be identified.

Singh, et al. (2002) have examined the clinical profile of fresh myocardial infarction (MI) and risk factors for CAD in young vs old patients. Seventy-five patients of fresh MI of either sex were studied. The risk factors for MI were recorded. Young MI was considered if the age of the patient was less than 45 years and old if above 60 years of age. The patients were
divided into two groups: group I comprised young and group II old patients. Fifty patients were in group I and 25 in group II. The mean age of patients was 36.85 years (group I) and 69.84 years (group II). In group I, 35 had anterior, 2 had posterior, 13 had inferior wall MI; in group II, 8 had anterior; 6 anteroseptal; 10 inferior; and 1 had RV infarction. Risk factors in group I were smoking in 18, hypertension in 16, obesity in 9, diabetes mellitus in 5, dyslipidemia in 16, and positive family history of ischemic heart disease in 14, and no risk factor could be identified in 5, whereas in group II the risk factors were smoking in 15, hypertension in 6, DM in 5, and family history of IHD in 1. Smoking was a dominant risk factor for CAD in young as well as old patients followed by hypertension and dyslipidemia. Two patients died in group I, and 4 in group II. They concluded that, in the present scenario, MI can occur at any age. In the younger age group, the incidence was maximum in the fourth decade and there was male preponderance, anterior wall MI was more common; whereas in group II, inferior wall MI was more common. Smoking was the dominant and major risk factor in the young as well as the older age group along with dyslipidemia, hypertension and obesity.

Shakar et al. (2002) made an attempt to assess the incidence of mortality due to AMI and associated risk factors.
Sample was divided into two groups according to age group I (20-35 years) and group II (36-80 years). Criteria assessed were associated diseases, site of infarction, surgical interventions, and biochemical parameters investigated. Results show that the incidence of myocardial infarction (MI) was significant in younger individuals (47.22%) vs in the elderly (52.78%), the peak being in the age group of 30-45 years in males and 40-55 years in females. Males predominate in both the groups. Smoking was the main risk factor—both in the younger as also in the elderly population (77% and 67% respectively) followed by hypertension (72% vs 80%) and diabetes mellitus (22% vs 34.5%). Mortality was higher in the elderly (22.68%) compared to the younger group (12.52%). Despite the fact that atherosclerotic changes are higher as age advances in this study a significant number of patients below the age of 35 years developed MI. Stress, smoking, and hypertension are the precipitating factors in the initiation of AMI in young populations.

Yadav et al. (2002) studied ninety consecutive cases of coronary artery disease (CAD). Their levels of lipoprotein (a) [Lp(a)] were compared with 30 matching controls. There were 55 cases of acute myocardial infarction (AMI), and 22 cases of unstable angina and 13 of stable angina. The lipid profile and
Lp(a) levels were analyzed. The mean serum Lp(a) in cases of CAD was 41± 2.58 mg/dl which is significantly higher than the control value of 24± 3.18 mg/dl (p<0.01). Analysis of subgroups of AMI and angina revealed that there was a significant difference in Lp(a) level of 47.4±2.5 mg % in the AMI group as compared to 30 ± 25 mg % in the angina group (p<0.01). Taking 30 mg% Lp(a) as cut-off value, 71% of cases of CAD had high Lp(a) as compared to 23% in control cases (p<0.01). Dyslipidemias were present in 73% of CAD cases and 53% of controls. The commonest lipid abnormality observed was increased LDL levels in cases of CAD and hypertriglyceridemia in controls. CAD cases with dyslipidemia had high levels of Lp(a) in 81% as compared to 54% in controls. It is observed that Lp(a) levels are significantly high in CAD cases and dyslipidemias are commonly associated with CAD.

**CAD Risk Factor Intervention**

Several studies have been conducted and research articles written on the various interventional strategies which help control the rising incidence of CAD risk factors, both in India and aboard. Some relevant literature reviewed in this context has been presented under this section.

George et al. (1998) assessed the effectiveness of a cognitive-behavioral intervention program in (a) modifying
Type A Behavior Pattern (TABP), (b) reducing anxiety, and (c) changing maladaptive cognitions in a 55- years old married male patient with coronary heart disease (CHD). Pre-, mid-, and post-treatment assessment were done using Jenkins Activity Survey, Emotional Control Scale, State-Trait Anxiety Inventory, Dysfunctional Attitude Scale, and Physiological measures of galvanic skin response. The cognitive-behavioral intervention program consisted of coronary counseling, education about TABP, behavioral counseling of significant others, and stress inoculation training. Clinically significant assessment scores indicate the effectiveness of the intervention program in the modification of TABP and associated problems.

Lowensteyn I, et al. (1998) examined the degree to which family physicians are willing to adopt a new diagnostic tool into their busy clinical practice, examined patient response to this new approach, and provided a preliminary evaluation of its effectiveness in terms of risk factor modification. Subjects included 253 community-based physicians, randomized into profile and control groups, and 958 of their patients (aged 30-74 years). The profile group physicians received coronary risk profile for the patients within 10 working days after the baseline patient assessment providing early feedback. Patients' coronary risk factors were evaluated at baseline and at 3-6 months.
follow-up. The profile group had a significantly higher ration of high-risk/low-risk patients who returned for a follow-up visit. Computer-generated coronary risk profile can be effective in assisting physicians to identify high-risk patients. Their use is also associated with significantly greater improvements in the serum profiles and the overall coronary risk of these patients.

Hiremath, Sathe, and Durairaj (1999) assessed the effect of comprehensive lifestyle change on atherosclerotic coronary artery stenosis in 20 patients. These patients were assigned a low-fat vegetarian diet, aerobic and yogic exercises, and stress management techniques like meditation etc. After 15 months of rigorous implementation of this program, these patients showed improvement in their exercise capacity and decrease in total serum cholesterol and low-density lipoprotein (LDL) levels. Regression of atherosclerosis was seen angiographically in 38% of coronary lesions. The results demonstrate that comprehensive lifestyle changes favorably affect the regression of atherosclerotic CAD.

Magdum et al. (1999) assessed the feasibility, cost-effectiveness and short-term benefits of aggressive and sustained lifestyle modification measures in regression of CAD. Sixty patients with angiographically demonstrated CAD were included in the study. Thirty patients in the study group
underwent an aggressive in-hospital lifestyle modification program under direct supervision. The program included a 5-day workshop consisting of lectures about health education and dietary intervention and practical demonstration of various exercises, yoga, and relaxation. Patients requiring counseling assistance to stop smoking were counseled at multiple sessions. The patients were followed-up at monthly intervals for assessment of compliance with respect to various interventions and for further motivation. Thirty patients in the control were advised usual lifestyle modification measures. Both the groups were similar with respect to baseline clinical characteristics, risk factor profile, and drug therapy. All the patients were followed up for a period of 3 months and assessed for changes in risk factors and clinical events. Dietary compliance was satisfactory in 90% patients in the study group as compared to 23.3% in the control group. A significantly higher number of patients were able to quit smoking in the study group. There was a significant reduction in the mean stress score in patients of the study group and significant fall in total cholesterol and LDL cholesterol. The changes in HDL and triglyceride levels were not statistically significant. Also, there were no significant differences in the blood sugar levels and the number and dosage of anti-diabetic and antihypertensive medications. There were
significant reductions in the number of angina episodes per week in the study group. More patients in the study group reported sense of well-being and an improved ability to cope with stress in daily life. There was no new MIs or deaths in either group at the end of 3 months. Comprehensive lifestyle changes are effective in producing significant beneficial alternations in various risk factors for CAD. These changes are useful in providing symptomatic relief and improvement in the quality of life. The long-term benefit of these alternations remains to be studied.

Nisbeth, Klausen, and Andersen (2000) studied the need for counseling and its effect on willingness and ability to change lifestyle, and subsequent changes in CHD risk factors. 85 male employees in a computer company (aged 25-45 years) participated. Subjects were randomized into an intervention group (I group) and a control group. The I group was divided into subgroups based on baseline behavior and risk factor status. After an initial health examination, participants from the I-group were counseled at baseline and after 5 months. An exercise group was advised to exercise aerobically 3 times /week, a diet group to reduce the intake of saturated fat and increase fish products, and smokers to quit smoking. 40 subjects were recommended one or more behavioral changes and eight
had no need. 34 were willing to make behavioral changes. Changes were evaluated after one year. Compared to the control group the fitness level increased and body weight decreased in the I group.

Sebregts, Falger, and Bar (2000) questioned whether nonpharmacological interventions actually contribute favorably (1) to risk factor modification in patients with CHD, and in doing so, (2) to a reduction in mortality and morbidity or to favorable changes in atherosclerotic stenosis. A computer search was performed on Medline and Psychlit, and relevant articles mentioned with the references but not found in these files, were also used. The authors restricted themselves to nonpharmacological interventions aimed at modification of smoking, serum cholesterol, physical exercise, type A behavior, hypertension, or body weight. The findings show that interventions aimed at healthy lifestyles may stimulate smoking cessation rates, reduce elevated serum total and LDL cholesterol concentrations, and favorably modify type A behavior in CHD patients. Moreover, reduction of coronary atherosclerosis has been reported after intensive lifestyle and exercise interventions, whereas exercise, and type A interventions may also lead to reduced CHD morbidity and mortality. As for hypertension and obesity, studies aimed at secondary prevention
Frasure Smith, Lesperance, and Talojic (2000) examined the prognostic importance of a variety of psychosocial factors, including depression, following MI. Baseline interviews, including standardized measures, were conducted with patients with a diagnosis of acute MI. Data on patients' medical condition was obtained from hospital charts. Patients or their family members were contacted at 6, 12, and 18 months after MI to assess patient survival status. Over the full 18 months of follow-up, 21 patients died, including 19 from cardiac causes and two from cancer. Major depression significantly increased the risk of mortality at all 3 timepoints. However, the majority of its impact was during the first 6 months. Results suggest that the identification of important psychological variables after a heart attack facilitates the development of therapeutic interventions to improve the prognosis following MI.

Pant et al. (2000) evaluated the efficacy of intensive care over usual care in modifying the modifiable risk factors in manifest CAD patients over 6 months follow-up. Sixty patients (mean age 51 years) were prospectively evaluated by randomizing 30 each in two groups, usual and intensive care group. In intensive care group, intensification of care was achieved by more frequent visits, group discussion, education
program, and advice of dietician. At the end of 6 months follow-up, analysis was done to see the effect of intensive care over usual care in achieving the desirable status among some modifiable risk factors such as hypertension, diabetes mellitus, smoking, obesity, LDL and HDL levels, and triglyceride levels. The study indicates that patients getting intensive care show positive trend in efficacy, although statistically not much significant. So, it is proposed that intensive care may be useful over usual care in achieving desirable status of modifiable risk factors in a more effective way.

Krishnamoorthy and Dash (2000) analyzed the motivation for cessation of smoking in 120 patients with coronary artery disease admitted for acute coronary syndromes (ACS) or for coronary revascularization (CR) at one-year follow-up. Age of ex-smokers (group I, n=84) was 42.4 ± 12.8 years and that of continuing smokers (group II, n=36) was 46.3 ± 18.5 years. Thirty-three of the 38 patients admitted for CR stopped smoking. But only 51 of the 82 patients with ACS did so. For group I, the motivation was provided by doctor, paramedic staff, family or friends, media etc. and the reasons given for motivation included-health, economic, suffering, family, and others. The group II gave various reasons for continued smoking like doctor did not tell, media advertising, withdrawal
symptoms, peer pressure, passive smoking etc. the researchers concluded that counseling is more effective when done repeatedly and by multiple persons. Doctors should spend more time on counseling. Emphasis should be on socio-economic factors as a motivator to stop smoking since many are aware of the health factor. Passive smoking and media are important contributors to continued smoking. Media as well as medical and paramedical curricula need to emphasize more on the evils of smoking.

Priscilla, Paul, and Cherian (2002) aimed to identify the risk factors prevailing before the onset of CAD in Post Coronary Artery Bypass Graft (CABG) patients. The purpose of their study was to prevent relapse or reoccurrence of the disease through lifestyle modification based on Dr. Dean Ornish's program for reversing heart diseases. The study sample consisted of 167 patients (147 men and 20 women) who underwent CABG. The age group of the patients ranged from 28 to 64 years with the mean age of 51.5 ± 6.0 years. A qualitative analysis of the data revealed certain psychological risk factors like sleep disturbance, anxiety, and depression to be the predominant factors prevailing before the onset of the CAD.

Kaul, Seth, and Manchanda (2002) observed the effects of Yoga lifestyle intervention on endothelial dysfunction in
patients with CAD. Eighteen patients with angiographically proven CAD were enrolled in the study. They took part in the yoga lifestyle modification program consisting of dietary changes, exercise and stress relaxation exercises. Endothelial function was studied at baseline and at four months of yogic lifestyle change. Four months of yogic lifestyle modification showed a trend towards improvement in endothelial dysfunction, though it did not reach statistical significance, perhaps due to the short period of yogic intervention as well as the small sample studied.

Varma et al. (2002) evaluated the scope of psychological intervention in the management of acute coronary syndromes (ACS). Consecutive patients of ACS were enrolled at the time of discharge from CCU. They were assigned either usual medical care (group I) or additional psychological intervention (group II) after psychological assessment based on self reporting questionnaires. The exclusion criteria included inability to participate or age > 70 years. All the patients were put on a comprehensive psychological intervention including psychologist- administered group therapy and education, muscle relaxation and breathing techniques, stress management, biofeedback, cognitive behavioral treatment, interpersonal and individual therapy administered in 12 sessions over 6 months.
The effect was observed on psychological distress levels, biological risk factor reduction, cardiovascular morbidity and mortality at 1 month and 6 month intervals. Preliminary results suggest significant reduction in psychological distress in group II and a superior biological factor modification.

Kumar et al. (2000) evaluated prospectively the dietary pattern and role of dietary modification in 58 patients of proven coronary artery disease. Of these, 52 were male, and their mean age was 42.6 ± 12.3 years. These patients were advised a diet according to the NCEP step II diet along with advice for weight reduction and regular aerobic exercise. After 6 weeks of dietary modification there was no significant change in weight. Fifty-six patients adhered to the exercise program as advised. Their mean caloric intakes was 1757.2 ± 375.0 Kcal. There was a significant increase in the intake of polyunsaturated fat, soluble and total fiber, but there was no significant change in total calories, carbohydrate, protein, non saturated fat, saturated and total fat after dietary therapy. There was a significant decrease of 19.5% of total cholesterol (TC), 14.5% decrease of HDL cholesterol, 24.8% decrease of LDL cholesterol, but no significant decrease in triglyceride and TC-to-HDL ratio. They concluded that the dietary pattern of Indian patients with CAD is different from their western counterparts. ATP III guidelines
may not be useful for Indian patients. Lifestyle medication is more important than dietary therapy alone.

**Coping Behavior of CAD Patients**

Review of literature reveals numerous studies related to the coping behavior of coronary artery disease patients. The studies reported under this section highlight the role of psychosocial and physical coping process in managing coronary artery diseases.

Gerin, Pieper, Marchese, and Pickering (1992) examined the effects of active and passive coping on cardiovascular response to stress. The study was designed to vary level of control and availability of active coping responses while maintaining effort constant. Sixty female undergraduates performed word-search puzzles while blood pressure and heart rate were monitored. Subjects were divided into three groups: In condition 1, reinforcement was continued on the subjects' performance only; in condition 2 and 3, reinforcement was continued on the joint performance of the subject and a poorly performing confederate. In condition 2nd, subjects could help their partners (active coping); in condition 3, they could not (passive coping). Cardiovascular responses were significantly greater in the passive-coping condition than in the other two conditions, thus indicating that with effort held constant,
enhanced control diminishes reactivity.

Demollet and de Potter (1992) have used cluster analysis to delineate coping subtypes in 166 Belgian men (aged 35-73 years) with coronary heart disease who completed an outpatient rehabilitation program. These subtypes were identified on the basis of three well-defined superordinate traits: negative affectivity, social inhibition, and self-deception. Four coping subtypes were identified: low-negative affectivity, high negative affectivity, inhibited, and repressive. The accuracy of the resulting classification was demonstrated across parallel data set and was further validated against external, health-related correlates. The identified coping subtypes were significantly related to Type A behavior and anger-in, return to work, prevalence of chest-pain complaints, and use of minor tranquilizers and sleeping pills.

Landerville and Vezina (1994) determined if elderly coronary artery disease (CAD) patients high and low in depression differ on how they appraise stressors associated with CAD and how they cope with such stressors. 20 old CAD patients high in depressive symptoms and 35 old CAD patients low in depressive symptoms (aged 65-84 years) reported their most severe stressor and related how they coped with it. Groups were homogenous in sociodemographic, health, and stressor-
related characteristics. CAD subjects high in depressive symptoms reported more harm to their own physical well-being and more threat to their self-esteem and a loved one's well-being. They also reported more escape-avoidance coping. Primary appraisal and escapist coping may be useful in the explanation of depressive symptoms in elderly CAD patients.

De Ridder et al. (1997) used a concept mapping method to sort out the beliefs of 172 patients on coping with illness and coping with the health care system into two dimensions (priority and content). Statistical analysis revealed 10 beliefs on coping with illness, with "autonomy" and "acceptance of illness" as the most important. Ten beliefs on coping with health care system were also identified, of which the most important was a professional relationship with the physician, based on mutual trust and respect between two equal partners. They argued that these beliefs represent idealized images of coping with illness and coping with the health care system.

Suls et al. (1997) studied the relationship between protective buffering (a style of coping in which the individual hides his /her concerns from spouse) and distress level among post-myocardial infarction (MI) patients and their spouses. Forty three male married MI survivors (aged 31-86 years) and their wives completed measures of psychological distress and
protective buffering at 4 week and 6 months post-hospital discharge. At both time periods, a greater propensity for protective buffering by the patient was related to higher levels of patients’ distress. Protective buffering by wife was also associated with higher levels of wife distress. In addition, patient buffering at 4 week predicted increased patient distress at 6 months. Results suggest that male MI patients who conceal their worries from their spouses adjust more poorly over time.

Dath et al. (1997) studied the efficacy of biofeedback induced relaxation and behavioral counseling in reducing anxiety related symptoms in coronary heart disease (CHD) cases. A single case study design with pre-post 2 years history of CHD in the age group of 35 to 45 years was administered to Hamilton’s Anxiety Rating Scale, Symptom Check List, and Jenkins Activity Survey-Form “C”. Therapy continued for 30 days with each case. Comparison of pre-post assessments revealed marked reduction in clinical symptoms and anxiety among the clients. Further, the therapy enhanced the client’s psychological well being and quality of life.

Schwarzer and Schroder (1997) have advocated that the quality of life after surgery can be improved by optimistic self-beliefs and social support. 248 patients undergoing heart surgery were surveyed once before and twice after surgery.
Study examined whether pre-surgical (Time 1) personal and social resources would predict quality of life 1 week after heart surgery (Time 2). Synergetic effects emerged upon degree of worry and mental activity as quality of life indicators. Study 2 examined resources of social network members. A sample of 114 significant others, most of them spouses, reported about their own resources at Time 1. Spouses’ optimistic self-beliefs and social support as measured at Time 1 predicted patients’ quality of life after half a year (Time 3).

Schwarzer and Schroder (1997) have advocated that coping with stressful events can be facilitated by personal and social resources, such as perceived self-efficacy and social support. This applies also to the adaptation to surgical stress and to severe diseases. 248 patients (mean age 58 years) were surveyed before and after heart surgery. Degree of worry, emotional states, reading activity, and physical activity were chosen as characteristics of the recovery process. Whether presurgical personal and social resources would predict readjustment after heart surgery was examined. Hierarchical regression analyses identified an interaction between the two resources underscoring the existence of the well-known support buffer effect. Covariance structure analysis revealed that perceived self-efficacy was a better predictor of recovery than
social support.

Fontana et al. (1998) used an anger-provocation paradigm to assess coping and stress reactivity during different phases of the menstrual cycle in 20 women with a positive parental history of cardiovascular disorders (mean age 39.5 years) and 14 women whose parents had no cardiovascular disease. Frequency of seeking social support in the natural environment was assessed, as were systolic and diastolic blood pressures, while the women performed anger-inducting arithmetic and speech-stressor task during the premenstrual and postmenstrual phases. Premenstrually, the women with a positive cardiac history sought support less frequently than those with a negative history. No differences were found between the groups postmenstrually. When the women were identified according to the frequency with which they sought social support, those who more often sought support registered lower baseline blood pressure levels than those women who less often sought support during both cycle phases.

Agrawal and Pandey (1998) examined the role of future orientation (FO) and optimism in coping with chronic diseases and in satisfaction with life (SWL). The sample comprised 44 middle class women (age 24-45) years (22 women were suffering from chronic diseases like cancer, diabetes,
cardiovascular disease or asthma, and 22 were normal healthy women). Story writing technique and semantic differential strategies were used. Findings indicate significant differences between the groups in FO and optimism. High FO patients portrayed an active positive, and optimistic future. There were differences in the coping techniques and expressed greater satisfaction with life.

Varma et al. (1999) conducted a study designed to score angina patients on stressful life events (SLE). Psychological distress experienced and coping behavior adopted were compared to the normal controls. The sample included 45 patients (30 male, 15 female; mean age 48 ± 6 years) of stable and unstable angina pectoris including 10 post-myocardial infarction patients. They were selected on the basis of clinical presentation and investigations. Thirty-five normal, age-matched controls without any psychiatric disease were also studied. Test materials used for collecting data included, Presumptive Life Events Scale (PALE), Coping Check List (CCL), General Health Questionnaire (GHQ), and Self Reporting Questionnaire (SRQ). PALE score was significantly higher in angina patients as compared to controls. Stress score for psychological distress too was higher in angina patients. Coping behavior was not significantly different; however,
angina patients used avoidance-positive and avoidance-negative approaches for coping more frequently than active cognitive approach. Angina patients had higher magnitude of stress during lifetime as compared to controls.

Ben-zur, Rappaport, Ammar, and Uretzky (2000) conducted a study in which a mail questionnaire was completed by 171 patients (aged 40-70 years) two to twenty months after undergoing Coronary Artery Bypass Graft Surgery (CABG). The post-CABG period was characterized by fewer working hours, a higher level of physical exercise, a reduction in smoking, and more appropriate nutritional habits, compared with the preoperational period. At the same time, the anxiety level of post-CABG patients was higher than that measured in a community sample. Post-CADG high psychological distress (anxiety and mood states) and low functional capacity was associated with high-levels of pessimism and ineffective emotion-focused coping strategies. These findings may be used by social workers in devising psychological interventions aims at improving post-CABG patients' quality of life and bolstering their coping strategies.

Piferi and Lawler (2000) examined the relationship of women's hostility to cardiovascular (CV) reactivity during stressful, interpersonal confrontations. Hostility level, coping
methods, and perceived social support were evaluated in 90, 17-41 year old female undergraduates. Blood Pressure (BP) and heart rate were monitored in the subjects during discussions with a disagreeing confederate. In 1st discussion, subjects were given positive feedback concerning their performance; in a 2nd discussion, they were given non-positive feedback on their effectiveness in expressing their views. Low hostile women displayed greater systolic BP and heart rate increases than high hostile women. In addition, the women showed greater systolic and diastolic BP reactivity during the positive feedback than during the non-positive feedback conditions. However, for diastolic BP, these results were qualified by an interaction, such that low hostile women displayed greater reactivity during positive feedback than during the non-positive feedback while high hostile women were equally reactive in both conditions. Assessment of coping styles indicated that high hostile women may be less reactive due to withdrawal and lack of engagement during the task, while low hostile women may show greater engagement, especially when encouraged by positive feedback.

Beresnevaite (2000) conducted a study in which 20 post myocardial infarction (MI) patients (19 men and 1 woman; mean age 51.75 years) were placed in a treatment group, which received weekly group psychotherapy for 4 months. 17 post MI
patients (16 men and 1 woman; mean age 48.47 years) were placed in a comparison group which received two educational sessions over a period of 1 month. Subjects completed the Toronto Alexithymia Scale (TAS) before the start of group therapy, at the end of the 4 months period and in follow-up assessment after 6 months, 1 year, and 2-year intervals. In the psychotherapy treatment group, there was a significant reduction in the mean TAS score following group therapy which was maintained over the 2-year follow-up period. In the educational group, there were no significant changes in mean TAS scores between the initial testing and any of the follow-up intervals. Over the 2-year follow-up period, patients with decreased alexithymia following group therapy experienced fewer cardiac events than patients whose Alexithymia remained unchanged.

Whittemore et al. (2000) examined the experiences of peer advisors participating in a social support intervention for single patients recovering from MI. Subjects were 10 actively involved peer advisors (aged 62+ years) previously experiencing MI who provided social support for a randomized component group of post-MI single elderly patients (mean age-76 years). Collected data included peer advisor logs, a focus group, and interviews with peer advisors. Results show that helping, mutual sharing,
committing, and benefitting were characteristics of peer experiences, with some negative aspects associated with many positive ones. Subjects found advising experiences generally meaningful. Primarily because of their personal experience of recovery from MI, peer advisors displayed a remarkable ability to relate to assigned subjects, offering a unique form of social support complementary to current health practices.

Dornelas et al. (2000) evaluated an intervention that consisted of brief inpatient counseling and follow-up telephone calls among 100, 27-83 year old cigarette smokers consecutively admitted during 1996 with MI. Subjects were assigned to minimal care or to a hospital-based smoking cessation program. Intervention consisted of bedside cessation counseling followed by 7 telephone calls over the 6 months following discharge. Primary outcomes were abstinence rates measured at 6 months and 1-year post discharge. Results show that at follow up, 42 and 34% of subjects in minimal care and 67 and 55% of subjects in intervention were abstinent at 6 and 12 months respectively. Abstinence rates were calculated assuming that subjects lost to attrition were smokers at follow-up. Low self-efficacy combined with no intervention resulted in a 93% relapse rate by 1 year. It is concluded that a hospital based smoking cessation program consisting of inpatient counseling
and telephone follow-up substantially increases smoking abstinence, 1 year after discharge in patients post-MI. Patients with low self-efficacy are almost certain to relapse without intervention. Such smoking cessation programs should be part of the management of patients with MI.

Newell, Bowman, and Cockburn (2000) critically reviewed literature about the effectiveness of interventions aims at improving cardiovascular patient compliance with non pharmacologic treatments. The authors searched the bibliographies of located studies; contacted Australian government departments and NGOs; and two experts examined the resulting study list. They selected 27 studies which randomly allocated patients to groups and were published. These trials were critically appraised against 8 methodologic criteria and classified as of good, fair, or poor quality. Information about target groups, samples, trial intervention strategies and their effectiveness were extracted from the 18 good- and fair-quality trials. Interater reliability was high on the 20% of references that were double-coded. The studies described the effectiveness of 27 intervention strategies at improving compliance with dietary, smoking cessation, exercise, weight-loss, stress-reduction, general lifestyle, relaxation, and blood-pressure screening programs. Partner-focused and structural
strategies showed the most consistent benefits; physician-focused strategies were unanimously unsuccessful; and patient focused strategies were of mixed benefit.

Garvin and Kim (2000) suggested that seeking information is a common coping strategy of patients facing a stressful event but people differ in how much information they want to help them in their coping process. Research-based practice related to patients' preferences for information is hampered by the lack of reliable, valid, and clinically useful instruments to measure preference for information. Also, it is important for researchers and clinicians to understand that preferences for information might differ in different cultures. These investigators determined the reliability and validity for three measures of preference for information: the Miller Behavioral Style Scale (MBSS), the Krantz Health Opinion Survey-Information subscales (KHOS-I), and the Preference for Information Scale. The subjects were 106 cardiac catheterization patients (37 from the US and 69 from South Korea). The MBSS and the KHOS-I were found to have fair-to-excellent reliability and fair-to-moderate convergent validity. The lack of a correlation of either of these instruments with Preference for Information Scale does not support convergent validity for that instrument.

Harenstam, Theorell, and Kaijser (2000) explored the
association among coping, psychosocial work factors, and signs of CHD among prison staff (777 men, 345 women). ECG recordings at rest, health examinations, and a questionnaire were used. A high level of covert coping in men and a low level of open coping in women showed the strongest association with signs of CHD. Among several traditional biological and lifestyle risk factors, only age and systolic blood pressure in men and none in the case of women were significantly associated with CHD signs in the final multivariate regression analyses. A coping style of repressed emotions and actions in anger-provoking situations, independent of traditional risk factors, seems to be associated with a prevalence of ECG signs in male and female prison staff.

Strizenec (2000) described that research concerning the effects of religion on coping with stressful situations has brought new specific data. In terms of theory and research, this subject area has been developed most by K.I. Pargament, who delineated three styles of religious coping: Self-directing, Deferring, and Collaborative. In a research project involving 228 adolescents (mean age 16 years) who completed Pargament's scale of religious coping, the authors confirmed the reliability for the Slovak translation of the above authors scale and found a prevalence of the collaboration with God coping.
style. Similar results were found in other smaller samples of subjects. The collaborative style is connected with intrinsic religious orientation.

Heilman and Witztum (2000) described the way that people for whom religion is at the heart of their cultural and personal life, try to cope with their problems via religious dogma or practice. He illustrates this through the three cases drawn from the ultra-Orthodox Jews of Jerusalem. The first describes a situation wherein religious beliefs and practices become the patient’s vehicle for configuring and articulating his disorder. The second and third illustrate a situation where religion provides a means for the believers to relate to and create a religious structure and meaning around it, and thus, help organize their lives and cope with the pain of their disorder. In all three cases, their religious beliefs and practices furnish these patients with the means of destigmatizing the illness and redefining it in acceptable religious narratives or spiritual terms. This in turn makes therapy and treatment personally and culturally acceptable for the therapist, the religious beliefs and practices offer help in identifying the disorder or act as agents in its treatment or even bases for rehabilitation. The authors suggest that understanding this complex relationship facilitates the therapeutic relationship
considerably.

Donker (2000) gave an overview of the current status of cardiac rehabilitation and its effects on morbidity and mortality. While there is an emphasis in most current programs upon physical exercise as an important autonomous risk factor for CHD, there is at the same time a tendency in cardiac rehabilitation to go beyond mere physical exercise towards adding more multimodal psychoeducational modules in rehabilitation programs; these approaches are aimed at educating the patient about a less risky and neat way of life. Such psychoeducation is more and more aimed at the "toxic" aspects of negative emotions. The in-between classic Type-A Behavior Pattern (TABP) might, in general, be less powerful in predicting later CHD morbidity or mortality than some specific emotional components of TABP, such as anger and hostility. The literature is reviewed as to risk factors and CHD and the role of negative affectivity in development and/or maintenance of CHD. Approaches for modification are discussed against the background of their effectivity in cardiac rehabilitation.

Jaarma et al. (2000) advocated that heart failure–related self-care behavior is important to optimize outcomes for patients with heart failure. Such behaviors include adherence to medication, diet, and exercise, but self-care also refers to such
things as seeking assistance when symptoms occur and daily weighing. Their study assessed the effects of education and support on heart failure-related self care behavior. Data were collected from 128 heart failure patients (mean age 72 years) during a hospital stay and at 1, 3 and 9-month follow-ups. The effects of intensive systematized and planned education from a nurse in hospital and at home were evaluated in an experimental design. Results showed that education enhanced self-care behavior significantly at 1 and 3 month follow-ups. Despite intensive education and support, patients did not manifest all self-care behaviors that might be expected. Patients in both the intervention and control groups described limitations in knowledge, judgment/decision-making, and skills. They concluded that supportive-educative intervention is effective in enhancing heart failure-related self-care behavior early after discharge. To optimize such intervention, more emphasis must be placed on behavioral strategies (self-medication), social support (from family members) and reinforcement (home visits).

Ng. Jenny and Tom (2000) adopted an experimental design with a nonequivalent, post test-only control group to study the rehabilitation outcomes of 152 persons who received cardiac surgery. 37 subjects (mean age 53.31 years) in a rehabilitation group participated in a 2-month exercise based cardiac
rehabilitation program, and another 115 subjects who did not attend the program formed the control group. The subjects' self-esteem was measured on the Adult Source of Self-esteem Inventory; their mobility skill was measured by a simple mobility test. Analysis of covariance indicated that the experimental group scored higher on positive self-esteem and showed significantly better improvement in mobility skill. The exercise-based cardiac rehabilitation program positively affected physical and psychological outcomes. Subjects' self-esteem was significantly correlated with their mobility skills among those aged under 60 years but not among those aged 60 or above.